AGRO-ECOLOGICAL ZONES

Background

Are natural physical regions which are in broad sense uniform in climate, physiography and soil patterns, for a generalised description and evaluation of agricultural potential and constraints (De Pauw 1984). Therefore “Agro-ecological zones” allow us to point out any particular aspects of environment that may constitute a significant resources or constraints to agriculture.

The first comprehensive map and description of agro-ecological zones (AEZs) in Tanzania w produced by Samki and Harrop 1981. A total of twenty (20) AEZs were distinguished based on:

- Soil types;
- Total annual rainfall and pattern (MonoVs Bimodal);
- Length of growing season (some of wet and moist months occurring in one period; and
- Altitude.

1984, De Pauw produced an up dated AEZs constituting of 63 AEZs. The same principals as in those used by Samki et al., 1984 were used:

- Country was divided into broad climate regions which are characterised by temperature regime and growing period characteristics. The later include information on reliability on the onset date and on the reliable length of growing period taking into account rainfall reliability and soil moisture storage.
- Next, subdivisions were made on the basis of physiographic regions, which are characterized in terms of genera; drainage condition ((e.g. upland or lowland, water shedding or water receiving), relief, altitude and occurrence of significant land degradation processes.
- Information on the major soils and soil associations, natural vegetation and major land use types were included in each AEZ.
- The sacale of AEZs map is 1:2,000,000

Methodology

Preparation of the national and districts agro-ecological zone were based on information by De Pauw 1984. Database in the GIS were created and linked with shape files which finally maps were produced. The important parameters for AEZs such as physiography/soils, altitude, rainfall amount and pattern and length of growing period were included in the legend for easy understanding and can be utilised by the agricultural officers in the district.

Out put

- National AEZs map at scale of 1:2,000,000
- Districts AEZs maps

- AEZs databases

Limitations

Some administrative boundaries for newly designated districts and regions were not available at our database hence some district were clipped together as one clip fro instance Muheza and Mkinga, Handeni and Kilindi, Hai and Siha etc.

Reference

De Puaw, 1984. Soils, Physiography and agro-ecological zones of Tanzania. Crop Monitoring and early warning systems project GCS/URT/047.NET. Ministry of Agricultural, Dar Es Salaam. Food and Agriculture organization of the United Nations.

Below is the national agro-ecological zones notes.

NATIONAL AGRO-ECOLOGICAL ZONES

COAST PLAINS

AEZ CODE	SUB ZONE -AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
C1	8,783	5-7	29-31 19-23	Nearly level to rolling plains of slope range 0-10%, developed on Quaternary, Neogene, Jurrasic and Cretaceous sediments. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure, and very low natural fertility; and moderately well to imperfectly drained, shallow to deep usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and moderate natural fertility.	< 200	1000-1200 Bimodal	2 dependable growing periods (DGP) per year. Variation of DGP length as function of soil moisture storage capcity and crop rooting habits. Duration is 3-4 months. Main DGP is March-April, while the secondary DGP is October – November. The zone has deep sandy soils with low AWC (30-80 mm/m) and moderate soil depth (1-2m). Poor to moderate moisture storing capacity (Smax 50-150mm)
C2	27,900	5-7	29-31 19-23	Nearly level to gently rolling plains and plateaux, slopes ranging from 0-10%, developed on Quaternary, Neogene, Jurrasic and Cretaceous sediment. Soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in subsoil and poor structure and with very low natural fertility; and moderately well to imperfectly drained, shallow to deep usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and moderate natural fertility.	< 500	800-1000 Monomodal	One DGP per year with duration of 3-4½ months, with variation of 3-4 weeks depending soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Soils have moderate to high AWC (80-150 mm/m) and favourable moisture storing characteristics (Smax 150-350 mm).
C3	6,310	5-7	29-31 19-23	Strongly dissected uplands and rolling to steep hills, slope range of 10-45%, developed on Jurassic, sandstones, shales, limestones, Paleogene limestone and marls and Neogene sandy clays. Soils are mainly well drained, moderately deep to deep, reddish and yellowish sandy clay loams and sandy clays, often with more sandy topsoils,	<500	800-1000 Monomodal	One DGP per year with duration of 3-4½ months, with variation of 3-4 weeks depending soil moisture storage capacity and crop rooting habits. Unreliable onset dates Soils in the zone are characterised to be of low to moderate AWC (80-100 mm/m) and poor to moderate moisture storing properties (Smax 50-150 mm) according to rainfall acceptanece.

				with weak structure and low natural fertility; and complex of rock outcrops, surface ironstone, very stony and very shallow soils; and important proportion of moderately well to imperfectly drained, shallow to deep, usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and moderately high natural fertility.			
C4	4,450	5.5-7	29-31 19-23	Flat, low altitude riverine floodplains (84%) and deltas (16%) with spatially and temporally varying flooding regimes and sedimentation patterns; mainly covered by young alluvial soils with variable drainage and flooding conditions. Dominant soils are well to moderately well drained, deep, brownish fine sands to sandy clay loams with high textural variability over short distances and highly stratified with more sandy or more clayey layers; and imperfectly to poorly drained, deep, (dark) grey, or grey brown clays, sandy clays or clay laoms often mottled and usually with more sandy horizons within the profile and moderate toposoil structure, with high natural fertility; and imperfectly to poorly drained, deep, coarse almost pure bleached sands often with finer texture overly usually with poor natural fertility	<200	1200-14000 Varible	Growing period mainly determined by flooding regime. The zone moisture characteristics is influenced by flood regimes, drainage variability,
C5	8,569	5-7	29-31 19-23	Flat to gently undulating plains, slope range 0-3% developed on old alluvial terrace no longer flooded. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in subsoil, weak structure and very low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with weak structure and very low natural fertility; and imperfectly to poorly drained due to flat topography and ponding above ironstone pans in subsoil (0-7 to 1.5 m deep) which prevent deep percolation and are able to maintain perched water tables stable enough rice cultivation.	< 200	1000-1200 Monomodal	One dependable growing period per year with duration of 3-4½months. Mainly covered by deep, medium to heavy textured soils with moderate to high AWC (80-150 mm/m) and favourable moisture storing properties (Smax 150-350 mm). Topographical favours runoff additions and promote flood risk.

C6	1,227	5-7	29-31 19-23	Nearly level to undulating and rolling plains developed on Neogene and Quaternary limestone, sandstones, marls, sands, clays. Soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in subsoil, weak structure and very low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands but with more clayey or stratified subsoils (sandy loams to sandy clays) with weak structure, somewhat higher organic matter content and very low natural fertility; and windblown sands patterned into dunes stabilized by vegetation.	<100	1600-2000 Monomodal	Long growing periods (5-10 months) depending on crop rooting habits and soil moisture storage characteristics. Onset dates are reliable. The physiographic units has low AWC (30-80 mm/m) and poor to moderate moisture storing capacity (Smax 50-150mm) but dry conditions are minimized by long rainy season.
C7	2,132	5-7	29-31 19-23	Nearly level to undulating and rolling plains developed on Neogene's and Quaternary limestone, sandstones, marls, sands, clays. Soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in subsoil, weak structure and very low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands but with more clayey or stratified subsoils (sandy loams to sandy clays) with weak structure, somewhat higher organic matter content and very low natural fertility; and windblown sands patterned into dunes stabilized by vegetation.	< 100	1400-1600 Bimodal	Two dependable growing periods (DGP), duration of 4-5 months for the main growing period with reliable onset dates and 1½ to 2½ for the secondary growing period with unreliable onset dates. Soil moisture properties same as C6.
EASTERN PLATEAUX AND MOUNTAIN BLOCKS							
EI	34,934	5-7	27-30 15-18	Mainly well drained, gently undulating to rolling plains and plateaux with altitude variability, developed on gneissic rocks, includes some poorly drained, flat and wide topographical depressions developed on young alluvium. Dominant soils are well drained, moderately deep to deep, dark reddish brown, yellowish red or red sandy clay loams and sandy clays with weak or moderate structure and low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with poor structure with very low natural fertility.	500 - 1200	400-500 Monomodal	One DGP per year with duration of less than 2 month, varying by less than 1 week in response to soil moisture storage properties and crop rooting habits. Onset dates are very unreliable. Soils are medium to heavy textured with moderate AWC (70-120mm/m) and poor moisture acceptance to due to surface sealing (Smax 40-60mm)

E2	39,134	5-7	27-30 15-18	Mainly well drained, gently undulating to rolling plains and plateaux, altitude 500-1200 m developed on gneissic rocks. There are poorly drained flat wide topographical depressions developed on young alluvium. Sloppy areas are strongly dissected, often rocky and severely eroded. Dominant soils are well drained, moderately deep to deep, dark reddish brown, yellowish red or red sandy clay loams and sandy clays with weak or moderate structure and low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with poor structure with very low natural fertility (Pare, Usambara and Lower Kilimnajaro)	500-1200	800-1000 Monomodal	One DGP per year with duration of 2 - 2½ months varying by less than 2 weeks in response to soil moisture storage capacity crop rooting habits. Unreliable onset dates. Soils are medium to heavy textured with moderate to high AWC (AWC 80-150 mm/m) but with poor moisture acceptance properties due to tendency for surface sealing (Smax 40-60 mm).
E3	30,332	4-7	29-31 19-23	Mainly well drained, flat to rolling plains, low altitude developed on intermediate metamorphic rocks. Major soils are well drained, moderately deep to deep, reddish and yellowish sandy clay loams and sandy clays, often with more sandy topsoil, with weak structure and low natural fertility; and somewhat excessively to moderately well drained, moderately deep to deep, reddish, brown or grey loamy sands, sandy loams and sandy clay loams with weak structure and low natural fertility; and well drained, moderately deep to deep, yellowish or reddish sandy clays with weak structure, very low to low natural fertility.	200-750	800-1000 Monomodal	Mainly one DGP 3 - 4½ months varying by 1-4 weeks depending on soil moisture storing properties and crop rooting habits. Onset dates are unreliable. Soil texture varies from medium to heavy textured alluvial with moderate to high AWC (80-150 mm/m) and favourable moisture storing properties (Smax 200-350mm). Natural soil fertility shows marked differences between sites, and soil acidity may be common
E4	8,463	4-7	29-31 19-23	Physiographic units range from well drained, level to rolling plains at low altitude (200-500m) to strongly dissected uplands and low hills transitional to mountains at altitude 500 – 1000 m; mainly developed on intermediate metamorphic rocks. Major soils are well drained, moderately deep to deep, yellowish or reddish sandy clays to clays with moderate to very low natural fertility.	200-1000	800-1000 Monomodal	One DGP per year which is 4½ to 6 month long, varying by 6 weeks depending soil moisture characteristics and crop rooting habits. Onsets are not reliable. In less dissected and less steep parts covered by well drained, deep clays, AWC is moderate (70-120 mm/m) and favourable moisture storing properties (Smax 200-400 mm). There are areas with soil toxicities which hinder root development and hence reduce ability of crop to extract stored soil moisture to (Smax 50-80 mm).
E5	15,291	5-7	29-31 19-23	Well drained, level to rolling plains at low altitude (200-500 m) developed on acid intermediate metamorphic rocks. Major soils are well drained, moderately deep to deep, reddish and yellowish sandy loams	200-500	800-1000 Monomodal	One DGP per year, with duration of 5-6 months, varying by 3-5 weeks depending on soil moisture storing properties and crop rooting habits. Onset dates are reliable. Soils are well drained, moderately deep, medium to heavy textured soils with moderate AWC (70-120mm/m) and poor moisture acceptance to due to surface sealing (Smax 40-60mm). Smax in areas without

				and sandy clays, often with more sandy topsoils. Other soils well drained, moderately deep to deep dark red to red, friable clays with moderate to strong structure and evidence of clay illuviation, with low natural fertility.			surface capping and or chemical barrier ranges from 150 – 300 mm.
E6	934	4-7	29-31 19-23	Well drained, undulating to rolling plains at low altitude (150-500 m) developed on intermediate metamorphic rocks. Major soils are well drained, moderately deep to deep, yellowish or reddish sandy clays to clays with moderate to low natural fertility, and some units low pH values with possibilities for aluminium toxicity.	150-500	1000-1200 Bimodal	Two DGP per year, with duration of 4-4½ months for the main growing period which has reliable onset dates and 2½ - 3 months for the short growing season, with unreliable onset dates, both varying by 2-3 weeks depending on soil moisture storage capacity and crop rooting habits. There is possibility of double cropping in many years. Soils are well drained, moderately deep, medium to heavy textured soils with moderate AWC (70-120mm/m) and poor moisture acceptance to due to surface sealing (Smax 40-60mm). Smax in areas without surface capping and or chemical barrier ranges from 150 – 300 mm.
E7	40,961	5-6½	27-30 15-18	Mainly well drained, flat to rolling plains, locally hilly at medium altitude (750-1300 m). 30% is strongly dissected uplands and low hills transitional to the medium altitude plateau. Major soils are well drained, moderately deep to deep dark red to red to friable clays with moderate to strong structure and evidence of clay illuviation. Natural soil fertility is low to moderate, with common problem of soil acidity.	800-1500	800-1000 Monomodal	One medium to long DGP with reliable onsets per year with duration of 5-7 months in most of the zone, varying by 1½-2 months depending on soil moisture storing capacity and crop rooting habits. Moderate moisture storing properties (good rainfall acceptance, lateral seepage water addition) poor to moderate water storing properties depending on the presence of chemical barriers (AWC 80-120 mm/m, Smax 30-70 with chemical barriers, Smax 100-300 without chemical barriers)
E8	1,777	5½ >8½	27-31 15-23	Flat (flood plains) alluvial plains with poorly drained, clayey soils, severely affected by salinity. Major soils are alkaline and saline with different colours, textures, structures, consistence and drainage but with fertility status and moisture storing properties adversely affected by presence of exchangeable sodium and or soluble salts at high levels enough to interfere with growth of most crops (ESP >15, pH>8½, EC>4), an important proportion of dark cracking clays of topographical depressions with moderate to high natural fertility.	1200	500-600 Monomodal	One DGP per year with onset date mostly determined by flooding regime. Soils are moderately well to imperfectly well drained, shallow to deep usually calcareous, with moisture storing properties with effective rooting depth restricted by impervious subsoil, AWC 150, Smax 75 – 150, often high ESP.
E9	7,701	≥ 7	29-31 19-23	Flat alluvial plains with homogenous sedimentation pattern. Major soils are imperfectly to poorly drained, deep, dark grey or grey brown, often mottled clays (clay 40-70%), more compact and contain fewer sandy strata. Natural fertility status is low to moderate.	400 - 500	800-1000 Monomodal	One DGP per year with duration of 4½ - 6½ months, varying by 2 months depending on soil moisture storing capacity and crop rooting habits. Onset dates are unreliable, and the growing period is influenced by rainfall ponding and runoff collection. Moisture storing properties less favourable due to poor internal drainage (AWC 150, Smax 150-225).
EI0	6,253	5½-7½	29-31 19-23	Flat alluvial plains with complex sedimentation pattern, subject to regular flood from braiding rivers. The	400-600	1400-1600 Monomdal	On non-flooding land, one DGP per year with duration of 5½ - 8 months, varying by 2½ months according to soil moisture storage capacity and crop rooting habits. Moisture storing properties ranges from moderate to high (more

				physiographic units are mainly covered by young alluvial, well to moderately well drained, deep, brownish fine sands to sandy clay loams with high textural variability over short distances and highly stratified with more sandy than more clayey layers, with high natural fertility. About 30% of the soils covering the unit are imperfectly to poorly drained, deep, dark grey or grey brown clays, sandy clays or clay loams often mottled, with high natural fertility.			stable water table, AWC 80-150 mm/m, Smax 150-300 m). Onset dates are not reliable.
EI1	3,357	5-7	27-31 15-23	Complex depressions composed of dissected ridges, fault scarps and alluvial plains; low to medium altitude. Mainly covered by well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth. Natural fertility is low to very low.	500-1000	1000-1200, Monomodal	One DGP per year with duration of 5 – 6 months, varying by 1 month depending on soil moisture storage capacity and crop rooting habits. Onset dates are reliable. Moisture storing properties ranges from low to moderate (AWC 50-80 mm/m, Smax 50-150 m). The soils have goof rainfall acceptance.
EI2	2,752	4½-7	22-25 10-15	Dissected, rolling to hilly mountains plateaux, slope range 10 – 40%, in parts affected by severe water erosion. Mainly covered by well drained, deep yellowish or reddish sandy clays with moderate to strong structure, with moderate natural fertility; and well drained, moderately deep to deep, yellowish or reddish sandy clays to clays with weak structure with very low to low natural fertility.	1000- 2000	2000-3500 Monomodal	One DGP per year duration of 5-6½ months, varying by 1½ months according to soil moisture storage capacity and crop rooting habits. Onset dates are unreliable. The soils have moderate AWC 70-120 mm/m and favourable moisture storing properties (Smax 200-400mm). Chemical barriers to root development may occur in some soils.
EI3	640	4½-7	22-25 10-15	Dissected, rolling to hilly mountain slopes and plateau, slope range 10-40%, slightly affected by soil erosion. Major soils are well drained, deep yellowish or reddish sandy clays to clays with moderate to strong structure and moderate natural fertility; and well drained, deep yellowish or reddish sandy clays to clays with weak structure and with low to very low natural fertility.	800-2000	>1200 Monomdal	One DGP per year but often transition from into next growing period without intermediate dry period. Duration 9-12 months, varying depending on soil moisture storage capacity and crop rooting habits, orographic factors and topography (runoff). Onset dates difficult to establish because of overlapping growing period. AWC (80-120 mm/m) moderate and moisture storage capacity is favourable (Smax 200-400 mm)
EI4	2,976	4½-7	22-25 10-15	Mainly 67% of the physiographic units are very strongly dissected mountain block with steep to very steep slopes (15-60%), narrow valleys; altitude 1000 – 2000 m; includes 33% of strongly dissected foothills at low altitude (500-1000 m). Zone, particularly foothills, strongly affected by soil creep, gully erosion and landslides. Major soils are well drained, deep yellowish or reddish sandy clays to clays with moderate to strong structure and moderate natural fertility; and	500-2000	1000-1200 Monomdal	One DGP per year but often transition from into next growing period without intermediate dry period. Duration 5½ - 7 months, varying depending on soil moisture storage capacity and crop rooting habits. Onset dates difficult to establish because of overlapping growing period. AWC (80-120 mm/m) moderate and moisture storage capacity is favourable (Smax 200-400 mm)

				well drained, deep yellowish or reddish sandy clays to clays with weak structure and with low to very low natural fertility			
EI5	1,920	4½-7	22-30 10-18	Dissected, rolling to hilly mountain slopes and plateau slope range 10-40%, in parts affected by severe water erosion and landslides. Mainly covered by well drained, deep yellowish or reddish sandy clays with moderate to strong structure, with moderate natural fertility; and well drained, moderately deep to deep, yellowish or reddish sandy clays to clays with weak structure with very low to low natural fertility.	800-1700	1000-1200 Monomodal	One DGP per year duration of 5-6½ months, varying by 1½ months according to soil moisture storage capacity and crop rooting habits. Onset dates are unreliable. The soils have moderate AWC 70-120 mm/m and favourable moisture storing properties (Smax 200-400mm). Chemical barriers to root development may occur in some soils.

HIGH PLAINS AND PLATEAUX							
HI	13,137	5-7	22-25 10-15	Mainly flat and undulating to rolling plains and plateaux at high altitude, developed on granites and gneisses. Major soils are well drained, deep yellowish or reddish sandy clays to clays with moderate to strong structure, with moderate natural fertility; and well drained, moderately deep to deep, reddish and yellowish sandy loams and sandy clays, often with more sandy topsoils, with weak structure and low natural fertility.	1500-2000	600-1600 Monomdal	One DGP per year with duration of 5-6 months depending on soil moisture storage capacity and crop rooting habits. The zone has reliable onset dates, moderate AWC (120 mm/m) and favourable moisture storing properties (Smax 300-400 m).
H2	6,989	5-7	22-25 10-15	Undulating to rolling plains at the high altitude developed on granites. Major soils are well drained, deep yellowish or reddish sandy clays to clays with moderate to strong structure, with moderate natural fertility; and well drained, moderately deep to deep, reddish and yellowish sandy loams and sandy clays, often with more sandy topsoils, with weak structure and low natural fertility.	1500-2100	1400-1600 Monomodal	One DGP per year with duration of 6-9 months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates, moderate AWC (120 mm/m) and favourable moisture storing properties (Smax 300-400 m).
H3	13,137	4½-7	22-25 10-15	Mainly strongly dissected hills and mountains at high altitude strongly susceptible to erosion and landslides. Major soils are well drained, moderately deep to deep, reddish and yellowish sandy loams and sandy clays, often with more sandy topsoils, with weak structure and low natural fertility.	1500-2300	1000-1400 Monomodal	One DGP per year with duration of 6-9 months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates, moderate AWC (120 mm/m) and favourable moisture storing properties (Smax 300-400 m).

H4	658	5½-7½	29-31 19-23	Flat to very gently undulating lacustrine plain at low altitude. Major soils are imperfectly to poorly drained, deep, dark grey or grey brown clays, sandy clays or clay loams often mottled; high natural fertility; and well to moderately well drained, deep, brownish fine sands to sandy clay loams with high textural variability over short distances and highly stratified with more sandy or more clayey layers. High natural fertility.	500	1600-2400 Mnonomdal	One DGP per year, often merging into next without intermediate dry period. Duration DGP 8-10 months, varying depending soil moisture storage capacity and crop rooting habits. Onset dates difficult to determine because of overlap of growing periods. AWC is moderate to high (80-150 mm/m) with moderate to high soil moisture storing properties (Smax 150 – 300 mm)
H5	9,300	5-7	22-25 10-15	Volcanic landforms ranging from undulating to rolling, medium to high altitude plains and plateaux; to strongly dissected hills, mountains, plateaux and plains at medium altitude. Major soils are well drained, deep, dark grey brown loamy sands, sandy loams and loams rich in allophanic clays with weak structure, low bulk density and with high natural fertility; and well drained, deep yellowish or reddish sandy clays to clays with moderate to strong structure with moderate natural fertility.	1200-2400	1000-2000 Monomodal	One DGP per year, increasing in duration from 6-9 months to 9-12 months, depending on altitude and soil moisture storage capacity. Onset dates difficult to determine because of overlap of growing periods. Soil moisture characteristics vary between physiographic units ranging from moderate to high AWC (100-200 mm/m) with favourable moisture storing properties (Smax 300-400).
H6	790	5-7	16-19 5-10	Undulating to hilly plateau at very high altitude, developed on volcanic ash and pumices, covering basement complex and volcanic rocks. Major soils are well drained, deep, dark grey brown loamy sands, sandy loams and loams rich in allophanic clays with weak structure, low bulk density and with high natural fertility; and well drained, deep yellowish or reddish sandy clays to clays with moderate to strong structure with moderate natural fertility	2300-2700	1000-1200 Monomodal	One DGP per year, often merging into next without intermediate dry period. Duration DGP 8-10 months, varying depending soil moisture storage capacity and crop rooting habits. Onset dates difficult to determine because of overlap of growing periods. Mainly covered by volcanic ash soils with high AWC (100-200 mm/m) and very favourable moisture storing properties.
H7	18,438	4½-7	22-25 10-15	Mainly mountainous topography at high altitude, either with extensive, undulating to hilly plateau crests or strongly dissected with limited plateau crests. Major soils are well drained, deep yellowish or reddish sandy clays to clays with moderate to strong structure with moderate natural fertility and complex of rock outcrops, surface ironstone, very stony soils and very shallow soils.	1500-2300	800-1000 Monomodal	One DGP per year with duration of 5-7 months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils have moderate AWC (120 mm/m) and favourable moisture storing properties (Smax 300-400).
VOLCANOES AND RIFT DEPRESSIONS							
N1	6,114	4½-7	22-25 10-15	Mainly rolling to hilly, dissected plateaux at high altitude developed on volcanic ash,	1500-2500	500-700 Monomodal	One DGP per year with duration of 3-5 months depending on soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Moderate to

				lavas and on gneisses. Mainly covered by heterogeneous soil types with important proportions of fertile, well drained, deep yellowish or reddish sandy clays to clay with moderate to strong structure developed on volcanic ash and lavas, and strongly weathered, heavy – textured soils of low to medium fertility.			high AWC (70-150 mm/m) and favourable moisture storing properties (Smax 200-400).
N2	1,060	6½-7	16-19 5-10	Rolling to hilly, high altitude with calderas and volcanic cones. Major soils are well drained, deep, dark brown non-calcareous loams, silty loams and clay loams with moderate structure, high natural fertility with proportion of shallow soils which are complex of rock outcrops, surface ironstone, very stony soils and very shallow soils; and shallow, stony, black sandy loams to sandy clay loams developed on lavas and lahars.	2000-2500	800-1000 Monomodal	One DGP per year with duration of 3-5 months depending on soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Moderate to high AWC (70-150 mm/m) and favourable moisture storing properties (Smax 200-400).
N3	3,686	>8½	27-30 15-18	Flat lacustrine plains at medium altitude, with extensive salt and soda flats, often inundated. Major soils are of varying colour, texture, structure, consistence and drainage but with fertility status and moisture storing properties adversely affected by presence of exchangeable sodium and/or soluble salts at levels that are high enough to interfere with growth of most crops (ESP>15, pH>8.5, EC>4. Also, moderately well to imperfectly drained, shallow to deep usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and moderate to high natural fertility. Often high ESP in subsoil.	900 -1100	400-500 Monomodal	Very short to short growing periods, adversely influenced by dominance of salts in soil. The zone is mainly covered by salt affected soils with important proportion of dark cracking clays of topographical depressions with moderate moisture storing properties.
N4	3,159		16-30 5-10	Volcanic mountains with gentle to steep ash and lava slopes stretching from medium (900-1600 m) to high altitude (2000-3500 m). Major soils are well drained, deep, reddish friable or firm clay loams and clays with strong structure with high natural fertility and accumulation of partly decayed plant material in permanent swamps or alpine meadows.	900-3500	500-1400 Monomodal	One DGP per year with duration increasing from 3-5 months to 6-11 months with altitude, soil moisture storage capacity and crop rooting habits. Onset dates are unreliable. The zone mainly covered by volcanic ash soils with low to moderate AWC (50-100 mm/m) and moderate moisture storing properties (Smax 100-200).
N5	4,544	6½-8½	27-30 15-18	Mainly flat to rolling plains at medium altitude, developed on volcanic ash and sediments. Major soils are well drained, shallow to deep, dark brown or dark grey calcareous sandy loams with weak structure with moderate natural fertility; and well	1300-1700	600-1200 Monomodal	One DGP per year with duration decreasing toward south from 4-6 months to 2-2½ months. Unreliable onset dates. The zone mainly covered by volcanic ash soils with low to very high AWC (50-200mm/m) and moderate to very favourable (high) moisture storing properties (Smax 100 – 600mm).

				drained, deep, dark grey or brown loamy sands, sandy loams and loams rich in allophanic clays with weak structure, low bulk density and high natural fertility.			
N6	6,127	6½-8½	27-30 15-18	Mainly flat to rolling plains at medium altitude, developed on volcanic ash or lava or lahars. Soils are heterogeneous with important proportions of shallow soils, well drained, dark (sandy) loams on volcanic ash and pumice and dark cracking clays of topographical depressions.	1300-1700	400-500 Monomodal	One DGP per year with duration of less than 2 - 2½ months depending on soil moisture storage capacity and crop rooting habits and exposure to rain shadow effect of Mt Kilimanjaro and Mt Meru. Onset dates unreliable, with low to moderate AWC (50-100 mm/m) and moderate soil moisture storing properties (Smax 100-200 mm).
N7	10,926	6½-8½	22-30 10-18	Level to rolling plains medium to high altitude, developed on slightly weathered volcanic ash. Major soils are well drained, shallow to deep, dark brown or dark grey calcareous sandy loams with weak structure with moderate natural fertility; and well drained, deep, dark grey or brown loamy sands, sandy loams and loams rich in allophanic clays with weak structure, low bulk density and high natural fertility	1300-1800	500-800 Monomodal	One DGP per year with duration of 2 - 3½ months depending on soil moisture storage capacity and crop rooting habits and exposure to rain shadow of Ngorongoro highlands. Onset dates unreliable. Soils developed from volcanic ash with characterized by moderate AWC (50-100 mm/m) and moderate moisture storing properties (Smax 100-200).
N8	9,610	6½-7	22-30 10-18	Level to undulating or rolling plains at medium to high altitude developed on volcanic ash and sediments, often with steep hills. Major soils are well drained, deep, dark brown non-calcareous loams, silty loams and clay loams with moderate structure with high natural fertility; and moderately well to imperfectly drained, shallow to deep mostly calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure with high natural fertility.	1300-2300	800-1000 Monomodal	One DGP per year with duration of 3-3½ months, varying depending on soil moisture storage capacity and crop rooting habits. Onset dates are unreliable. Volcanic ash soils, mostly well drained clays with moderate to high AWC (70-150 mm/m) and favourable moisture storing properties (Smax 200-400 mm).
N9	2,675	7-8½	22-30 10-18	Undulating plains at medium to high altitude, developed on sodic volcanic ash. Major soils are well drained, deep, reddish friable or firm clay loams and clays with strong structure and high natural fertility; and moderately well to imperfectly drained, mostly calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure with high natural fertility.	1100-1800	600-800 Monomodal	One DGP per year with duration of 3-3½ months, varying depending on soil moisture storage capacity and crop rooting habits. Onset dates are unreliable. Soils are heavy textured with high sodicity and poor moisture storing properties (Smax 30-50).
N10	724	5-6½	22-25 15-18	Undulating to rolling plateaux and plains of medium to high altitude, developed on lavas and granites. Major soils are well drained, deep yellowish or reddish sandy clays to clays with moderate to strong structure,	1500-1800	1400-1600 Monomodal	One DGP per year with duration of 6½ - 9½ months depending on soil moisture storing properties and crop rooting habits. Onset dates difficult to determined due to overlap of growing periods. Covered by soil with moderate to high AWC (70-150 mm/m) and favourable moisture storing capacity (Smax 200-400 mm).

				with very low to low natural fertility; and well drained, moderately deep or deep yellowish or reddish sandy clays to clays with weak structure and moderate natural fertility; well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with weak structure and low natural fertility.			

CENTRAL PLATEAUX (PLAINS)							
PI	7,995	5-7	27-30 15-18	Mainly gently undulating plains with some rocky hill-footslope association at medium altitude, developed on granites. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are complexes of rock outcrops, surface ironstone, very stony, and very shallow (< 25 cm); and good proportion of well drained, very shallow to moderately deep, black or dark grey sandy loams to sandy clay loams with strong topsoil structure and high natural fertility.	1100 - 1300	600-700 Monomodal	One DGP per year with duration of 2-2½ months depending soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Soils are generally moderately deep sandy or loamy with low to moderate AWC (30-100 mm/m) and poor moisture storing properties mostly for sandy and loamy soils susceptible to surface capping (Smax 50-150mm); and favourable for other loamy soils (Smax 150-300 mm).
P2	50,093	5-7	27-30 15-18	Mainly gently undulating plains, for the most part well drained, at medium altitude, developed on granites and gneisses. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are complexes of rock outcrops, surface ironstone, very stony, and very shallow (< 25 cm); and moderately well to imperfectly drained, shallow to deep frequently calcareous, black, dark grey or brown cracking clays often overlying paler	1100-1300	550-600 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils are generally moderately deep sandy or loamy with low to moderate AWC (30-100 mm/m) and poor moisture storing properties mostly for sandy and loamy soils susceptible to surface capping (Smax 50-150mm); and favourable for other loamy soils (Smax 150-300 mm). In some units with salt affected soils effective soil depth is restricted by impervious subsoil, often high ESP.

				subsoil with ephemeral structure and high natural fertility.			
P3	42,662	5-7	27-30 15-18	Mainly gently undulating plains, for the most part well drained, at medium altitude, developed on granites and gneisses. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are complexes of rock outcrops, surface ironstone, very stony, and very shallow (< 25 cm); and moderately well to imperfectly drained, shallow to deep frequently calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and high natural fertility.	1100-1300	600-1000 Monomodal	One DGP per year with duration of 4-5 months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils are generally moderately deep sandy or loamy with low to moderate AWC (30-100 mm/m) and poor moisture storing properties mostly for sandy and loamy soils susceptible to surface capping (Smax 50-150mm); and favourable for other loamy soils (Smax 150-300 mm). In some units with salt affected soils effective soil depth is restricted by impervious subsoil, often high ESP.
P4	27,545	5-7	27-30 15-18	Mainly flat to gently undulating plains with scattered hill-footslope associations at medium altitude, developed on granites, banded ironstones and young alluvium. Soils exhibit heterogeneous pattern with important proportions of well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are complexes of rock outcrops, surface ironstone, very stony, and very shallow; and moderately well to imperfectly drained, shallow to deep frequently calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and high natural fertility.	1200-1300	800-1000 Monomodal	One DGP per year with duration of 3½-5 months depending on soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Soils are moderately deep to deep with low to moderate AWC (50-100 mm/m) that may present 'chemical barriers' (e.g. salts) to root development in which case moisture reserve that can be used by crops is very low (Smax 30-50 mm). Where no chemical barriers exist, the moisture storing properties are moderate (Smax 100-200 mm).
P5	67,855	5-7	27-30 15-18	See P3	1100-1300	800-1000 Monomodal	One DGP per year with duration of 5-6 months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils are generally moderately deep sandy or loamy with low to moderate AWC (30-100 mm/m) and poor moisture storing properties mostly for sandy and loamy soils susceptible to surface capping (Smax 50-150mm); and favourable for other loamy soils (Smax 150-300 mm). In some units with salt affected soils

							effective soil depth is restricted by impervious subsoil, often high ESP.

P6	30,079	5-7	27-30 15-18	Mainly undulating plains and plateaux developed on sandstones, shales and quartzites medium altitude. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, deep, reddish or brown sandy loams and sandy clay loams and sandy clays often with more sandy topsoil, weak structure and low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with poor structure and very low natural fertility.	800-1800	850-1700 Monomodal	One DGP per year with duration of 6-8½ months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils are heterogeneous with low to moderate AWC (50-100 mm/m) and poor to moderate moisture storing properties (Smax 30-150 mm).
P7	6,253	7-8½	27-30 15-18	Flat to very gently undulating plains developed in old lake sediments. Major soils are well to moderately well drained, shallow to moderately deep, grey or brown, friable calcareous clay loams and clays, with moderate to strong structure and high natural fertility; and imperfectly drained, shallow, dark grey or brown sands to sandy clays with hardpan within 50 cm from the surface, often calcareous and sodic in the subsoil (ESP 10-15) with moderate natural fertility.	1000-1100	600-800 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Soils are shallow to moderately deep (0.5 – 1.5 m) friable clays with high AWC (150). Favourable moisture storing properties (Smax 200-250).
P8	38,496	6½-7	27-30 15-18	Flat to gently undulating plains developed partly on granites, partly on old colluvium; medium altitude. Major soils are imperfectly drained, shallow, dark grey or brown sands to sandy clays with hardpan within 50 cm from the surface, often calcareous and sodic in the subsoil (ESP 10-15) with moderate natural fertility; and moderately well to imperfectly drained, shallow to deeper, usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and with high natural fertility; and well drained, moderately deep to deep, red or brown often gravely, sandy loams and sandy clay loams, with weak structure and low natural fertility.	1000-1200	600-1200 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storage capacity and crop rooting habits. Onset dates unreliable. The zone mainly covered by hardpan soils with poor moisture storing properties AWC (30-100), with important proportions of dark cracking clays of topographical depressions with moderate moisture storing properties AWC 150 mm/m; Smax 75-150 mm; and sandy and medium textured with moderate to high moisture storing properties (AWC 50 – 100 mm/m; Smax 50-300 mm).
P9	6,180	4-6	27-30	Mainly gently undulating to plains formed	1100-1400	500-600	One DGP per year with duration of 3-3½ months depending on moisture storage

			15-18	on 'continental deposits' overlying granites. Major soils are somewhat excessively to moderately well drained, moderately deep to deep, reddish, brown or grey loamy sands, sandy loams and sandy clay loams with poor structure with very low natural fertility; and well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with weak structure and low natural fertility.		Monomodal	capacity and crop rooting habits. Reliable onset dates. Heterogeneous soils with dominance of light and medium textured soils with poor to moderate moisture storing properties (AWC 50-100 mm/m; Smax 50-200 mm) without chemical barriers.
PI0	10,114	4-6	27-30 15-18	Gently undulating plains formed on 'continental deposits' overlying granite. Major soils are somewhat excessively to moderately well drained, moderately deep to deep, reddish, brown or grey loamy sands, sandy loams and sandy clay loams with poor structure with very low natural fertility; and well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility	1100-1400	600-800 Monomodal	One DGP per year with duration of 3-3½ months, depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils are mainly moderately deep with low to moderate AWC (50-100 mm/m) that may present chemical barriers to root development in which case moisture reserve that can be used by crop is very low (Smax 30-50 mm). Where on chemical barriers exist, the moisture storing properties are moderate (Smax 100-200 mm).
PI1	4,146	6½-7	27-30 15-18	Flat plains at medium altitude developed mainly on alluvium. Major soils are imperfectly drained, shallow, dark grey or brown sands to sandy clays with hardpan within 50 cm from the surface, often calcareous and sodic in the subsoil (ESP 10-15) with moderate natural fertility; and soils of varying colour, texture, structure, consistence and drainage but with fertility status and moisture storing properties adversely affected by presence of exchangeable sodium and/or soluble salts at levels that are high enough to interfere with growth of most crops (ESP>15, pH>8.5, EC>4	900	400-600 Monomodal	For upland areas comparable to those of zone P10 above. However most of the zone DGP is influenced by flooding, water-logging, runoff losses or additions and presence of salinity.
PI2	4,568	5½ - 9	27-30 15-18	Flat seasonally inundated, lowland plains developed on young alluvium. Major soils are moderately well to imperfectly drained, shallow to deep often calcareous, black, dark grey or brown cracking clays mostly overlying paler subsoil with ephemeral structure and high natural fertility; and imperfectly drained, shallow, dark grey or	900-1200	600-700 Monomodal	DGP varies with Physiography. For upland areas one DGP per year with duration of 3-3½ months depending soil moisture storing capacity and crop rooting habits. For most of the zone growing period in determined by duration of depth of flooding. Soil moisture storage is poor to moderate AWC 30-150 mm/m, Smax 75-150 mm.

				brown sands to sandy clays with hardpan within 50 cm from the surface, often calcareous and sodic in subsoil (ESP 10-15), with moderate natural fertility.			
PI3	17,216	5 - 8½	27-30 15-18	Flat, seasonally inundated lowland plains with important proportion of permanent or semi-permanent swamps. . Major soils are moderately well to imperfectly drained, shallow to deep often calcareous, black, dark grey or brown cracking clays mostly overlying paler subsoil with ephemeral structure and high natural fertility; and imperfectly to poorly drained, deep, non-calcareous, grey or brown sandy loams to sandy clays with strongly mottled and compact subsoil but with more sandy, more friable and darker toposoil. Moderate natural fertility; sodic subsoil possible.	900-1200	800-1000 Monomodal	DGP varies with Physiography. For upland areas, one DGP per year with duration of 5-6 months depending on soil moisture storage capacity and crop rooting habits. However, in most of the zone, growing period condition determined by duration and depth of flooding.
RUKWA - RUAHA RIFT ZONE - ALLUVIAL FLATS							
RI	17,461	>8½	27-30 15-18	Mainly flat plains covered by riverine or lacustrine alluvium, strongly affected by salinity or sodicity and by variable flooding conditions, medium altitude, mostly below 1000 m. Mainly covered by salt affected soils which are soils of varying colour, texture, structure, consistence and drainage but with fertility and moisture storing characteristics adversely affected by presence of exchangeable sodium and/or soluble salts at levels that are high enough to interfere with growth of most crops (ESP>15, pH>8.5, EC>4); and well drained, moderately deep to deep, reddish and yellowish sandy clay loams and sandy clays, often with more sandy topsoil, weak structure and low natural fertility; and well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with weak structure and very low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with weak structure and very low natural fertility.	900 - 1200	850-1300 Monomodal	One DGP per year with duration of 5-6 months around Lake Rukwa and 6-9 months in the Northwest (Karema depression). Growing period in the zone varies with rain-shadow effects in the lee of hill ranges or escarpments and variable flooding conditions. Reliable onset dates. Major soils covering the zone are characterized with moderate to high AWC (80-150 mm/m) and moderate to high moisture storing properties (Smax 150-350 mm). In 35% of the zone the ability of crops to extract moisture is negatively affected by strong salinity or alkalinity.

R2	4,619		27-30 15-18	Flat to very gently undulating plains covered by lacustrine alluvium or by alluvial fans, levees, piedmonts and tributaries floodplains, medium altitude mostly below 1000 m. Major soils are imperfectly to poorly drained, deep, dark grey or grey brown, often mottled clays. They have usually higher clay content than the young alluvial clays (clay % 40-70), are more compact and contain fewer sand strata, contain sodicity and soluble salts in subsoil, and usually lower natural fertility; and salt affected soils with varying colour, texture, structure, consistence and drainage but with fertility and moisture storing characteristics adversely affected by presence of exchangeable sodium and/or soluble salts at levels that are high enough to interfere with growth of most crops (ESP>15, pH>8.5, EC>4);	800 - 1200	800-1200 Monomodal	One DGP per year with duration of 4-5 months depending on soil moisture storing capacity and crop rooting habits. Actual growing period is strongly influenced by flooding regime and salinity and highly variable in the zone. Reliable onset dates. Soils covering the zone exhibits moderate to high AWC (80-150 mm/m) and moderate to high moisture storing properties (Smax 150-350 mm). Ability of crops to extract moisture is negatively affected by strong salinity or alkalinity
R3	2,688	>8½	27-30 15-18	Complex terrain, formed partly by flat to very gently undulating plains of lacustrine origin and partly by undulating plains of very old surface, at medium altitude. Covered by heterogeneous soils, ranging from sodic salt affected soils with varying colour, texture, structure, consistence and drainage but with fertility and moisture storing characteristics adversely affected by presence of exchangeable sodium and/or soluble salts at levels that are high enough to interfere with growth of most crops (ESP>15, pH>8.5, EC>4); well drained, moderate deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams depth with weak structure and very low natural fertility; and hardpan soils, and seasonally waterlogged soils with moderate fertility.	900-1400	600-1000 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storing capacity and crop rooting habits. Reliable onset dates. Heterogeneous soils with low to moderate moisture storing properties and seasonally waterlogged soils. ,

R4	1,514	5½-7	27-30 15-18	Flat plains covered by riverine alluvium and regularly flooded, with complex sedimentation pattern; medium altitude. Dominant soils are well to moderately drained, deep, brownish fine sands to sandy clay loams with high textural variability over short distances and high stratified with more sandy or clayey layers. High natural fertility; and imperfectly to poorly drained, deep, dark grey or grey brown clays, sandy clays or clay loams often mottled and usually with more sandy horizons within the profile and moderate topsoil structure and high natural fertility.	800-1000	1200-1400 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storing capacity and crop rooting habits. Reliable onset dates. In most of the zone growing period mainly determined by flooding regime which shows considerable spatial and temporal variability. The zone is mainly covered by heavy textured soils with moderate to high AWC (80-150 mm/m) and moderate moisture storing properties (Smax 150-350 mm).
INLAND SEDIMENTARY SEDIMENTS							
SI	11,136	5-7	29-31 19-23	Mainly gently undulating to rolling plateaux developed on Karroo sandstones and Neogene sandy sediments; low altitude. Major soils are well drained, moderately deep to deep, red, yellowish or red or orange sands and loamy sands with sands with sandy loams in depth, with weak structure and very low natural fertility; and important proportion of moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with weak structure and very low natural fertility.	200-500	800-1000 Monomodal	One DGP per year with duration of 3-4½ months, varying by 3-4 weeks depending on soil moisture storing capacity and crop rooting habits. Unreliable onset dates. The zone is covered by well drained loamy sands with low fertility and poor to moderate moisture storing properties.
S2	51,5992	5-7	27-31 15-23	Mainly gently undulating to rolling plateaux developed on Karroo sediments. Some parts of the zone strongly dissected terrain. Dominant soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, weak structure and very low natural fertility; and proportion of moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with weak structure and very low natural fertility	200-1000	1000-1200 Monomodal	One DGP per year with duration of 5-7 months, varying by 1-2 months depending on soil moisture storing capacity and crop rooting habits. Reliable onset dates. The zone is mainly covered by moderately deep sandy and loamy soils with low to moderate AWC (50-80 mm/m) and poor to moderate moisture storing properties.
UFIPA PLATEAU							
U	16,654	5-7	22-25 10-15	Complex of flat to gently undulating plains developed on various parent rocks (gneiss, schist, sandstones, acid volcanics, and granites) but mostly well drained and located at high altitude. Major soils are well drained, moderately deep to deep, reddish and yellowish sandy clay loams and sandy clays,	800-1800	800-1200 Monomodal	One DGP per year with duration of 5-6½ months depending on soil moisture storage capacity and crop rooting habits. In the northwest corner of the zone growing period may be 6-8½ months. Reliable onset dates. The zone is mainly covered by (moderately) deep sandy and loamy soils with low to moderate AWC (30-100 mm/m) and poor to moderate moisture storing properties (Smax 50-300 mm).

				often with more sandy topsoil, weak structure and low natural fertility; and well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, weak structure and very low natural fertility; and important proportions of moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with poor structure and very low natural fertility.			
WESTERN HIGHLANDS							
W1	8,688	4-7	22-25 10-15	Mainly strongly dissected hills formed by parallel ridges of sandstone and quartzites and deep, broad or narrow valleys developed on phyllites, often with permanent samps at high altitude. Major soils are well drained, moderately deep or deep, yellowish or reddish sandy clays to clays with weak structure and very low to low natural fertility; and complex of undifferentiated very shallow soils (< 25 cm deep) with rock outcrops.	1300-1800	1000-1500 Monomodal	One DGP per year often merged into the next, with duration of 7-9 months depending on soils moisture storage capacity and crop rooting habits. Unreliable onset dates. Major soils are well drained, clayey soils with moderate AWC (70-120 mm/m) and with favourable moisture storing properties (Smax 200-400 mm). Existence of chemical barriers may hamper utilisation of soil moisture reserves (Smax 50-80 mm).
W2	13,427	4-7	22-25 10-15	Dissected hilly plateaux developed on basalt, argilclaceous sandstones and shales, with flat or gently undulating tablelands bounded by steep scarps and valleys often strongly affected by erosion, at high altitude. Mainly covered by equal proportions of heavy – textured soils with high organic matter contents which are well drained, moderately deep or deep, yellowish or reddish sandy clays to clays with weak structure and very low to low natural fertility; and well drained, deep yellowish or reddish sandy clays to clays with moderate to strong structure and moderate natural fertility.	1500-1700	1000-1500 Monomdal	One DGP per year with duration of 6½ - 8 months depending on moisture storage capacity and crop rooting habits. Reliable onset dates. Major soils are well drained, clayey soils with moderate AWC (70-120 mm/m) and with favourable moisture storing properties (Smax 200-400 mm). Existence of chemical barriers may hamper utilisation of soil moisture reserves (Smax 50-80 mm).
W3	6,690	5-7	27-30 15-18	Mainly undulating to rolling plains and plateaux with resistant quartzite ridges often broken by steep escarpments, high altitude, developed on sandstones, often more dissected and hilly with parallel ridges and intervening narrow valleys. Major soils are mainly equal proportions of sandy soils and heavy-textured soils with strong acidity which are well drained, moderately deep to deep, red, yellowish red or orange sands and	1200-1600	800-1000 Monomodal	One DGP per year with duration of 4-5 months depending on soil moisture storing capacity and crop rooting habits. Unreliable onset dates. The zone is mainly covered by sandy and loamy soils with low to moderate AWC (50-100 mm/m) and with moderate moisture stroing properties (Smax 100-200 mm). Chemical barriers may prevent roots to utilize moisture reserves (Smax 50-80 mm).

				loamy sands with sandy loams in depth, and weak structure and very low natural fertility; and, well drained, deep, reddish or brown sandy loams and sand clay loams with weak structure and very low natural fertility; and accumulation of partly decayed plant materials in permanent swamps or alpine meadows.			
W4	10,622	4-7	27-30 15-18	Undulating to rolling upland plains developed on phyllite with protruding ridges of quartzite capped ironstone. Include a large flat to undulating central valley developed on alluvium and colluvium derived phyllites. Contains also flat riverine plain regularly flooded. Major soils are well drained, moderately deep or deep, yellowish or reddish sandy clays to clays with weak structure and very low to low natural fertility; and complex of undifferentiated very shallow soils (< 25 cm deep) with rock outcrops; and well drained, young and fertile alluvial soils, sandy and loamy soils.	1400-1500	1000->1500 Monomodal	One DGP per year often merged into next, with duration of 9-12 months depending on soil moisture storing capacity and crop rooting habits. Onset dates difficult to establish because of overlap of growing period. The zone is mainly covered by sandy and loamy soils with low to moderate AWC (50-100 mm/m) and with moderate moisture storing properties (Smax 100-200 mm). Chemical barriers may prevent roots to utilize moisture reserves (Smax 50-80 mm).

Below is the districts agro-ecological zone notes

AGRO-ECOLOGICAL ZONES FOR ARUMERU DISTRICT (ARUSHA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
E2		5-7	27-30 15-18	Mainly well drained, gently undulating to rolling plains and plateaux, altitude 500-1200 m developed on gneissic rocks. There are poorly drained flat wide topographical depressions developed on young alluvium. Sloppy areas are strongly dissected, often rocky and severely eroded. Dominant soils are well drained, moderately deep to deep, dark reddish brown, yellowish red or red sandy clay loams and sandy clays with weak or moderate structure and low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with poor structure with very low natural fertility (Pare, Usambara and Lower Kilimnajaro)	500-1200	800-1000 Monomodal	One DGP per year with duration of 2 - 2½ months varying by less than 2 weeks in response to soil moisture storage capacity crop rooting habits. Unreliable onset dates. Soils are medium to heavy textured with moderate to high AWC (AWC 80-150 mm/m) but with poor moisture acceptance properties due to tendency for surface sealing (Smax 40-60 mm).
N4			16-30 5-10	Volcanic mountains with gentle to steep ash and lava slopes stretching from medium (900-1600 m) to high altitude (2000-3500 m). Major soils are well drained, deep, reddish friable or firm clay loams and clays with strong structure with high natural fertility and accumulation of partly decayed plant material in permanent swamps or alpine meadows.	900-3500	500-1400 Monomodal	One DGP per year with duration increasing from 3-5 months to 6-11 months with altitude, soil moisture storage capacity and crop rooting habits. Onset dates are unreliable. The zone mainly covered by volcanic ash soils with low to moderate AWC (50-100 mm/m) and moderate moisture storing properties (Smax 100-200).
N5		6½-8½	27-30 15-18	Mainly flat to rolling plains at medium altitude, developed on volcanic ash and sediments. Major soils are well drained, shallow to deep, dark brown or dark grey calcareous sandy loams with weak structure with moderate natural fertility; and well drained, deep, dark grey or brown loamy	1300-1700	600-1200 Monomodal	One DGP per year with duration decreasing toward south from 4-6 months to 2-2½ months. Unreliable onset dates. The zone mainly covered by volcanic ash soils with low to very high AWC (50-200mm/m) and moderate to very favourable (high) moisture storing properties (Smax 100 – 600mm).

				sands, sandy loams and loams rich in allophanic clays with weak structure, low bulk density and high natural fertility.			
N6		6½-8½	27-30 15-18	Mainly flat to rolling plains at medium altitude, developed on volcanic ash or lava or lahars. Soils are heterogeneous with important proportions of shallow soils, well drained, dark (sandy) loams on volcanic ash and pumice and dark cracking clays of topographical depressions.	1300-1700	400-500 Monomodal	One DGP per year with duration of less than 2 - 2½ months depending on soil moisture storage capacity and crop rooting habits and exposure to rain shadow effect of Mt Kilimanjaro and Mt Meru. Onset dates unreliable, with low to moderate AWC (50-100 mm/m) and moderate soil moisture storing properties (Smax 100-200 mm).
R		na	na	Rocky terrain	na	na	na

AGRO-ECOLOGICAL ZONES FOR ARUSHA DISTRICT (ARUSHA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
E2		5-7	27-30 15-18	Mainly well drained, gently undulating to rolling plains and plateaux, altitude 500-1200 m developed on gneissic rocks. There are poorly drained flat wide topographical depressions developed on young alluvium. Sloppy areas are strongly dissected, often rocky and severely eroded. Dominant soils are well drained, moderately deep to deep, dark reddish brown, yellowish red or red sandy clay loams and sandy clays with weak or moderate structure and low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with poor structure with very low natural fertility (Pare, Usambara and Lower Kilimnajaro)	500-1200	800-1000 Monomodal	One DGP per year with duration of 2 - 2½ months varying by less than 2 weeks in response to soil moisture storage capacity crop rooting habits. Unreliable onset dates. Soils are medium to heavy textured with moderate to high AWC (AWC 80-150 mm/m) but with poor moisture acceptance properties due to tendency for surface sealing (Smax 40-60 mm).
N5		6½-8½	27-30 15-18	Mainly flat to rolling plains at medium altitude, developed on volcanic ash and sediments. Major soils are well drained, shallow to deep, dark brown or dark grey calcareous sandy loams with weak structure with moderate natural fertility; and well drained, deep, dark grey or brown loamy sands, sandy loams and loams rich in allophanic clays with weak structure, low bulk density and high natural fertility.	1300-1700	600-1200 Monomodal	One DGP per year with duration decreasing toward south from 4-6 months to 2-2½ months. Unreliable onset dates. The zone mainly covered by volcanic ash soils with low to very high AWC (50-200mm/m) and moderate to very favourable (high) moisture storing properties (Smax 100 – 600mm).

AGRO-ECOLOGICAL ZONES FOR BABATI DISTRICT (MANYARA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) /	Length of Growing Period and Soil Moisture Properties

	Km)					Patten	
E2		5-7	27-30 15-18	Mainly well drained, gently undulating to rolling plains and plateaux, altitude 500-1200 m developed on gneissic rocks. There are poorly drained flat wide topographical depressions developed on young alluvium. Sloppy areas are strongly dissected, often rocky and severely eroded. Dominant soils are well drained, moderately deep to deep, dark reddish brown, yellowish red or red sandy clay loams and sandy clays with weak or moderate structure and low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with poor structure with very low natural fertility (Pare, Usambara and Lower Kilimnajaro)	500-1200	800-1000 Monomodal	One DGP per year with duration of 2 - 2½ months varying by less than 2 weeks in response to soil moisture storage capacity crop rooting habits. Unreliable onset dates. Soils are medium to heavy textured with moderate to high AWC (AWC 80-150 mm/m) but with poor moisture acceptance properties due to tendency for surface sealing (Smax 40-60 mm).
NI		4½-7	22-25 10-15	Mainly rolling to hilly, dissected plateaux at high altitude developed on volcanic ash, lavas and on gneisses. Mainly covered by heterogeneous soil types with important proportions of fertile, well drained, deep yellowish or reddish sandy clays to clay with moderate to strong structure developed on volcanic ash and lavas, and strongly weathered, heavy – textured soils of low to medium fertility.	1500-2500	500-700 Monomodal	One DGP per year with duration of 3-5 months depending on soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Moderate to high AWC (70-150 mm/m) and favourable moisture storing properties (Smax 200-400).
N3		>8½	27-30 15-18	Flat lacustrine plains at medium altitude, with extensive salt and soda flats, often inundated. Major soils are of varying colour, texture, structure, consistence and drainage but with fertility status and moisture storing properties adversely affected by presence of exchangeable sodium and/or soluble salts at levels that are high enough to interfere with growth of most crops (ESP>15, pH>8.5, EC>4. Also, moderately well to imperfectly drained, shallow to deep usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and moderate to high natural fertility. Often high ESP in subsoil.	900 -1100	400-500 Monomodal	Very short to short growing periods, adversely influenced by dominance of salts in soil. The zone is mainly covered by salt affected soils with important proportion of dark cracking clays of topographical depressions with moderate moisture storing properties.
PI		5-7	27-30 15-18	Mainly gently undulating plains with some rocky hill-footslope association at medium altitude, developed on granites. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor	1100 - 1300	600-700 Monomodal	One DGP per year with duration of 2-2½ months depending soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Soils are generally moderately deep sandy or loamy with low to moderate AWC (30-100 mm/m) and poor moisture storing properties

				structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are complexes of rock outcrops, surface ironstone, very stony, and very shallow (< 25 cm); and good proportion of well drained, very shallow to moderately deep, black or dark grey sandy loams to sandy clay loams with strong topsoil structure and high natural fertility.			mostly for sandy and loamy soils susceptible to surface capping (Smax 50-150mm); and favourable for other loamy soils (Smax 150-300 mm).
P2		5-7	27-30 15-18	Mainly gently undulating plains, for the most part well drained, at medium altitude, developed on granites and gneisses. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are complexes of rock outcrops, surface ironstone, very stony, and very shallow (< 25 cm); and moderately well to imperfectly drained, shallow to deep frequently calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and high natural fertility.	1100-1300	550-600 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils are generally moderately deep sandy or loamy with low to moderate AWC (30-100 mm/m) and poor moisture storing properties mostly for sandy and loamy soils susceptible to surface capping (Smax 50-150mm); and favourable for other loamy soils (Smax 150-300 mm). In some units with salt affected soils effective soil depth is restricted by impervious subsoil, often high ESP.
O	na	na	na	Lake	na	na	na

AGRO-ECOLOGICAL ZONES FOR BAGAMOYO DISTRICT (COAST REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
C1		5-7	29-31 19-23	Nearly level to rolling plains of slope range 0-10%, developed on Quaternary, Neogene, Jurrasic and Cretaceous sediments. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure, and very low natural fertility; and moderately well to imperfectly drained, shallow to deep usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and moderate natural fertility.	< 200	1000-1200 Bimodal	2 dependable growing periods (DGP) per year. Variation of DGP length as function of soil moisture storage capcity and crop rooting habits. Duration is 3-4 months. Main DGP is March-April, while the secondary DGP is October – November. The zone has deep sandy soils with low AWC (30-80 mm/m) and moderate soil depth (1-2m). Poor to moderate moisture storing capacity (Smax 50-150mm)
C2		5-7	29-31 19-23	Nearly level to gently rolling plains and plateaux, slopes ranging from 0-10%, developed on Quaternary, Neogene, Jurrasic and Cretaceous sediment. Soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy	< 500	800-1000 Monomodal	One DGP per year with duration of 3-4½ months, with variation of 3-4 weeks depending soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Soils have moderate to high AWC (80-150 mm/m) and favourable moisture storing

				sands with sandy loams in subsoil and poor structure and with very low natural fertility; and moderately well to imperfectly drained, shallow to deep usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and moderate natural fertility.			characteristics (Smax 150-350 mm).
C3		5-7	29-31 19-23	Strongly dissected uplands and rolling to steep hills, slope range of 10-45%, developed on Jurassic, sandstones, shales, limestones, Paleogene limestone and marls and Neogene sandy clays. Soils are mainly well drained, moderately deep to deep, reddish and yellowish sandy clay loams and sandy clays, often with more sandy topsoils, with weak structure and low natural fertility; and complex of rock outcrops, surface ironstone, very stony and very shallow soils; and important proportion of moderately well to imperfectly drained, shallow to deep, usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and moderately high natural fertility.	<500	800-1000 Monomodal	One DGP per year with duration of 3-4½ months, with variation of 3-4 weeks depending soil moisture storage capacity and crop rooting habits. Unreliable onset dates Soils in the zone are characterised to be of low to moderate AWC (80-100 mm/m) and poor to moderate moisture storing properties (Smax 50-150 mm) according to rainfall acceptanece.
C4		5.5-7	29-31 19-23	Flat, low altitude riverine floodplains (84%) and deltas (16%) with spatially and temporally varying flooding regimes and sedimentation patterns; mainly covered by young alluvial soils with variable drainage and flooding conditions. Dominant soils are well to moderately well drained, deep, brownish fine sands to sandy clay loams with high textural variability over short distances and highly stratified with more sandy or more clayey layers; and imperfectly to poorly drained, deep, (dark) grey, or grey brown clays, sandy clays or clay laoms often mottled and usually with more sandy horizons within the profile and moderate toposoil structure, with high natural fertility; and imperfectly to poorly drained, deep, coarse almost pure bleached sands often with finer texture overly usually with poor natural fertility	<200	1200-14000 Varible	Growing period mainly determined by flooding regime. The zone moisture characteristics is influenced by flood regimes, drainage variability,
E3		4-7	29-31 19-23	Mainly well drained, flat to rolling plains, low altitude developed on intermediate metamorphic rocks. Major soils are well drained, moderately deep to deep, reddish and yellowish sandy clay loams and sandy clays,	200-750	800-1000 Monomodal	Mainly one DGP 3 - 4½ months varying by 1-4 weeks depending on soil moisture storing properties and crop rooting habits. Onset dates are unreliable. Soil texture varies from medium to heavy textured alluvial with moderate to high

				often with more sandy topsoil, with weak structure and low natural fertility; and somewhat excessively to moderately well drained, moderately deep to deep, reddish, brown or grey loamy sands, sandy loams and sandy clay loams with weak structure and low natural fertility; and well drained, moderately deep to deep, yellowish or reddish sandy clays with weak structure, very low to low natural fertility.			AWC (80-150 mm/m) and favourable moisture storing properties (Smax 200-350mm). Natural soil fertility shows marked differences between sites, and soil acidity may be common
E4		4-7	29-31 19-23	Physiographic units range from well drained, level to rolling plains at low altitude (200-500m) to strongly dissected uplands and low hills transitional to mountains at altitude 500 – 1000 m; mainly developed on intermediate metamorphic rocks. Major soils are well drained, moderately deep to deep, yellowish or reddish sandy clays to clays with moderate to very low natural fertility.	200-1000	800-1000 Monomodal	One DGP per year which is 4½ to 6 month long, varying by 6 weeks depending soil moisture characteristics and crop rooting habits. Onsets are not reliable. In less dissected and less steep parts covered by well drained, deep clays, AWC is moderate (70-120 mm/m) and favourable moisture storing properties (Smax 200-400 mm). There are areas with soil toxicities which hinder root development and hence reduce ability of crop to extract stored soil moisture to (Smax 50-80 mm).
E9		≥ 7	29-31 19-23	Flat alluvial plains with homogenous sedimentation pattern. Major soils are imperfectly to poorly drained, deep, dark grey or grey brown, often mottled clays (clay 40-70%), more compact and contain fewer sandy strata. Natural fertility status is low to moderate.	400 - 500	800-1000 Monomodal	One DGP per year with duration of 4½ - 6½ months, varying by 2 months depending on soil moisture storing capacity and crop rooting habits. Onset dates are unreliable, and the growing period is influenced by rainfall ponding and runoff collection. Moisture storing properties less favourable due to poor internal drainage (AWC 150, Smax 150-225).
O		na	na	Lake	na	na	na

AGRO-ECOLOGICAL ZONES FOR BARIADI DISTRICT (SHINYANGA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
N9		7-8½	22-30 10-18	Undulating plains at medium to high altitude, developed on sodic volcanic ash. Major soils are well drained, deep, reddish friable or firm clay loams and clays with strong structure and high natural fertility; and moderately well to imperfectly drained, mostly calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure with high natural fertility.	1100-1800	600-800 Monomodal	One DGP per year with duration of 3-3½ months, varying depending on soil moisture storage capacity and crop rooting habits. Onset dates are unreliable. Soils are heavy textured with high sodicity and poor moisture storing properties (Smax 30-50).
P8		6½-7	27-30 15-18	Flat to gently undulating plains developed partly on granites, partly on old colluvium; medium altitude. Major soils are imperfectly drained, shallow, dark grey or brown sands to sandy clays with hardpan within 50 cm from the surface, often calcareous and sodic in the subsoil (ESP 10-15) with moderate natural fertility; and moderately well to imperfectly drained, shallow to deeper, usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and with high natural fertility; and well drained, moderately deep to deep, red or brown often gravely, sandy loams and sandy clay loams, with weak structure and low natural fertility.	1000-1200	600-1200 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storage capacity and crop rooting habits. Onset dates unreliable. The zone mainly covered by hardpan soils with poor moisture storing properties AWC (30-100), with important proportions of dark cracking clays of topographical depressions with moderate moisture storing properties AWC 150 mm/m; Smax 75-150 mm; and sandy and medium textured with moderate to high moisture storing properties (AWC 50 – 100 mm/m; Smax 50-300 mm).
O		na	na	Lake	na	na	na

AGRO-ECOLOGICAL ZONES FOR BIHARAMLO DISTRICT (KAGERA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
P4		5-7	27-30 15-18	Mainly flat to gently undulating plains with scattered hill-footslope associations at medium altitude, developed on granites, banded ironstones and young alluvium. Soils exhibit heterogeneous pattern with important proportions of well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are complexes of rock outcrops, surface ironstone, very stony, and very shallow; and moderately well to imperfectly drained, shallow to deep frequently calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and high natural fertility.	1200-1300	800-1000 Monomodal	One DGP per year with duration of 3½-5 months depending on soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Soils are moderately deep to deep with low to moderate AWC (50-100 mm/m) that may present 'chemical barriers' (e.g. salts) to root development in which case moisture reserve that can be used by crops is very low (Smax 30-50 mm). Where no chemical barriers exist, the moisture storing properties are moderate (Smax 100-200 mm).
P5		5-7	27-30 15-18	See P3	1100-1300	800-1000 Monomodal	One DGP per year with duration of 5-6 months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils are generally moderately deep sandy or loamy with low to moderate AWC (30-100 mm/m) and poor moisture storing properties mostly for sandy and loamy soils susceptible to surface capping (Smax 50-150mm); and favourable for other loamy soils (Smax 150-300 mm). In some units with salt affected soils effective soil depth is restricted by impervious subsoil, often high ESP.
WI		4-7	22-25 10-15	Mainly strongly dissected hills formed by parallel ridges of sandstone and quartzites and deep, broad or narrow valleys developed on phyllites, often with permanent samps at high altitude. Major soils are well drained, moderately deep or deep, yellowish or reddish sandy clays to clays with weak structure and very low to low natural fertility; and complex of undifferentiated very shallow soils (< 25	1300-1800	1000-1500 Monomodal	One DGP per year often merged into the next, with duration of 7-9 months depending on soils moisture storage capacity and crop rooting habits. Unreliable onset dates. Major soils are well drained, clayey soils with moderate AWC (70-120 mm/m) and with favourable moisture storing properties (Smax 200-400 mm). Existence of chemical barriers may

				cm deep) with rock outcrops.			hamper utilisation of soil moisture reserves (Smax 50-80 mm).
W2		4-7	22-25 10-15	Dissected hilly plateaux developed on basalt, argilclaceous sandstones and shales, with flat or gently undulating tablelands bounded by steep scarps and valleys often strongly affected by erosion, at high altitude. Mainly covered by equal proportions of heavy – textured soils with high organic matter contents which are well drained, moderately deep or deep, yellowish or reddish sandy clays to clays with weak structure and very low to low natural fertility; and well drained, deep yellowish or reddish sandy clays to clays with moderate to strong structure and moderate natural fertility.	1500-1700	1000-1500 Monomdal	One DGP per year with duration of 6½ - 8 months depending on moisture storage capacity and crop rooting habits. Reliable onset dates. Major soils are well drained, clayey soils with moderate AWC (70-120 mm/m) and with favourable moisture storing properties (Smax 200-400 mm). Existence of chemical barriers may hamper utilisation of soil moisture reserves (Smax 50-80 mm).
W3		5-7	27-30 15-18	Mainly undulating to rolling plains and plateaux with resistant quartzite ridges often broken by steep escarpments, high altitude, developed on sandstones, often more dissected and hilly with parallel ridges and intervening narrow valleys. Major soils are mainly equal proportions of sandy soils and heavy-textured soils with strong acidity which are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, and weak structure and very low natural fertility; and, well drained, deep, reddish or brown sandy loams and sand clay loams with weak structure and very low natural fertility; and accumulation of partly decayed plant materials in permanent swamps or alpine meadows.	1200-1600	800-1000 Monomodal	One DGP per year with duration of 4-5 months depending on soil moisture storing capacity and crop rooting habits. Unreliable onset dates. The zone is mainly covered by sandy and loamy soils with low to moderate AWC (50-100 mm/m) and with moderate moisture stroing properties (Smax 100-200 mm). Chemical barriers may prevent roots to utilize moisture reserves (Smax 50-80 mm).
W4		4-7	27-30 15-18	Undulating to rolling upland plains developed on phyllite with protruding ridges of quartzite capped ironstone. Include a large flat to undulating central valley developed on alluvium and colluvium derived phyllites. Contains also flat riverine plain regularly flooded. Major soils are well drained, moderately deep or deep, yellowish or reddish sandy clays to clays with weak structure and very low to low natural fertility; and complex of undifferentiated very shallow soils (< 25 cm deep) with rock outcrops; and well drained, young and fertile alluvial soils, sandy and loamy soils.	1400-1500	1000->1500 Monomodal	One DGP per year often merged into next, with duration of 9-12 months depending on soil moisture storing capacity and crop rooting habits. Onset dates difficult to establish because of overlap of growing period. The zone is mainly covered by sandy and loamy soils with low to moderate AWC (50-100 mm/m) and with moderate moisture storing properties (Smax 100-200 mm). Chemical barriers may prevent roots to utilize moisture reserves (Smax 50-80 mm).

L		na	na	Lake	na	na	na

AGRO-ECOLOGICAL ZONES FOR BUKOBA DISTRICT (BUKOBA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
WI		4-7	22-25 10-15	Mainly strongly dissected hills formed by parallel ridges of sandstone and quartzites and deep, broad or narrow valleys developed on phyllites, often with permanent samps at high altitude. Major soils are well drained, moderately deep or deep, yellowish or reddish sandy clays to clays with weak structure and very low to low natural fertility; and complex of undifferentiated very shallow soils (< 25 cm deep) with rock outcrops.	1300-1800	1000-1500 Monomodal	One DGP per year often merged into the next, with duration of 7-9 months depending on soils moisture storage capacity and crop rooting habits. Unreliable onset dates. Major soils are well drained, clayey soils with moderate AWC (70-120 mm/m) and with favourable moisture storing properties (Smax 200-400 mm). Existence of chemical barriers may hamper utilisation of soil moisture reserves (Smax 50-80 mm).
W3		5-7	27-30 15-18	Mainly undulating to rolling plains and plateaux with resistant quartzite ridges often broken by steep escarpments, high altitude,	1200-1600	800-1000 Monomodal	One DGP per year with duration of 4-5 months depending on soil moisture storing capacity and crop rooting habits. Unreliable onset dates.

				developed on sandstones, often more dissected and hilly with parallel ridges and intervening narrow valleys. Major soils are mainly equal proportions of sandy soils and heavy-textured soils with strong acidity which are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, and weak structure and very low natural fertility; and, well drained, deep, reddish or brown sandy loams and sand clay loams with weak structure and very low natural fertility; and accumulation of partly decayed plant materials in permanent swamps or alpine meadows.			The zone is mainly covered by sandy and loamy soils with low to moderate AWC (50-100 mm/m) and with moderate moisture stroing properties (Smax 100-200 mm). Chemical barriers may prevent roots to utilize moisture reserves (Smax 50-80 mm).
W4		4-7	27-30 15-18	Undulating to rolling upland plains developed on phyllite with protruding ridges of quartzite capped ironstone. Include a large flat to undulating central valley developed on alluvium and colluvium derived phyllites. Contains also flat riverine plain regularly flooded. Major soils are well drained, moderately deep or deep, yellowish or reddish sandy clays to clays with weak structure and very low to low natural fertility; and complex of undifferentiated very shallow soils (< 25 cm deep) with rock outcrops; and well drained, young and fertile alluvial soils, sandy and loamy soils.	1400-1500	1000->1500 Monomodal	One DGP per year often merged into next, with duration of 9-12 months depending on soil moisture storing capacity and crop rooting habits. Onset dates difficult to establish because of overlap of growing period. The zone is mainly covered by sandy and loamy soils with low to moderate AWC (50-100 mm/m) and with moderate moisture storing properties (Smax 100-200 mm). Chemical barriers may prevent roots to utilize moisture reserves (Smax 50-80 mm).
L		na	na	Lake	na	na	na

AGRO-ECOLOGICAL ZONES FOR BUKOMBE DISTRICT (SHINYANGA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
PI3		5 - 8½	27-30 15-18	Flat, seasonally inundated lowland plains with important proportion of permanent or semi-permanent swamps. . Major soils are moderately well to imperfectly drained, shallow to deep often calcareous, black, dark grey or brown cracking clays mostly overlying paler subsoil with ephemeral structure and high natural fertility; and imperfectly to poorly drained, deep, non-calcareous, grey or brown sandy loams to sandy clays with strongly mottled and compact subsoil but with more sandy, more friable and darker toposoil. Moderate natural fertility; sodic subsoil possible.	900-1200	800-1000 Monomodal	DGP varies with Physiography. For upland areas, one DGP per year with duration of 5-6 months depending on soil moisture storage capacity and crop rooting habits. However, in most of the zone, growing period condition determined by duration and depth of flooding.
P4		5-7	27-30 15-18	Mainly flat to gently undulating plains with scattered hill-footslope associations at medium altitude, developed on granites, banded ironstones and young alluvium. Soils exhibit heterogeneous pattern with important proportions of well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week	1200-1300	800-1000 Monomodal	One DGP per year with duration of 3½-5 months depending on soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Soils are moderately deep to deep with low to moderate AWC (50-100 mm/m) that may present 'chemical barriers' (e.g. salts) to root development in which case moisture reserve that can be used by crops is very low (Smax 30-50 mm). Where no chemical barriers exist, the moisture storing properties are moderate (Smax 100-200 mm).

				structure and low natural fertility; and immature soils which are complexes of rock outcrops, surface ironstone, very stony, and very shallow; and moderately well to imperfectly drained, shallow to deep frequently calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and high natural fertility.			
P5		5-7	27-30 15-18	See P3	1100-1300	800-1000 Monomodal	One DGP per year with duration of 5-6 months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils are generally moderately deep sandy or loamy with low to moderate AWC (30-100 mm/m) and poor moisture storing properties mostly for sandy and loamy soils susceptible to surface capping (Smax 50-150mm); and favourable for other loamy soils (Smax 150-300 mm). In some units with salt affected soils effective soil depth is restricted by impervious subsoil, often high ESP.
W2		4-7	22-25 10-15	Dissected hilly plateaux developed on basalt, argilclaceous sandstones and shales, with flat or gently undulating tablelands bounded by steep scarps and valleys often strongly affected by erosion, at high altitude. Mainly covered by equal proportions of heavy – textured soils with high organic matter contents which are well drained, moderately deep or deep, yellowish or reddish sandy clays to clays with weak structure and very low to low natural fertility; and well drained, deep yellowish or reddish sandy clays to clays with moderate to strong structure and moderate natural fertility.	1500-1700	1000-1500 Monomdal	One DGP per year with duration of 6½ - 8 months depending on moisture storage capacity and crop rooting habits. Reliable onset dates. Major soils are well drained, clayey soils with moderate AWC (70-120 mm/m) and with favourable moisture storing properties (Smax 200-400 mm). Existence of chemical barriers may hamper utilisation of soil moisture reserves (Smax 50-80 mm).

AGRO-ECOLOGICAL ZONES FOR BUNDA DISTRICT (MARA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
P8		6½-7	27-30 15-18	Flat to gently undulating plains developed partly on granites, partly on old colluvium; medium altitude. Major soils are imperfectly drained, shallow, dark grey or brown sands to sandy clays with hardpan within 50 cm from the surface, often calcareous and sodic in the subsoil (ESP 10-15) with moderate natural fertility; and moderately well to imperfectly drained, shallow to deeper, usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and with high natural fertility; and well drained, moderately deep to deep, red or brown often gravely, sandy loams and sandy clay loams, with weak structure and low natural fertility.	1000-1200	600-1200 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storage capacity and crop rooting habits. Onset dates unreliable. The zone mainly covered by hardpan soils with poor moisture storing properties AWC (30-100), with important proportions of dark cracking clays of topographical depressions with moderate moisture storing properties AWC 150 mm/m; Smax 75-150 mm; and sandy and medium textured with moderate to high moisture storing properties (AWC 50 – 100 mm/m; Smax 50-300 mm).
R		na	na	Rocky terrain	na	na	na
L		na	na	Lake	na	na	na

AGRO-ECOLOGICAL ZONES FOR CHAKECHAKE DISTRICT (KUSINI PEMBA REGION)

AEZ	SUB	pH	Temperatur		Altitude	Rainfall	Length of Growing Period and Soil

CODE	ZONE-AREA (Sq-Km)	(H_2O)	e (^{0}c)	Soils and Topography	(m)	total (mm/Year) / Patten	Moisture Properties
C6		5-7	29-31 19-23	Nearly level to undulating and rolling plains developed on Neogene and Quaternary limestone, sandstones, marls, sands, clays. Soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in subsoil, weak structure and very low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands but with more clayey or stratified subsoils (sandy loams to sandy clays) with weak structure, somewhat higher organic matter content and very low natural fertility; and windblown sands patterned into dunes stabilized by vegetation.	<100	1600-2000 Monomodal	Long growing periods (5-10 months) depending on crop rooting habits and soil moisture storage characteristics. Onset dates are reliable. The physiographic units has low AWC (30-80 mm/m) and poor to moderate moisture storing capacity (Smax 50-150mm) but dry conditions are minimized by long rainy season.
O		na	na	Lake	na	na	na

AGRO-ECOLOGICAL ZONES FOR CHUNYA DISTRICT (MBEYA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
P2		5-7	27-30 15-18	Mainly gently undulating plains, for the most part well drained, at medium altitude, developed on granites and gneisses. Major	1100-1300	550-600 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates.

				soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are complexes of rock outcrops, surface ironstone, very stony, and very shallow (< 25 cm); and moderately well to imperfectly drained, shallow to deep frequently calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and high natural fertility.			Soils are generally moderately deep sandy or loamy with low to moderate AWC (30-100 mm/m) and poor moisture storing properties mostly for sandy and loamy soils susceptible to surface capping (Smax 50-150mm); and favourable for other loamy soils (Smax 150-300 mm). In some units with salt affected soils effective soil depth is restricted by impervious subsoil, often high ESP.
P3		5-7	27-30 15-18	Mainly gently undulating plains, for the most part well drained, at medium altitude, developed on granites and gneisses. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are complexes of rock outcrops, surface ironstone, very stony, and very shallow (< 25 cm); and moderately well to imperfectly drained, shallow to deep frequently calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and high natural fertility.	1100-1300	600-1000 Monomodal	One DGP per year with duration of 4-5 months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils are generally moderately deep sandy or loamy with low to moderate AWC (30-100 mm/m) and poor moisture storing properties mostly for sandy and loamy soils susceptible to surface capping (Smax 50-150mm); and favourable for other loamy soils (Smax 150-300 mm). In some units with salt affected soils effective soil depth is restricted by impervious subsoil, often high ESP.
P5		5-7	27-30 15-18	See P3	1100-1300	800-1000 Monomodal	One DGP per year with duration of 5-6 months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils are generally moderately deep sandy or loamy with low to moderate AWC (30-100 mm/m) and poor moisture storing properties mostly for sandy and loamy soils susceptible to surface capping (Smax 50-150mm); and favourable for other loamy soils (Smax 150-300 mm). In some units with salt affected soils effective soil depth is restricted by impervious subsoil, often high ESP.
P6		5-7	27-30 15-18	Mainly undulating plains and plateaux developed on sandstones, shales and quartzites medium altitude. Major soils are	800-1800	850-1700 Monomodal	One DGP per year with duration of 6-8½ months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates.

				well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, deep, reddish or brown sandy loams and sandy clay loams and sandy clays often with more sandy topsoil, weak structure and low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with poor structure and very low natural fertility.			Soils are heterogeneous with low to moderate AWC (50-100 mm/m) and poor to moderate moisture storing properties (Smax 30-150 mm).
RI		>8½	27-30 15-18	Mainly flat plains covered by riverine or lacustrine alluvium, strongly affected by salinity or sodicity and by variable flooding conditions, medium altitude, mostly below 1000 m. Mainly covered by salt affected soils which are soils of varying colour, texture, structure, consistence and drainage but with fertility and moisture storing characteristics adversely affected by presence of exchangeable sodium and/or soluble salts at levels that are high enough to interfere with growth of most crops (ESP>15, pH>8.5, EC>4); and well drained, moderately deep to deep, reddish and yellowish sandy clay loams and sandy clays, often with more sandy topsoil, weak structure and low natural fertility; and well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with weak structure and very low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with weak structure and very low natural fertility.	900 - 1200	850-1300 Monomodal	One DGP per year with duration of 5-6 months around Lake Rukwa and 6-9 months in the Northwest (Karema depression). Growing period in the zone varies with rain-shadow effects in the lee of hill ranges or escarpments and variable flooding conditions. Reliable onset dates. Major soils covering the zone are characterized with moderate to high AWC (80-150 mm/m) and moderate to high moisture storing properties (Smax 150-350 mm). In 35% of the zone the ability of crops to extract moisture is negatively affected by strong salinity or alkalinity.
R		na	na	Rocky terrain	na	na	Na
L		na	na	Lake	na	na	Na

AGRO-ECOLOGICAL ZONES FOR DODOMA DISTRICT (DODOMA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
E2		5-7	27-30 15-18	Mainly well drained, gently undulating to rolling plains and plateaux, altitude 500-1200 m developed on gneissic rocks. There are poorly drained flat wide topographical depressions developed on young alluvium. Sloppy areas are strongly dissected, often rocky and severely eroded. Dominant soils are well drained, moderately deep to deep, dark reddish brown, yellowish red or red sandy clay loams and sandy clays with weak or moderate structure and low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with poor structure with very low natural fertility (Pare, Usambara and Lower Kilimnajaro)	500-1200	800-1000 Monomodal	One DGP per year with duration of 2 - 2½ months varying by less than 2 weeks in response to soil moisture storage capacity crop rooting habits. Unreliable onset dates. Soils are medium to heavy textured with moderate to high AWC (AWC 80-150 mm/m) but with poor moisture acceptance properties due to tendency for surface sealing (Smax 40-60 mm).
PI		5-7	27-30 15-18	Mainly gently undulating plains with some rocky hill-footslope association at medium altitude, developed on granites. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor	1100 - 1300	600-700 Monomodal	One DGP per year with duration of 2-2½ months depending soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Soils are generally moderately deep sandy or loamy with low to moderate AWC (30-100 mm/m) and poor moisture storing properties

				structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are complexes of rock outcrops, surface ironstone, very stony, and very shallow (< 25 cm); and good proportion of well drained, very shallow to moderately deep, black or dark grey sandy loams to sandy clay loams with strong topsoil structure and high natural fertility.			mostly for sandy and loamy soils susceptible to surface capping (Smax 50-150mm); and favourable for other loamy soils (Smax 150-300 mm).
P2		5-7	27-30 15-18	Mainly gently undulating plains, for the most part well drained, at medium altitude, developed on granites and gneisses. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are complexes of rock outcrops, surface ironstone, very stony, and very shallow (< 25 cm); and moderately well to imperfectly drained, shallow to deep frequently calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and high natural fertility.	1100-1300	550-600 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils are generally moderately deep sandy or loamy with low to moderate AWC (30-100 mm/m) and poor moisture storing properties mostly for sandy and loamy soils susceptible to surface capping (Smax 50-150mm); and favourable for other loamy soils (Smax 150-300 mm). In some units with salt affected soils effective soil depth is restricted by impervious subsoil, often high ESP.
P9		4-6	27-30 15-18	Mainly gently undulating to plains formed on 'continental deposits' overlying granites. Major soils are somewhat excessively to moderately well drained, moderately deep to deep, reddish, brown or grey loamy sands, sandy loams and sandy clay loams with poor structure with very low natural fertility; and well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with weak structure and low natural fertility.	1100-1400	500-600 Monomodal	One DGP per year with duration of 3-3½ months depending on moisture storage capacity and crop rooting habits. Reliable onset dates. Heterogeneous soils with dominance of light and medium textured soils with poor to moderate moisture storing properties (AWC 50-100 mm/m; Smax 50-200 mm) without chemical barriers.
P11		6½-7	27-30 15-18	Flat plains at medium altitude developed mainly on alluvium. Major soils are imperfectly drained, shallow, dark grey or	900	400-600 Monomodal	For upland areas comparable to those of zone P10 above. However most of the zone DGP is influenced by flooding, water-logging, runoff

				brown sands to sandy clays with hardpan within 50 cm from the surface, often calcareous and sodic in the subsoil (ESP 10-15) with moderate natural fertility; and soils of varying colour, texture, structure, consistence and drainage but with fertility status and moisture storing properties adversely affected by presence of exchangeable sodium and/or soluble salts at levels that are high enough to interfere with growth of most crops (ESP>15, pH>8.5, EC>4			losses or additions and presence of salinity.
R3		>8½	27-30 15-18	Complex terrain, formed partly by flat to very gently undulating plains of lacustrine origin and partly by undulating plains of very old surface, at medium altitude. Covered by heterogeneous soils, ranging from sodic salt affected soils with varying colour, texture, structure, consistence and drainage but with fertility and moisture storing characteristics adversely affected by presence of exchangeable sodium and/or soluble salts at levels that are high enough to interfere with growth of most crops (ESP>15, pH>8.5, EC>4); well drained, moderate deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams depth with weak structure and very low natural fertility; and hardpan soils, and seasonally waterlogged soils with moderate fertility.	900-1400	600-1000 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storing capacity and crop rooting habits. Reliable onset dates. Heterogeneous soils with low to moderate moisture storing properties and seasonally waterlogged soils. ,
R4		5½-7	27-30 15-18	Flat plains covered by riverine alluvium and regularly flooded, with complex sedimentation pattern; medium altitude. Dominant soils are well to moderately drained, deep, brownish fine sands to sandy clay loams with high textural variability over short distances and high stratified with more sandy or clayey layers. High natural fertility; and imperfectly to poorly drained, deep, dark grey or grey brown clays, sandy clays or clay loams often mottled and usually with more sandy horizons within the profile and moderate topsoil structure and high natural fertility.	800-1000	1200-1400 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storing capacity and crop rooting habits. Reliable onset dates. In most of the zone growing period mainly determined by flooding regime which shows considerable spatial and temporal variability. The zone is mainly covered by heavy textured soils with moderate to high AWC (80-150 mm/m) and moderate moisture storing properties (Smax 150-350 mm).
R		na	na	Rocky terrain	na		na

AGRO-ECOLOGICAL ZONES FOR GEITA DISTRICT (MWANZA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
P4	27,545	5-7	27-30 15-18	Mainly flat to gently undulating plains with scattered hill-footslope associations at medium altitude, developed on granites, banded ironstones and young alluvium. Soils exhibit heterogeneous pattern with important proportions of well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are complexes of rock outcrops, surface ironstone, very stony, and very shallow; and moderately well to imperfectly drained, shallow to deep frequently calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and high natural fertility.	1200-1300	800-1000 Monomodal	One DGP per year with duration of 3½-5 months depending on soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Soils are moderately deep to deep with low to moderate AWC (50-100 mm/m) that may present 'chemical barriers' (e.g. salts) to root development in which case moisture reserve that can be used by crops is very low (Smax 30-50 mm). Where no chemical barriers exist, the moisture storing properties are moderate (Smax 100-200 mm).
L		na	na	na	na	na	na

AGRO-ECOLOGICAL ZONES FOR HAI DISTRICT (KILIMANJARO REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties

E2		5-7	27-30 15-18	Mainly well drained, gently undulating to rolling plains and plateaux, altitude 500-1200 m developed on gneissic rocks. There are poorly drained flat wide topographical depressions developed on young alluvium. Sloppy areas are strongly dissected, often rocky and severely eroded. Dominant soils are well drained, moderately deep to deep, dark reddish brown, yellowish red or red sandy clay loams and sandy clays with weak or moderate structure and low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with poor structure with very low natural fertility (Pare, Usambara and Lower Kilimnajaro)	500-1200	800-1000 Monomodal	One DGP per year with duration of 2 - 2½ months varying by less than 2 weeks in response to soil moisture storage capacity crop rooting habits. Unreliable onset dates. Soils are medium to heavy textured with moderate to high AWC (AWC 80-150 mm/m) but with poor moisture acceptance properties due to tendency for surface sealing (Smax 40-60 mm).
N4			16-30 5-10	Volcanic mountains with gentle to steep ash and lava slopes stretching from medium (900-1600 m) to high altitude (2000-3500 m). Major soils are well drained, deep, reddish friable or firm clay loams and clays with strong structure with high natural fertility and accumulation of partly decayed plant material in permanent swamps or alpine meadows.	900-3500	500-1400 Monomodal	One DGP per year with duration increasing from 3-5 months to 6-11 months with altitude, soil moisture storage capacity and crop rooting habits. Onset dates are unreliable. The zone mainly covered by volcanic ash soils with low to moderate AWC (50-100 mm/m) and moderate moisture storing properties (Smax 100-200).
N5		6½-8½	27-30 15-18	Mainly flat to rolling plains at medium altitude, developed on volcanic ash and sediments. Major soils are well drained, shallow to deep, dark brown or dark grey calcareous sandy loams with weak structure with moderate natural fertility; and well drained, deep, dark grey or brown loamy sands, sandy loams and loams rich in allophanic clays with weak structure, low bulk density and high natural fertility.	1300-1700	600-1200 Monomodal	One DGP per year with duration decreasing toward south from 4-6 months to 2-2½ months. Unreliable onset dates. The zone mainly covered by volcanic ash soils with low to very high AWC (50-200mm/m) and moderate to very favourable (high) moisture storing properties (Smax 100 – 600mm).
N6		6½-8½	27-30 15-18	Mainly flat to rolling plains at medium altitude, developed on volcanic ash or lava or lahars. Soils are heterogeneous with important proportions of shallow soils, well drained, dark (sandy) loams on volcanic ash and pumice and dark cracking clays of topographical depressions.	1300-1700	400-500 Monomodal	One DGP per year with duration of less than 2 - 2½ months depending on soil moisture storage capacity and crop rooting habits and exposure to rain shadow effect of Mt Kilimanjaro and Mt Meru. Onset dates unreliable, with low to moderate AWC (50-100 mm/m) and moderate soil moisture storing properties (Smax 100-200 mm).
R		na	na	Rocky terrain	na	na	na

AGRO-ECOLOGICAL ZONES FOR HANANG DISTRICT (MANYARA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
NI		4½-7	22-25 10-15	Mainly rolling to hilly, dissected plateaux at high altitude developed on volcanic ash, lavas and on gneisses. Mainly covered by heterogeneous soil types with important proportions of fertile, well drained, deep yellowish or reddish sandy clays to clay with moderate to strong structure developed on volcanic ash and lavas, and strongly weathered, heavy – textured soils of low to medium fertility.	1500-2500	500-700 Monomodal	One DGP per year with duration of 3-5 months depending on soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Moderate to high AWC (70-150 mm/m) and favourable moisture storing properties (Smax 200-400).
PI		5-7	27-30 15-18	Mainly gently undulating plains with some rocky hill-footslope association at medium	1100 - 1300	600-700 Monomodal	One DGP per year with duration of 2-2½ months depending soil moisture storage capacity and crop

				altitude, developed on granites. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are complexes of rock outcrops, surface ironstone, very stony, and very shallow (< 25 cm); and good proportion of well drained, very shallow to moderately deep, black or dark grey sandy loams to sandy clay loams with strong topsoil structure and high natural fertility.			rooting habits. Unreliable onset dates. Soils are generally moderately deep sandy or loamy with low to moderate AWC (30-100 mm/m) and poor moisture storing properties mostly for sandy and loamy soils susceptible to surface capping (Smax 50-150mm); and favourable for other loamy soils (Smax 150-300 mm).
P2		5-7	27-30 15-18	Mainly gently undulating plains, for the most part well drained, at medium altitude, developed on granites and gneisses. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are complexes of rock outcrops, surface ironstone, very stony, and very shallow (< 25 cm); and moderately well to imperfectly drained, shallow to deep frequently calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and high natural fertility.	1100-1300	550-600 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils are generally moderately deep sandy or loamy with low to moderate AWC (30-100 mm/m) and poor moisture storing properties mostly for sandy and loamy soils susceptible to surface capping (Smax 50-150mm); and favourable for other loamy soils (Smax 150-300 mm). In some units with salt affected soils effective soil depth is restricted by impervious subsoil, often high ESP.
R		na	na	Rocky terrain	na	na	na

AGRO-ECOLOGICAL ZONES FOR HANDENI DISTRICT (TANGA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
CI		5-7	29-31 19-23	Nearly level to rolling plains of slope range 0-10%, developed on Quaternary, Neogene, Jurrasic and Cretaceous sediments. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure, and very low natural fertility; and moderately well to imperfectly drained, shallow to deep usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and moderate natural fertility.	< 200	1000-1200 Bimodal	2 dependable growing periods (DGP) per year. Variation of DGP length as function of soil moisture storage capcity and crop rooting habits. Duration is 3-4 months. Main DGP is March-April, while the secondary DGP is October – November. The zone has deep sandy soils with low AWC (30-80 mm/m) and moderate soil depth (1-2m). Poor to moderate moisture storing capacity (Smax 50-150mm)
C4		5.5-7	29-31 19-23	Flat, low altitude riverine floodplains (84%) and deltas (16%) with spatially and temporally varying flooding regimes and sedimentation patterns; mainly covered by young alluvial soils with variable drainage and flooding conditions. Dominant soils are well to moderately well drained, deep, brownish fine sands to sandy clay loams with high textural variability over short distances and highly stratified with more sandy or more clayey layers; and imperfectly to poorly drained, deep, (dark) grey, or grey brown	<200	1200-14000 Varible	Growing period mainly determined by flooding regime. The zone moisture characteristics is influenced by flood regimes, drainage variability,

				clays, sandy clays or clay laoms often mottled and usually with more sandy horizons within the profile and moderate toposoil structure, with high natural fertility; and imperfectly to poorly drained, deep, coarse almost pure bleached sands often with finer texture overly usually with poor natural fertility			
EI		5-7	27-30 15-18	Mainly well drained, gently undulating to rolling plains and plateaux with altitude variability, developed on gneissic rocks, includes some poorly drained, flat and wide topographical depressions developed on young alluvium. Dominant soils are well drained, moderately deep to deep, dark reddish brown, yellowish red or red sandy clay loams and sandy clays with weak or moderate structure and low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with poor structure with very low natural fertility.	500 - 1200	400-500 Monomodal	One DGP per year with duration of less than 2 month, varying by less than 1 week in response to soil moisture storage properties and crop rooting habits. Onset dates are very unreliable. Soils are medium to heavy textured with moderate AWC (70-120mm/m) and poor moisture acceptance to due to surface sealing (Smax 40-60mm)
E2		5-7	27-30 15-18	Mainly well drained, gently undulating to rolling plains and plateaux, altitude 500-1200 m developed on gneissic rocks. There are poorly drained flat wide topographical depressions developed on young alluvium. Sloppy areas are strongly dissected, often rocky and severely eroded. Dominant soils are well drained, moderately deep to deep, dark reddish brown, yellowish red or red sandy clay loams and sandy clays with weak or moderate structure and low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with poor structure with very low natural fertility (Pare, Usambara and Lower Kilimnajaro)	500-1200	800-1000 Monomodal	One DGP per year with duration of 2 - 2½ months varying by less than 2 weeks in response to soil moisture storage capacity crop rooting habits. Unreliable onset dates. Soils are medium to heavy textured with moderate to high AWC (AWC 80-150 mm/m) but with poor moisture acceptance properties due to tendency for surface sealing (Smax 40-60 mm).
E3		4-	29-31 19-23	Mainly well drained, flat to rolling plains, low altitude developed on intermediate metamorphic rocks. Major soils are well drained, moderately deep to deep, reddish and yellowish sandy clay loams and sandy clays, often with more sandy topsoil, with weak structure and low natural fertility; and somewhat excessively to moderately well drained, moderately deep to deep, reddish, brown or grey loamy sands, sandy loams and sandy clay loams with weak structure and low	200-750	800-1000 Monomodal	Mainly one DGP 3 - 4½ months varying by 1-4 weeks depending on soil moisture storing properties and crop rooting habits. Onset dates are unreliable. Soil texture varies from medium to heavy textured alluvial with moderate to high AWC (80-150 mm/m) and favourable moisture storing properties (Smax 200-350mm). Natural soil fertility shows marked differences between sites, and soil acidity may be common

				natural fertility; and well drained, moderately deep to deep, yellowish or reddish sandy clays with weak structure, very low to low natural fertility.			
R		na	na	Rocky terrain	na	na	na

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
P3		5-7	27-30 15-18	Mainly gently undulating plains, for the most part well drained, at medium altitude, developed on granites and gneisses. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are complexes of rock outcrops, surface ironstone, very stony, and very shallow (< 25 cm); and moderately well to imperfectly drained, shallow to deep frequently calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and high natural fertility.	1100-1300	600-1000 Monomodal	One DGP per year with duration of 4-5 months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils are generally moderately deep sandy or loamy with low to moderate AWC (30-100 mm/m) and poor moisture storing properties mostly for sandy and loamy soils susceptible to surface capping (Smax 50-150mm); and favourable for other loamy soils (Smax 150-300 mm). In some units with salt affected soils effective soil depth is restricted by impervious subsoil, often high ESP.
P7		7-8½	27-30 15-18	Flat to very gently undulating plains developed in old lake sediments. Major soils are well to moderately well drained, shallow to moderately deep, grey or brown, friable calcareous clay loams and clays, with moderate to strong structure and high natural fertility; and imperfectly drained, shallow, dark grey or brown sands to sandy clays with hardpan within 50 cm from the surface, often calcareous and sodic in the subsoil (ESP 10-15) with moderate natural fertility.	1000-1100	600-800 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Soils are shallow to moderately deep (0.5 – 1.5 m) friable clays with high AWC (150). Favourable moisture storing properties (Smax 200-250).
P8		6½-7	27-30 15-18	Flat to gently undulating plains developed partly on granites, partly on old colluvium; medium altitude. Major soils are imperfectly drained, shallow, dark grey or brown sands to sandy clays with hardpan within 50 cm from the surface, often calcareous and sodic in the subsoil (ESP 10-15) with moderate natural fertility; and moderately well to imperfectly drained, shallow to deeper, usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and with high natural fertility; and well drained, moderately deep to deep, red or brown often gravely, sandy loams and sandy clay loams, with weak structure and low	1000-1200	600-1200 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storage capacity and crop rooting habits. Onset dates unreliable. The zone mainly covered by hardpan soils with poor moisture storing properties AWC (30-100), with important proportions of dark cracking clays of topographical depressions with moderate moisture storing properties AWC 150 mm/m; Smax 75-150 mm; and sandy and medium textured with moderate to high moisture storing properties (AWC 50 – 100 mm/m; Smax 50-300 mm).

				natural fertility.			
PI2		5½ - 9	27-30 15-18	Flat seasonally inundated, lowland plains developed on young alluvium. Major soils are moderately well to imperfectly drained, shallow to deep often calcareous, black, dark grey or brown cracking clays mostly overlying paler subsoil with ephemeral structure and high natural fertility; and imperfectly drained, shallow, dark grey or brown sands to sandy clays with hardpan within 50 cm from the surface, often calcareous and sodic in subsoil (ESP 10-15), with moderate natural fertility.	900-1200	600-700 Monomodal	DGP varies with Physiography. For upland areas one DGP per year with duration of 3-3½ months depending soil moisture storing capacity and crop rooting habits. For most of the zone growing period in determined by duration of depth of flooding. Soil moisture storage is poor to moderate AWC 30-150 mm/m, Smax 75-150 mm.

AGRO-ECOLOGICAL ZONES FOR ILALA DISTRICT (DAR ES SALAAM)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
C2		5-7	29-31 19-23	Nearly level to gently rolling plains and plateaux, slopes ranging from 0-10%, developed on Quaternary, Neogene, Jurrasic and Cretaceous sediment. Soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in subsoil and poor structure and with very low natural fertility; and moderately well to imperfectly drained,	< 500	800-1000 Monomodal	One DGP per year with duration of 3-4½ months, with variation of 3-4 weeks depending soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Soils have moderate to high AWC (80-150 mm/m) and favourable moisture storing characteristics (Smax 150-350 mm).

				shallow to deep usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and moderate natural fertility.			
C3		5-7	29-31 19-23	Strongly dissected uplands and rolling to steep hills, slope range of 10-45%, developed on Jurassic, sandstones, shales, limestones, Paleogene limestone and marls and Neogene sandy clays. Soils are mainly well drained, moderately deep to deep, reddish and yellowish sandy clay loams and sandy clays, often with more sandy topsoils, with weak structure and low natural fertility; and complex of rock outcrops, surface ironstone, very stony and very shallow soils; and important proportion of moderately well to imperfectly drained, shallow to deep, usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and moderately high natural fertility.	<500	800-1000 Monomodal	One DGP per year with duration of 3-4½ months, with variation of 3-4 weeks depending soil moisture storage capacity and crop rooting habits. Unreliable onset dates Soils in the zone are characterised to be of low to moderate AWC (80-100 mm/m) and poor to moderate moisture storing properties (Smax 50-150 mm) according to rainfall acceptanece.
C5		5-7	29-31 19-23	Flat to gently undulating plains, slope range 0-3% developed on old alluvial terrace no longer flooded. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in subsoil, weak structure and very low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with weak structure and very low natural fertility; and imperfectly to poorly drained due to flat topography and ponding above ironstone pans in subsoil (0-7 to 1.5 m deep) which prevent deep percolation and are able to maintain perched water tables stable enough rice cultivation.	< 200	1000-1200 Monomodal	One dependable growing period per year with duration of 3-4½months. Mainly covered by deep, medium to heavy textured soils with moderate to high AWC (80-150 mm/m) and favourable moisture storing properties (Smax 150-350 mm). Topographical favours runoff additions and promote flood risk.
O		na	na	Ocean	na	na	na

AGRO-ECOLOGICAL ZONES FOR ILEJE DISTRICT (MBEYA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
H4		5½-7½	29-31 19-23	Flat to very gently undulating lacustrine plain at low altitude. Major soils are imperfectly to poorly drained, deep, dark grey or grey brown clays, sandy clays or clay loams often mottled; high natural fertility; and well to moderately well drained, deep, brownish fine sands to sandy clay loams with high textural variability over short distances and highly stratified with more sandy or more clayey layers. High natural fertility.	500	1600-2400 Mnonomdal	One DGP per year, often merging into next without intermediate dry period. Duration DGP 8-10 months, varying depending soil moisture storage capacity and crop rooting habits. Onset dates difficult to determine because of overlap of growing periods. AWC is moderate to high (80-150 mm/m) with moderate to high soil moisture storing properties (Smax 150 – 300 mm)
H5		5-7	22-25 10-15	Volcanic landforms ranging from undulating to rolling, medium to high altitude plains and plateaux; to strongly dissected hills, mountains, plateaux and plains at medium altitude. Major soils are well drained, deep, dark grey brown loamy sands, sandy loams and loams rich in allophanic clays with weak structure, low bulk density and with high natural fertility; and well drained, deep yellowish or reddish sandy clays to clays with moderate to strong structure with moderate	1200-2400	1000-2000 Monomodal	One DGP per year, increasing in duration from 6-9 months to 9-12 months, depending on altitude and soil moisture storage capacity. Onset dates difficult to determine because of overlap of growing periods. Soil moisture characteristics vary between physiographic units ranging from moderate to high AWC (100-200 mm/m) with favourable moisture storing properties (Smax 300-400).

				natural fertility.			
R		na	na	Rocky terrain	na	na	na

AGRO-ECOLOGICAL ZONES FOR IRAMBA DISTRICT (SINGIDA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
NI		4½-7	22-25 10-15	Mainly rolling to hilly, dissected plateaux at high altitude developed on volcanic ash, lavas and on gneisses. Mainly covered by heterogeneous soil types with important proportions of fertile, well drained, deep yellowish or reddish sandy clays to clay with moderate to strong structure developed on volcanic ash and lavas, and strongly weathered, heavy – textured soils of low to medium fertility.	1500-2500	500-700 Monomodal	One DGP per year with duration of 3-5 months depending on soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Moderate to high AWC (70-150 mm/m) and favourable moisture storing properties (Smax 200-400).
P2		5-7	27-30 15-18	Mainly gently undulating plains, for the most part well drained, at medium altitude, developed on granites and gneisses. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are complexes of rock outcrops, surface ironstone, very stony, and very shallow (< 25 cm); and moderately well to imperfectly drained, shallow to deep frequently calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with	1100-1300	550-600 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils are generally moderately deep sandy or loamy with low to moderate AWC (30-100 mm/m) and poor moisture storing properties mostly for sandy and loamy soils susceptible to surface capping (Smax 50-150mm); and favourable for other loamy soils (Smax 150-300 mm). In some units with salt affected soils effective soil depth is restricted by impervious subsoil, often high ESP.

				ephemeral structure and high natural fertility.			
P8		6½-7	27-30 15-18	Flat to gently undulating plains developed partly on granites, partly on old colluvium; medium altitude. Major soils are imperfectly drained, shallow, dark grey or brown sands to sandy clays with hardpan within 50 cm from the surface, often calcareous and sodic in the subsoil (ESP 10-15) with moderate natural fertility; and moderately well to imperfectly drained, shallow to deeper, usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and with high natural fertility; and well drained, moderately deep to deep, red or brown often gravely, sandy loams and sandy clay loams, with weak structure and low natural fertility.	1000-1200	600-1200 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storage capacity and crop rooting habits. Onset dates unreliable. The zone mainly covered by hardpan soils with poor moisture storing properties AWC (30-100), with important proportions of dark cracking clays of topographical depressions with moderate moisture storing properties AWC 150 mm/m; Smax 75-150 mm; and sandy and medium textured with moderate to high moisture storing properties (AWC 50 – 100 mm/m; Smax 50-300 mm).
PI2		5½ - 9	27-30 15-18	Flat seasonally inundated, lowland plains developed on young alluvium. Major soils are moderately well to imperfectly drained, shallow to deep often calcareous, black, dark grey or brown cracking clays mostly overlying paler subsoil with ephemeral structure and high natural fertility; and imperfectly drained, shallow, dark grey or brown sands to sandy clays with hardpan within 50 cm from the surface, often calcareous and sodic in subsoil (ESP 10-15), with moderate natural fertility.	900-1200	600-700 Monomodal	DGP varies with Physiography. For upland areas one DGP per year with duration of 3-3½ months depending soil moisture storing capacity and crop rooting habits. For most of the zone growing period in determined by duration of depth of flooding. Soil moisture storage is poor to moderate AWC 30-150 mm/m, Smax 75-150 mm.
R		na	na	Rocky terrain	na	na	na

AGRO-ECOLOGICAL ZONES FOR IRINGA DISTRICT (IRINGA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
EI0		5½-7½	29-31 19-23	Flat alluvial plains with complex sedimentation pattern, subject to regular flood from braiding rivers. The physiographic units are mainly covered by young alluvial, well to moderately well drained, deep, brownish fine sands to sandy clay loams with high textural variability over short distances and highly stratified with more sandy than more clayey layers, with high natural fertility. About 30% of the soils covering the unit are imperfectly to poorly drained, deep, dark grey or grey brown clays, sandy clays or clay loams often mottled, with high natural fertility.	400-600	1400-1600 Monomdal	On non-flooding land, one DGP per year with duration of 5½ - 8 months, varying by 2½ months according to soil moisture storage capacity and crop rooting habits. Moisture storing properties ranges from moderate to high (more stable water table, AWC 80-150 mm/m, Smax 150-300 m). Onset dates are not reliable.
HI		5-7	22-25 10-15	Mainly flat and undulating to rolling plains and plateaux at high altitude, developed on granites and gneisses. Major soils are well drained, deep yellowish or reddish sandy clays to clays with moderate to strong structure, with moderate natural fertility; and well drained, moderately deep to deep, reddish and yellowish sandy loams and sandy clays, often with more sandy topsoils, with weak structure and low natural fertility.	1500-2000	600-1600 Monomdal	One DGP per year with duration of 5-6 months depending on soil moisture storage capacity and crop rooting habits. The zone has reliable onset dates, moderate AWC (120 mm/m) and favourable moisture storing properties (Smax 300-400 m).
H7		4½-7	22-25 10-15	Mainly mountainous topography at high altitude, either with extensive, undulating to hilly plateau crests or strongly dissected with limited plateau crests. Major soils are well drained, deep yellowish or reddish sandy clays to clays with moderate to strong structure with moderate natural fertility and complex of rock outcrops, surface ironstone, very stony soils and very shallow soils.	1500-2300	800-1000 Monomodal	One DGP per year with duration of 5-7 months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils have moderate AWC (120 mm/m) and favourable moisture storing properties (Smax 300-400).
P2		5-7	27-30 15-18	Mainly gently undulating plains, for the most part well drained, at medium altitude, developed on granites and gneisses. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep,	1100-1300	550-600 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils are generally moderately deep sandy or loamy with low to moderate AWC (30-100 mm/m) and poor moisture storing properties mostly for sandy and loamy soils susceptible to surface capping (Smax 50-150mm); and

				red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are complexes of rock outcrops, surface ironstone, very stony, and very shallow (< 25 cm); and moderately well to imperfectly drained, shallow to deep frequently calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and high natural fertility.			favourable for other loamy soils (Smax 150-300 mm). In some units with salt affected soils effective soil depth is restricted by impervious subsoil, often high ESP.
R3		>8½	27-30 15-18	Complex terrain, formed partly by flat to very gently undulating plains of lacustrine origin and partly by undulating plains of very old surface, at medium altitude. Covered by heterogeneous soils, ranging from sodic salt affected soils with varying colour, texture, structure, consistence and drainage but with fertility and moisture storing characteristics adversely affected by presence of exchangeable sodium and/or soluble salts at levels that are high enough to interfere with growth of most crops (ESP>15, pH>8.5, EC>4); well drained, moderate deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams depth with weak structure and very low natural fertility; and hardpan soils, and seasonally waterlogged soils with moderate fertility.	900-1400	600-1000 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storing capacity and crop rooting habits. Reliable onset dates. Heterogeneous soils with low to moderate moisture storing properties and seasonally waterlogged soils. ,
R4		5½-7	27-30 15-18	Flat plains covered by riverine alluvium and regularly flooded, with complex sedimentation pattern; medium altitude. Dominant soils are well to moderately drained, deep, brownish fine sands to sandy clay loams with high textural variability over short distances and high stratified with more sandy or clayey layers. High natural fertility; and imperfectly to poorly drained, deep, dark grey or grey brown clays, sandy clays or clay loams often mottled and usually with more sandy horizons within the profile and moderate topsoil structure and high natural fertility.	800-1000	1200-1400 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storing capacity and crop rooting habits. Reliable onset dates. In most of the zone growing period mainly determined by flooding regime which shows considerable spatial and temporal variability. The zone is mainly covered by heavy textured soils with moderate to high AWC (80-150 mm/m) and moderate moisture storing properties (Smax 150-350 mm).
R		na		na	na	na	na

AGRO-ECOLOGICAL ZONES FOR KAHAMA DISTRICT (SHINYANGA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
PI3		5 - 8½	27-30 15-18	Flat, seasonally inundated lowland plains with important proportion of permanent or semi-permanent swamps. . Major soils are moderately well to imperfectly drained, shallow to deep often calcareous, black, dark grey or brown cracking clays mostly overlying paler subsoil with ephemeral structure and high natural fertility; and imperfectly to poorly drained, deep, non-calcareous, grey or brown sandy loams to sandy clays with	900-1200	800-1000 Monomodal	DGP varies with Physiography. For upland areas, one DGP per year with duration of 5-6 months depending on soil moisture storage capacity and crop rooting habits. However, in most of the zone, growing period condition determined by duration and depth of flooding.

				strongly mottled and compact subsoil but with more sandy, more friable and darker toposoil. Moderate natural fertility; sodic subsoil possible.			
P4		5-7	27-30 15-18	Mainly flat to gently undulating plains with scattered hill-footslope associations at medium altitude, developed on granites, banded ironstones and young alluvium. Soils exhibit heterogeneous pattern with important proportions of well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are complexes of rock outcrops, surface ironstone, very stony, and very shallow; and moderately well to imperfectly drained, shallow to deep frequently calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and high natural fertility.	1200-1300	800-1000 Monomodal	One DGP per year with duration of 3½-5 months depending on soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Soils are moderately deep to deep with low to moderate AWC (50-100 mm/m) that may present 'chemical barriers' (e.g. salts) to root development in which case moisture reserve that can be used by crops is very low (Smax 30-50 mm). Where no chemical barriers exist, the moisture storing properties are moderate (Smax 100-200 mm).
P5		5-7	27-30 15-18	Mainly gently undulating plains, for the most part well drained, at medium altitude, developed on granites and gneisses. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are complexes of rock outcrops, surface ironstone, very stony, and very shallow (< 25 cm); and moderately well to imperfectly drained, shallow to deep frequently calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and high natural fertility.	1100-1300	800-1000 Monomodal	One DGP per year with duration of 5-6 months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils are generally moderately deep sandy or loamy with low to moderate AWC (30-100 mm/m) and poor moisture storing properties mostly for sandy and loamy soils susceptible to surface capping (Smax 50-150mm); and favourable for other loamy soils (Smax 150-300 mm). In some units with salt affected soils effective soil depth is restricted by impervious subsoil, often high ESP.
P8		6½-7	27-30 15-18	Flat to gently undulating plains developed partly on granites, partly on old colluvium; medium altitude. Major soils are imperfectly drained, shallow, dark grey or brown sands to sandy clays with hardpan within 50 cm from	1000-1200	600-1200 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storage capacity and crop rooting habits. Onset dates unreliable. The zone mainly covered by hardpan soils with poor moisture storing properties AWC (30-100),

				the surface, often calcareous and sodic in the subsoil (ESP 10-15) with moderate natural fertility; and moderately well to imperfectly drained, shallow to deeper, usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and with high natural fertility; and well drained, moderately deep to deep, red or brown often gravely, sandy loams and sandy clay loams, with weak structure and low natural fertility.			with important proportions of dark cracking clays of topographical depressions with moderate moisture storing properties AWC 150 mm/m; Smax 75-150 mm; and sandy and medium textured with moderate to high moisture storing properties (AWC 50 – 100 mm/m; Smax 50-300 mm).
R		na	na	Rocky terrain	na	na	na

AGRO-ECOLOGICAL ZONES FOR KARAGWE DISTRICT (KAGERA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
WI		4-7	22-25 10-15	Mainly strongly dissected hills formed by parallel ridges of sandstone and quartzites and deep, broad or narrow valleys developed on phyllites, often with permanent samps at high altitude. Major soils are well drained, moderately deep or deep, yellowish or reddish sandy clays to clays with weak structure and very low to low natural fertility; and complex of undifferentiated very shallow soils (< 25 cm deep) with rock outcrops.	1300-1800	1000-1500 Monomodal	One DGP per year often merged into the next, with duration of 7-9 months depending on soils moisture storage capacity and crop rooting habits. Unreliable onset dates. Major soils are well drained, clayey soils with moderate AWC (70-120 mm/m) and with favourable moisture storing properties (Smax 200-400 mm). Existence of chemical barriers may hamper utilisation of soil moisture reserves (Smax 50-80 mm).
W3		5-7	27-30 15-18	Mainly undulating to rolling plains and plateaux with resistant quartzite ridges often broken by steep escarpments, high altitude, developed on sandstones, often more dissected and hilly with parallel ridges and intervening narrow valleys. Major soils are mainly equal proportions of sandy soils and heavy-textured soils with strong acidity which are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, and weak structure and very low natural fertility; and,	1200-1600	800-1000 Monomodal	One DGP per year with duration of 4-5 months depending on soil moisture storing capacity and crop rooting habits. Unreliable onset dates. The zone is mainly covered by sandy and loamy soils with low to moderate AWC (50-100 mm/m) and with moderate moisture stroing properties (Smax 100-200 mm). Chemical barriers may prevent roots to utilize moisture reserves (Smax 50-80 mm).

				well drained, deep, reddish or brown sandy loams and sand clay loams with weak structure and very low natural fertility; and accumulation of partly decayed plant materials in permanent swamps or alpine meadows.			
W4		4-7	27-30 15-18	Undulating to rolling upland plains developed on phyllite with protruding ridges of quartzite capped ironstone. Include a large flat to undulating central valley developed on alluvium and colluvium derived phyllites. Contains also flat riverine plain regularly flooded. Major soils are well drained, moderately deep or deep, yellowish or reddish sandy clays to clays with weak structure and very low to low natural fertility; and complex of undifferentiated very shallow soils (< 25 cm deep) with rock outcrops; and well drained, young and fertile alluvial soils, sandy and loamy soils.	1400-1500	1000->1500 Monomodal	One DGP per year often merged into next, with duration of 9-12 months depending on soil moisture storing capacity and crop rooting habits. Onset dates difficult to establish because of overlap of growing period. The zone is mainly covered by sandy and loamy soils with low to moderate AWC (50-100 mm/m) and with moderate moisture storing properties (Smax 100-200 mm). Chemical barriers may prevent roots to utilize moisture reserves (Smax 50-80 mm).

AGRO-ECOLOGICAL ZONES FOR KARATU DISTRICT (ARUSHA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
NI		4½-7	22-25 10-15	Mainly rolling to hilly, dissected plateaux at high altitude developed on volcanic ash, lavas and on gneisses. Mainly covered by heterogeneous soil types with important proportions of fertile, well drained, deep yellowish or reddish sandy clays to clay with moderate to strong structure developed on volcanic ash and lavas, and strongly weathered, heavy – textured soils of low to medium fertility.	1500-2500	500-700 Monomodal	One DGP per year with duration of 3-5 months depending on soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Moderate to high AWC (70-150 mm/m) and favourable moisture storing properties (Smax 200-400).
N3		>8½	27-30 15-18	Flat lacustrine plains at medium altitude, with extensive salt and soda flats, often inundated. Major soils are of varying colour, texture, structure, consistence and drainage but with fertility status and moisture storing properties adversely affected by presence of exchangeable sodium and/or soluble salts at levels that are high enough to interfere with growth of most crops (ESP>15, pH>8.5, EC>4. Also, moderately well to imperfectly drained, shallow to deep usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and moderate to high natural fertility. Often high ESP in subsoil.	900 -1100	400-500 Monomodal	Very short to short growing periods, adversely influenced by dominance of salts in soil. The zone is mainly covered by salt affected soils with important proportion of dark cracking clays of topographical depressions with moderate moisture storing properties.
P2		5-7	27-30 15-18	Mainly gently undulating plains, for the most part well drained, at medium altitude, developed on granites and gneisses. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are	1100-1300	550-600 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils are generally moderately deep sandy or loamy with low to moderate AWC (30-100 mm/m) and poor moisture storing properties mostly for sandy and loamy soils susceptible to surface capping (Smax 50-150mm); and favourable for other loamy soils (Smax 150-300 mm). In some units with salt affected soils effective soil depth is restricted by impervious

				complexes of rock outcrops, surface ironstone, very stony, and very shallow (< 25 cm); and moderately well to imperfectly drained, shallow to deep frequently calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and high natural fertility.			subsoil, often high ESP.
R		na	na	Rocky terrain	na	na	na
L		na	na	Lake	na	na	na

AGRO-ECOLOGICAL ZONES FOR KASKAZINI A DISTRICT (KASKAZINI REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	**Temperature (^{0}c)**	**Soils and Topography**	**Altitude (m)**	**Rainfall total (mm/Year) / Patten**	**Length of Growing Period and Soil Moisture Properties**

C7	2,132	5-7	29-31 19-23	Nearly level to undulating and rolling plains developed on Neogene's and Quaternary limestone, sandstones, marls, sands, clays. Soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in subsoil, weak structure and very low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands but with more clayey or stratified subsoils (sandy loams to sandy clays) with weak structure, somewhat higher organic matter content and very low natural fertility; and windblown sands patterned into dunes stabilized by vegetation.	< 100	1400-1600 Bimodal	Two dependable growing periods (DGP), duration of 4-5 months for the main growing period with reliable onset dates and 1½ to 2½ for the secondary growing period with unreliable onset dates. Soil moisture properties same as C6.
O		na	na	Ocean	na	na	na

AGRO-ECOLOGICAL ZONES FOR KASKAZINI B DISTRICT (KASKAZINI REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	**Temperature (^{0}c)**	**Soils and Topography**	**Altitude (m)**	**Rainfall total (mm/Year) / Patten**	**Length of Growing Period and Soil Moisture Properties**
C7		5-7	29-31 19-23	Nearly level to undulating and rolling plains developed on Neogene's and Quaternary limestone, sandstones, marls, sands, clays. Soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in subsoil,	< 100	1400-1600 Bimodal	Two dependable growing periods (DGP), duration of 4-5 months for the main growing period with reliable onset dates and 1½ to 2½ for the secondary growing period with unreliable onset dates. Soil moisture properties same as C6.

				weak structure and very low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands but with more clayey or stratified subsoils (sandy loams to sandy clays) with weak structure, somewhat higher organic matter content and very low natural fertility; and windblown sands patterned into dunes stabilized by vegetation.			
O		na	na	Ocean	na	na	na

AGRO-ECOLOGICAL ZONES FOR KASULU DISTRICT (KIGOMA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
P5		5-7	27-30 15-18	Mainly gently undulating plains, for the most part well drained, at medium altitude, developed on granites and gneisses. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are complexes of rock outcrops, surface	1100-1300	800-1000 Monomodal	One DGP per year with duration of 5-6 months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils are generally moderately deep sandy or loamy with low to moderate AWC (30-100 mm/m) and poor moisture storing properties mostly for sandy and loamy soils susceptible to surface capping (Smax 50-150mm); and favourable for other loamy soils (Smax 150-300 mm). In some units with salt affected soils effective soil depth is restricted by impervious subsoil, often high ESP.

				ironstone, very stony, and very shallow (< 25 cm); and moderately well to imperfectly drained, shallow to deep frequently calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and high natural fertility.			
P6		5-7	27-30 15-18	Mainly undulating plains and plateaux developed on sandstones, shales and quartzites medium altitude. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, deep, reddish or brown sandy loams and sandy clay loams and sandy clays often with more sandy topsoil, weak structure and low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with poor structure and very low natural fertility.	800-1800	850-1700 Monomodal	One DGP per year with duration of 6-8½ months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils are heterogeneous with low to moderate AWC (50-100 mm/m) and poor to moderate moisture storing properties (Smax 30-150 mm).
PI3		5 - 8½	27-30 15-18	Flat, seasonally inundated lowland plains with important proportion of permanent or semi-permanent swamps. . Major soils are moderately well to imperfectly drained, shallow to deep often calcareous, black, dark grey or brown cracking clays mostly overlying paler subsoil with ephemeral structure and high natural fertility; and imperfectly to poorly drained, deep, non-calcareous, grey or brown sandy loams to sandy clays with strongly mottled and compact subsoil but with more sandy, more friable and darker toposoil. Moderate natural fertility; sodic subsoil possible.	900-1200	800-1000 Monomodal	DGP varies with Physiography. For upland areas, one DGP per year with duration of 5-6 months depending on soil moisture storage capacity and crop rooting habits. However, in most of the zone, growing period condition determined by duration and depth of flooding.
W2		4-7	22-25 10-15	Dissected hilly plateaux developed on basalt, argilclaceous sandstones and shales, with flat or gently undulating tablelands bounded by steep scarps and valleys often strongly affected by erosion, at high altitude. Mainly covered by equal proportions of heavy – textured soils with high organic matter contents which are well drained, moderately deep or deep, yellowish or reddish sandy clays to clays with weak structure and very low to low natural fertility; and well drained, deep yellowish or reddish sandy clays to clays with moderate to strong structure and moderate	1500-1700	1000-1500 Monomdal	One DGP per year with duration of 6½ - 8 months depending on moisture storage capacity and crop rooting habits. Reliable onset dates. Major soils are well drained, clayey soils with moderate AWC (70-120 mm/m) and with favourable moisture storing properties (Smax 200-400 mm). Existence of chemical barriers may hamper utilisation of soil moisture reserves (Smax 50-80 mm).

				natural fertility.			

AGRO-ECOLOGICAL ZONES FOR KATI DISTRICT (KUSININ UNGUJA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
C7		5-7	29-31 19-23	Nearly level to undulating and rolling plains developed on Neogene's and Quaternary limestone, sandstones, marls, sands, clays. Soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in subsoil, weak structure and very low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands but with more clayey or stratified subsoils (sandy loams to sandy clays) with weak structure, somewhat higher organic matter content and very low natural fertility; and windblown sands patterned into dunes stabilized by vegetation.	< 100	1400-1600 Bimodal	Two dependable growing periods (DGP), duration of 4-5 months for the main growing period with reliable onset dates and 1½ to 2½ for the secondary growing period with unreliable onset dates. Soil moisture properties same as C6.
O		na	na	Ocean	na	na	na

AGRO-ECOLOGICAL ZONES FOR KIBAHADISTRICT (COAST REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
CI		5-7	29-31 19-23	Nearly level to rolling plains of slope range 0-10%, developed on Quaternary, Neogene, Jurrasic and Cretaceous sediments. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure, and very low natural fertility; and moderately well to imperfectly drained, shallow to deep usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and moderate natural fertility.	< 200	1000-1200 Bimodal	2 dependable growing periods (DGP) per year. Variation of DGP length as function of soil moisture storage capcity and crop rooting habits. Duration is 3-4 months. Main DGP is March-April, while the secondary DGP is October – November. The zone has deep sandy soils with low AWC (30-80 mm/m) and moderate soil depth (1-2m). Poor to moderate moisture storing capacity (Smax 50-150mm)
C2		5-7	29-31 19-23	Nearly level to gently rolling plains and plateaux, slopes ranging from 0-10%, developed on Quaternary, Neogene, Jurrasic and Cretaceous sediment. Soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in subsoil and poor structure and with very low natural fertility; and moderately well to imperfectly drained, shallow to deep usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and moderate natural fertility.	< 500	800-1000 Monomodal	One DGP per year with duration of 3-4½ months, with variation of 3-4 weeks depending soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Soils have moderate to high AWC (80-150 mm/m) and favourable moisture storing characteristics (Smax 150-350 mm).
C3		5-7	29-31 19-23	Strongly dissected uplands and rolling to steep hills, slope range of 10-45%, developed on Jurassic, sandstones, shales, limestones, Paleogene limestone and marls and Neogene sandy clays. Soils are mainly well drained, moderately deep to deep, reddish and yellowish sandy clay loams and sandy clays,	<500	800-1000 Monomodal	One DGP per year with duration of 3-4½ months, with variation of 3-4 weeks depending soil moisture storage capacity and crop rooting habits. Unreliable onset dates Soils in the zone are characterised to be of low to moderate AWC (80-100 mm/m) and poor to

				often with more sandy topsoils, with weak structure and low natural fertility; and complex of rock outcrops, surface ironstone, very stony and very shallow soils; and important proportion of moderately well to imperfectly drained, shallow to deep, usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and moderately high natural fertility.			moderate moisture storing properties (Smax 50-150 mm) according to rainfall acceptanece.
C4		5.5-7	29-31 19-23	Flat, low altitude riverine floodplains (84%) and deltas (16%) with spatially and temporally varying flooding regimes and sedimentation patterns; mainly covered by young alluvial soils with variable drainage and flooding conditions. Dominant soils are well to moderately well drained, deep, brownish fine sands to sandy clay loams with high textural variability over short distances and highly stratified with more sandy or more clayey layers; and imperfectly to poorly drained, deep, (dark) grey, or grey brown clays, sandy clays or clay laoms often mottled and usually with more sandy horizons within the profile and moderate toposoil structure, with high natural fertility; and imperfectly to poorly drained, deep, coarse almost pure bleached sands often with finer texture overly usually with poor natural fertility	<200	1200-14000 Varible	Growing period mainly determined by flooding regime. The zone moisture characteristics is influenced by flood regimes, drainage variability,
SI		5-7	29-31 19-23	Mainly gently undulating to rolling plateaux developed on Karroo sandstones and Neogene sandy sediments; low altitude. Major soils are well drained, moderately deep to deep, red, yellowish or red or orange sands and loamy sands with sands with sandy loams in depth, with weak structure and very low natural fertility; and important proportion of moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with weak structure and very low natural fertility.	200-500	800-1000 Monomodal	One DGP per year with duration of 3-4½ months, varying by 3-4 weeks depending on soil moisture storing capacity and crop rooting habits. Unreliable onset dates. The zone is covered by well drained loamy sands with low fertility and poor to moderate moisture storing properties.

AGRO-ECOLOGICAL ZONES FOR KIBONDO DISTRICT (KIGOMA REGION)

AEZ	SUB	pH	Temperatur		Altitude	Rainfall	Length of Growing Period and Soil

CODE	ZONE-AREA (Sq-Km)	(H_2O)	e (^{0}c)	Soils and Topography	(m)	total (mm/Year) / Patten	Moisture Properties
P5		5-7	27-30 15-18	Mainly gently undulating plains, for the most part well drained, at medium altitude, developed on granites and gneisses. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are complexes of rock outcrops, surface ironstone, very stony, and very shallow (< 25 cm); and moderately well to imperfectly drained, shallow to deep frequently calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and high natural fertility.	1100-1300	800-1000 Monomodal	One DGP per year with duration of 5-6 months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils are generally moderately deep sandy or loamy with low to moderate AWC (30-100 mm/m) and poor moisture storing properties mostly for sandy and loamy soils susceptible to surface capping (Smax 50-150mm); and favourable for other loamy soils (Smax 150-300 mm). In some units with salt affected soils effective soil depth is restricted by impervious subsoil, often high ESP.
PI3		5 - 8½	27-30 15-18	Flat, seasonally inundated lowland plains with important proportion of permanent or semi-permanent swamps. . Major soils are moderately well to imperfectly drained, shallow to deep often calcareous, black, dark grey or brown cracking clays mostly overlying paler subsoil with ephemeral structure and high natural fertility; and imperfectly to poorly drained, deep, non-calcareous, grey or brown sandy loams to sandy clays with strongly mottled and compact subsoil but with more sandy, more friable and darker toposoil. Moderate natural fertility; sodic subsoil possible.	900-1200	800-1000 Monomodal	DGP varies with Physiography. For upland areas, one DGP per year with duration of 5-6 months depending on soil moisture storage capacity and crop rooting habits. However, in most of the zone, growing period condition determined by duration and depth of flooding.
W2		4-7	22-25 10-15	Dissected hilly plateaux developed on basalt, argilclaceous sandstones and shales, with flat or gently undulating tablelands bounded by steep scarps and valleys often strongly affected by erosion, at high altitude. Mainly covered by equal proportions of heavy – textured soils with high organic matter contents which are well drained, moderately deep or deep, yellowish or reddish sandy clays to clays with weak structure and very low to low natural fertility; and well drained, deep yellowish or reddish sandy clays to clays with moderate to strong structure and moderate	1500-1700	1000-1500 Monomdal	One DGP per year with duration of 6½ - 8 months depending on moisture storage capacity and crop rooting habits. Reliable onset dates. Major soils are well drained, clayey soils with moderate AWC (70-120 mm/m) and with favourable moisture storing properties (Smax 200-400 mm). Existence of chemical barriers may hamper utilisation of soil moisture reserves (Smax 50-80 mm).

				natural fertility.			
W3		5-7	27-30 15-18	Mainly undulating to rolling plains and plateaux with resistant quartzite ridges often broken by steep escarpments, high altitude, developed on sandstones, often more dissected and hilly with parallel ridges and intervening narrow valleys. Major soils are mainly equal proportions of sandy soils and heavy-textured soils with strong acidity which are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, and weak structure and very low natural fertility; and, well drained, deep, reddish or brown sandy loams and sand clay loams with weak structure and very low natural fertility; and accumulation of partly decayed plant materials in permanent swamps or alpine meadows.	1200-1600	800-1000 Monomodal	One DGP per year with duration of 4-5 months depending on soil moisture storing capacity and crop rooting habits. Unreliable onset dates. The zone is mainly covered by sandy and loamy soils with low to moderate AWC (50-100 mm/m) and with moderate moisture stroing properties (Smax 100-200 mm). Chemical barriers may prevent roots to utilize moisture reserves (Smax 50-80 mm).
W4		4-7	27-30 15-18	Undulating to rolling upland plains developed on phyllite with protruding ridges of quartzite capped ironstone. Include a large flat to undulating central valley developed on alluvium and colluvium derived phyllites. Contains also flat riverine plain regularly flooded. Major soils are well drained, moderately deep or deep, yellowish or reddish sandy clays to clays with weak structure and very low to low natural fertility; and complex of undifferentiated very shallow soils (< 25 cm deep) with rock outcrops; and well drained, young and fertile alluvial soils, sandy and loamy soils.	1400-1500	1000->1500 Monomodal	One DGP per year often merged into next, with duration of 9-12 months depending on soil moisture storing capacity and crop rooting habits. Onset dates difficult to establish because of overlap of growing period. The zone is mainly covered by sandy and loamy soils with low to moderate AWC (50-100 mm/m) and with moderate moisture storing properties (Smax 100-200 mm). Chemical barriers may prevent roots to utilize moisture reserves (Smax 50-80 mm).

AGRO-ECOLOGICAL ZONES FOR KIGOMA DISTRICT (KIGOMA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
P5		5-7	27-30 15-18	Mainly gently undulating plains, for the most part well drained, at medium altitude, developed on granites and gneisses. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are complexes of rock outcrops, surface ironstone, very stony, and very shallow (< 25 cm); and moderately well to imperfectly drained, shallow to deep frequently calcareous, black, dark grey or brown cracking	1100-1300	800-1000 Monomodal	One DGP per year with duration of 5-6 months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils are generally moderately deep sandy or loamy with low to moderate AWC (30-100 mm/m) and poor moisture storing properties mostly for sandy and loamy soils susceptible to surface capping (Smax 50-150mm); and favourable for other loamy soils (Smax 150-300 mm). In some units with salt affected soils effective soil depth is restricted by impervious subsoil, often high ESP.

				clays often overlying paler subsoil with ephemeral structure and high natural fertility.			
PI3		5 - 8½	27-30 15-18	Flat, seasonally inundated lowland plains with important proportion of permanent or semi-permanent swamps. . Major soils are moderately well to imperfectly drained, shallow to deep often calcareous, black, dark grey or brown cracking clays mostly overlying paler subsoil with ephemeral structure and high natural fertility; and imperfectly to poorly drained, deep, non-calcareous, grey or brown sandy loams to sandy clays with strongly mottled and compact subsoil but with more sandy, more friable and darker toposoil. Moderate natural fertility; sodic subsoil possible.	900-1200	800-1000 Monomodal	DGP varies with Physiography. For upland areas, one DGP per year with duration of 5-6 months depending on soil moisture storage capacity and crop rooting habits. However, in most of the zone, growing period condition determined by duration and depth of flooding.
W2		4-7	22-25 10-15	Dissected hilly plateaux developed on basalt, argilclaceous sandstones and shales, with flat or gently undulating tablelands bounded by steep scarps and valleys often strongly affected by erosion, at high altitude. Mainly covered by equal proportions of heavy – textured soils with high organic matter contents which are well drained, moderately deep or deep, yellowish or reddish sandy clays to clays with weak structure and very low to low natural fertility; and well drained, deep yellowish or reddish sandy clays to clays with moderate to strong structure and moderate natural fertility.	1500-1700	1000-1500 Monomdal	One DGP per year with duration of 6½ - 8 months depending on moisture storage capacity and crop rooting habits. Reliable onset dates. Major soils are well drained, clayey soils with moderate AWC (70-120 mm/m) and with favourable moisture storing properties (Smax 200-400 mm). Existence of chemical barriers may hamper utilisation of soil moisture reserves (Smax 50-80 mm).
P6		5-7	27-30 15-18	Mainly undulating plains and plateaux developed on sandstones, shales and quartzites medium altitude. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, deep, reddish or brown sandy loams and sandy clay loams and sandy clays often with more sandy topsoil, weak structure and low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with poor structure and very low natural fertility.	800-1800	850-1700 Monomodal	One DGP per year with duration of 6-8½ months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils are heterogeneous with low to moderate AWC (50-100 mm/m) and poor to moderate moisture storing properties (Smax 30-150 mm).
RI		>8½	27-30 15-18	Mainly flat plains covered by riverine or lacustrine alluvium, strongly affected by salinity or sodicity and by variable flooding	900 - 1200	850-1300 Monomodal	One DGP per year with duration of 5-6 months around Lake Rukwa and 6-9 months in the Northwest (Karema depression). Growing period

				conditions, medium altitude, mostly below 1000 m. Mainly covered by salt affected soils which are soils of varying colour, texture, structure, consistence and drainage but with fertility and moisture storing characteristics adversely affected by presence of exchangeable sodium and/or soluble salts at levels that are high enough to interfere with growth of most crops (ESP>15, pH>8.5, EC>4); and well drained, moderately deep to deep, reddish and yellowish sandy clay loams and sandy clays, often with more sandy topsoil, weak structure and low natural fertility; and well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with weak structure and very low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with weak structure and very low natural fertility.			in the zone varies with rain-shadow effects in the lee of hill ranges or escarpments and variable flooding conditions. Reliable onset dates. Major soils covering the zone are characterized with moderate to high AWC (80-150 mm/m) and moderate to high moisture storing properties (Smax 150-350 mm). In 35% of the zone the ability of crops to extract moisture is negatively affected by strong salinity or alkalinity.
U		5-7	22-25 10-15	Complex of flat to gently undulating plains developed on various parent rocks (gneiss, schist, sandstones, acid volcanics, and granites) but mostly well drained and located at high altitude. Major soils are well drained, moderately deep to deep, reddish and yellowish sandy clay loams and sandy clays, often with more sandy topsoil, weak structure and low natural fertility; and well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, weak structure and very low natural fertility; and important proportions of moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with poor structure and very low natural fertility.	800-1800	800-1200 Monomodal	One DGP per year with duration of 5-6½ months depending on soil moisture storage capacity and crop rooting habits. In the northwest corner of the zone growing period may be 6-8½ months. Reliable onset dates. The zone is mainly covered by (moderately) deep sandy and loamy soils with low to moderate AWC (30-100 mm/m) and poor to moderate moisture storing properties (Smax 50-300 mm).
R		na	na	Rocky terrain	na	na	na
L		na	na	Lake	na	na	na

AGRO-ECOLOGICAL ZONES FOR KILOMBERO DISTRICT (MOROGORO REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
E4		4-7	29-31 19-23	Physiographic units range from well drained, level to rolling plains at low altitude (200-500m) to strongly dissected uplands and low hills transitional to mountains at altitude 500 – 1000 m; mainly developed on intermediate metamorphic rocks. Major soils are well drained, moderately deep to deep, yellowish or reddish sandy clays to clays with moderate to very low natural fertility.	200-1000	800-1000 Monomodal	One DGP per year which is 4½ to 6 month long, varying by 6 weeks depending soil moisture characteristics and crop rooting habits. Onsets are not reliable. In less dissected and less steep parts covered by well drained, deep clays, AWC is moderate (70-120 mm/m) and favourable moisture storing properties (Smax 200-400 mm). There are areas with soil toxicities which hinder root development and hence reduce ability of crop to extract stored soil moisture to (Smax 50-80 mm).
E7		5-6½	27-30 15-18	Mainly well drained, flat to rolling plains, locally hilly at medium altitude (750-1300 m). 30% is strongly dissected uplands and low hills transitional to the medium altitude plateau. Major soils are well drained, moderately deep to deep dark red to red to friable clays with moderate to strong structure and evidence of clay illuviation. Natural soil fertility is low to moderate, with common problem of soil acidity.	800-1500	800-1000 Monomodal	One medium to long DGP with reliable onsets per year with duration of 5-7 months in most of the zone, varying by 1½-2 months depending on soil moisture storing capacity and crop rooting habits. Moderate moisture storing properties (good rainfall acceptance, lateral seepage water addition) poor to moderate water storing properties depending on the presence of chemical barriers (AWC 80-120 mm/m, Smax 30-70 with chemical barriers, Smax 100-300 without chemical barriers)
EI0		5½-7½	29-31 19-23	Flat alluvial plains with complex sedimentation pattern, subject to regular flood from braiding rivers. The physiographic units are mainly covered by young alluvial, well to moderately well drained, deep, brownish fine sands to sandy clay loams with high textural variability over short distances and highly stratified with more sandy than more clayey layers, with high natural fertility. About 30% of the soils covering the unit are imperfectly to poorly drained, deep, dark grey or grey brown clays, sandy clays or clay loams often mottled, with high natural fertility.	400-600	1400-1600 Monomdal	On non-flooding land, one DGP per year with duration of 5½ - 8 months, varying by 2½ months according to soil moisture storage capacity and crop rooting habits. Moisture storing properties ranges from moderate to high (more stable water table, AWC 80-150 mm/m, Smax 150-300 m). Onset dates are not reliable.

H2		5-7	22-25 10-15	Undulating to rolling plains at the high altitude developed on granites. Major soils are well drained, deep yellowish or reddish sandy clays to clays with moderate to strong structure, with moderate natural fertility; and well drained, moderately deep to deep, reddish and yellowish sandy loams and sandy clays, often with more sandy topsoils, with weak structure and low natural fertility.	1500-2100	1400-1600 Monomodal	One DGP per year with duration of 6-9 months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates, moderate AWC (120 mm/m) and favourable moisture storing properties (Smax 300-400 m).
H7		4½-7	22-25 10-15	Mainly mountainous topography at high altitude, either with extensive, undulating to hilly plateau crests or strongly dissected with limited plateau crests. Major soils are well drained, deep yellowish or reddish sandy clays to clays with moderate to strong structure with moderate natural fertility and complex of rock outcrops, surface ironstone, very stony soils and very shallow soils.	1500-2300	800-1000 Monomodal	One DGP per year with duration of 5-7 months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils have moderate AWC (120 mm/m) and favourable moisture storing properties (Smax 300-400).
S1		5-7	29-31 19-23	Mainly gently undulating to rolling plateaux developed on Karroo sandstones and Neogene sandy sediments; low altitude. Major soils are well drained, moderately deep to deep, red, yellowish or red or orange sands and loamy sands with sands with sandy loams in depth, with weak structure and very low natural fertility; and important proportion of moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with weak structure and very low natural fertility.	200-500	800-1000 Monomodal	One DGP per year with duration of 3-4½ months, varying by 3-4 weeks depending on soil moisture storing capacity and crop rooting habits. Unreliable onset dates. The zone is covered by well drained loamy sands with low fertility and poor to moderate moisture storing properties.
S2		5-7	27-31 15-23	Mainly gently undulating to rolling plateaux developed on Karroo sediments. Some parts of the zone strongly dissected terrain. Dominant soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, weak structure and very low natural fertility; and proportion of moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with weak structure and very low natural fertility	200-1000	1000-1200 Monomodal	One DGP per year with duration of 5-7 months, varying by 1-2 months depending on soil moisture storing capacity and crop rooting habits. Reliable onset dates. The zone is mainly covered by moderately deep sandy and loamy soils with low to moderate AWC (50-80 mm/m) and poor to moderate moisture storing properties.

AGRO-ECOLOGICAL ZONES FOR KILOSA DISTRICT (MOROGORO REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
E2		5-7	27-30 15-18	Mainly well drained, gently undulating to rolling plains and plateaux, altitude 500-1200 m developed on gneissic rocks. There are poorly drained flat wide topographical depressions developed on young alluvium. Sloppy areas are strongly dissected, often rocky and severely eroded. Dominant soils are well drained, moderately deep to deep, dark	500-1200	800-1000 Monomodal	One DGP per year with duration of 2 - 2½ months varying by less than 2 weeks in response to soil moisture storage capacity crop rooting habits. Unreliable onset dates. Soils are medium to heavy textured with moderate to high AWC (AWC 80-150 mm/m) but with poor moisture acceptance properties due to tendency for surface sealing (Smax 40-60 mm).

				reddish brown, yellowish red or red sandy clay loams and sandy clays with weak or moderate structure and low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with poor structure with very low natural fertility (Pare, Usambara and Lower Kilimnajaro)			
E4		4-7	29-31 19-23	Physiographic units range from well drained, level to rolling plains at low altitude (200-500m) to strongly dissected uplands and low hills transitional to mountains at altitude 500 – 1000 m; mainly developed on intermediate metamorphic rocks. Major soils are well drained, moderately deep to deep, yellowish or reddish sandy clays to clays with moderate to very low natural fertility.	200-1000	800-1000 Monomodal	One DGP per year which is 4½ to 6 month long, varying by 6 weeks depending soil moisture characteristics and crop rooting habits. Onsets are not reliable. In less dissected and less steep parts covered by well drained, deep clays, AWC is moderate (70-120 mm/m) and favourable moisture storing properties (Smax 200-400 mm). There are areas with soil toxicities which hinder root development and hence reduce ability of crop to extract stored soil moisture to (Smax 50-80 mm).
E9		≥ 7	29-31 19-23	Flat alluvial plains with homogenous sedimentation pattern. Major soils are imperfectly to poorly drained, deep, dark grey or grey brown, often mottled clays (clay 40-70%), more compact and contain fewer sandy strata. Natural fertility status is low to moderate.	400 - 500	800-1000 Monomodal	One DGP per year with duration of 4½ - 6½ months, varying by 2 months depending on soil moisture storing capacity and crop rooting habits. Onset dates are unreliable, and the growing period is influenced by rainfall ponding and runoff collection. Moisture storing properties less favourable due to poor internal drainage (AWC 150, Smax 150-225).
EI0		5½-7½	29-31 19-23	Flat alluvial plains with complex sedimentation pattern, subject to regular flood from braiding rivers. The physiographic units are mainly covered by young alluvial, well to moderately well drained, deep, brownish fine sands to sandy clay loams with high textural variability over short distances and highly stratified with more sandy than more clayey layers, with high natural fertility. About 30% of the soils covering the unit are imperfectly to poorly drained, deep, dark grey or grey brown clays, sandy clays or clay loams often mottled, with high natural fertility.	400-600	1400-1600 Monomdal	On non-flooding land, one DGP per year with duration of 5½ - 8 months, varying by 2½ months according to soil moisture storage capacity and crop rooting habits. Moisture storing properties ranges from moderate to high (more stable water table, AWC 80-150 mm/m, Smax 150-300 m). Onset dates are not reliable.
EI4		4½-7	22-25 10-15	Mainly 67% of the physiographic units are very strongly dissected mountain block with steep to very steep slopes (15-60%), narrow valleys; altitude 1000 – 2000 m; includes 33% of strongly dissected foothills at low altitude (500-1000 m). Zone, particularly foothills, strongly affected by soil creep, gully erosion and landslides. Major soils are well	500-2000	1000-1200 Monomdal	One DGP per year but often transition from into next growing period without intermediate dry period. Duration 5½ - 7 months, varying depending on soil moisture storage capacity and crop rooting habits. Onset dates difficult to establish because of overlapping growing period. AWC (80-120 mm/m) moderate and moisture storage capacity is

				drained, deep yellowish or reddish sandy clays to clays with moderate to strong structure and moderate natural fertility; and well drained, deep yellowish or reddish sandy clays to clays with weak structure and with low to very low natural fertility			favourable (Smax 200-400 mm)
H7		4½-7	22-25 10-15	Mainly mountainous topography at high altitude, either with extensive, undulating to hilly plateau crests or strongly dissected with limited plateau crests. Major soils are well drained, deep yellowish or reddish sandy clays to clays with moderate to strong structure with moderate natural fertility and complex of rock outcrops, surface ironstone, very stony soils and very shallow soils.	1500-2300	800-1000 Monomodal	One DGP per year with duration of 5-7 months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils have moderate AWC (120 mm/m) and favourable moisture storing properties (Smax 300-400).
S2		5-7	27-31 15-23	Mainly gently undulating to rolling plateaux developed on Karroo sediments. Some parts of the zone strongly dissected terrain. Dominant soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, weak structure and very low natural fertility; and proportion of moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with weak structure and very low natural fertility	200-1000	1000-1200 Monomodal	One DGP per year with duration of 5-7 months, varying by 1-2 months depending on soil moisture storing capacity and crop rooting habits. Reliable onset dates. The zone is mainly covered by moderately deep sandy and loamy soils with low to moderate AWC (50-80 mm/m) and poor to moderate moisture storing properties.

AGRO-ECOLOGICAL ZONES FOR KILWA DISTRICT (MTWARA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
C2		5-7	29-31 19-23	Nearly level to gently rolling plains and plateaux, slopes ranging from 0-10%, developed on Quaternary, Neogene, Jurrasic and Cretaceous sediment. Soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in subsoil and poor structure and with very low natural fertility; and moderately well to imperfectly drained, shallow to deep usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and moderate natural fertility.	< 500	800-1000 Monomodal	One DGP per year with duration of 3-4½ months, with variation of 3-4 weeks depending soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Soils have moderate to high AWC (80-150 mm/m) and favourable moisture storing characteristics (Smax 150-350 mm).
C3		5-7	29-31 19-23	Strongly dissected uplands and rolling to steep hills, slope range of 10-45%, developed on Jurassic, sandstones, shales, limestones, Paleogene limestone and marls and Neogene sandy clays. Soils are mainly well drained, moderately deep to deep, reddish and yellowish sandy clay loams and sandy clays, often with more sandy topsoils, with weak structure and low natural fertility; and complex of rock outcrops, surface ironstone, very stony and very shallow soils; and important proportion of moderately well to imperfectly drained, shallow to deep, usually	<500	800-1000 Monomodal	One DGP per year with duration of 3-4½ months, with variation of 3-4 weeks depending soil moisture storage capacity and crop rooting habits. Unreliable onset dates Soils in the zone are characterised to be of low to moderate AWC (80-100 mm/m) and poor to moderate moisture storing properties (Smax 50-150 mm) according to rainfall acceptanece.

				calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and moderately high natural fertility.			
C5		5-7	29-31 19-23	Flat to gently undulating plains, slope range 0-3% developed on old alluvial terrace no longer flooded. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in subsoil, weak structure and very low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with weak structure and very low natural fertility; and imperfectly to poorly drained due to flat topography and ponding above ironstone pans in subsoil (0-7 to 1.5 m deep) which prevent deep percolation and are able to maintain perched water tables stable enough rice cultivation.	< 200	1000-1200 Monomodal	One dependable growing period per year with duration of 3-4½months. Mainly covered by deep, medium to heavy textured soils with moderate to high AWC (80-150 mm/m) and favourable moisture storing properties (Smax 150-350 mm). Topographical favours runoff additions and promote flood risk.
E3		4-7	29-31 19-23	Mainly well drained, flat to rolling plains, low altitude developed on intermediate metamorphic rocks. Major soils are well drained, moderately deep to deep, reddish and yellowish sandy clay loams and sandy clays, often with more sandy topsoil, with weak structure and low natural fertility; and somewhat excessively to moderately well drained, moderately deep to deep, reddish, brown or grey loamy sands, sandy loams and sandy clay loams with weak structure and low natural fertility; and well drained, moderately deep to deep, yellowish or reddish sandy clays with weak structure, very low to low natural fertility.	200-750	800-1000 Monomodal	Mainly one DGP 3 - 4½ months varying by 1-4 weeks depending on soil moisture storing properties and crop rooting habits. Onset dates are unreliable. Soil texture varies from medium to heavy textured alluvial with moderate to high AWC (80-150 mm/m) and favourable moisture storing properties (Smax 200-350mm). Natural soil fertility shows marked differences between sites, and soil acidity may be common
R		na	na	Rocky terraain	na	na	na
O		na	na	Ocean	na	na	na

AGRO-ECOLOGICAL ZONES FOR KINONDONI DISTRICT (DAR ES SALAAM REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
C2		5-7	29-31 19-23	Nearly level to gently rolling plains and plateaux, slopes ranging from 0-10%, developed on Quaternary, Neogene, Jurrasic and Cretaceous sediment. Soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in subsoil and poor structure and with very low natural fertility; and moderately well to imperfectly drained, shallow to deep usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and moderate natural fertility.	< 500	800-1000 Monomodal	One DGP per year with duration of 3-4½ months, with variation of 3-4 weeks depending soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Soils have moderate to high AWC (80-150 mm/m) and favourable moisture storing characteristics (Smax 150-350 mm).
C3		5-7	29-31 19-23	Strongly dissected uplands and rolling to steep hills, slope range of 10-45%, developed on Jurassic, sandstones, shales, limestones, Paleogene limestone and marls and Neogene sandy clays. Soils are mainly well drained, moderately deep to deep, reddish and yellowish sandy clay loams and sandy clays, often with more sandy topsoils, with weak structure and low natural fertility; and complex of rock outcrops, surface ironstone, very stony and very shallow soils; and important proportion of moderately well to imperfectly drained, shallow to deep, usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and moderately high natural fertility.	<500	800-1000 Monomodal	One DGP per year with duration of 3-4½ months, with variation of 3-4 weeks depending soil moisture storage capacity and crop rooting habits. Unreliable onset dates Soils in the zone are characterised to be of low to moderate AWC (80-100 mm/m) and poor to moderate moisture storing properties (Smax 50-150 mm) according to rainfall acceptanece.
O		na	na	Ocean	na	na	na

AGRO-ECOLOGICAL ZONES FOR KISARAWE DISTRICT (COAST REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
C1		5-7	29-31 19-23	Nearly level to rolling plains of slope range 0-10%, developed on Quaternary, Neogene, Jurrasic and Cretaceous sediments. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure, and very low natural fertility; and moderately well to imperfectly drained, shallow to deep usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and moderate natural fertility.	< 200	1000-1200 Bimodal	2 dependable growing periods (DGP) per year. Variation of DGP length as function of soil moisture storage capcity and crop rooting habits. Duration is 3-4 months. Main DGP is March-April, while the secondary DGP is October – November. The zone has deep sandy soils with low AWC (30-80 mm/m) and moderate soil depth (1-2m). Poor to moderate moisture storing capacity (Smax 50-150mm)
C2		5-7	29-31 19-23	Nearly level to gently rolling plains and plateaux, slopes ranging from 0-10%, developed on Quaternary, Neogene, Jurrasic and Cretaceous sediment. Soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in subsoil and poor structure and with very low natural fertility; and moderately well to imperfectly drained, shallow to deep usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and moderate natural fertility.	< 500	800-1000 Monomodal	One DGP per year with duration of 3-4½ months, with variation of 3-4 weeks depending soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Soils have moderate to high AWC (80-150 mm/m) and favourable moisture storing characteristics (Smax 150-350 mm).
C3		5-7	29-31 19-23	Strongly dissected uplands and rolling to steep hills, slope range of 10-45%, developed on Jurassic, sandstones, shales, limestones, Paleogene limestone and marls and Neogene sandy clays. Soils are mainly well drained, moderately deep to deep, reddish and yellowish sandy clay loams and sandy clays, often with more sandy topsoils, with weak structure and low natural fertility; and complex of rock outcrops, surface ironstone, very stony and very shallow soils; and important proportion of moderately well to imperfectly drained, shallow to deep, usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and moderately high natural fertility.	<500	800-1000 Monomodal	One DGP per year with duration of 3-4½ months, with variation of 3-4 weeks depending soil moisture storage capacity and crop rooting habits. Unreliable onset dates Soils in the zone are characterised to be of low to moderate AWC (80-100 mm/m) and poor to moderate moisture storing properties (Smax 50-150 mm) according to rainfall acceptanece.
C4		5.5-7	29-31 19-23	Flat, low altitude riverine floodplains (84%) and deltas (16%) with spatially and	<200	1200-14000 Varible	Growing period mainly determined by flooding regime.

				temporally varying flooding regimes and sedimentation patterns; mainly covered by young alluvial soils with variable drainage and flooding conditions. Dominant soils are well to moderately well drained, deep, brownish fine sands to sandy clay loams with high textural variability over short distances and highly stratified with more sandy or more clayey layers; and imperfectly to poorly drained, deep, (dark) grey, or grey brown clays, sandy clays or clay laoms often mottled and usually with more sandy horizons within the profile and moderate toposoil structure, with high natural fertility; and imperfectly to poorly drained, deep, coarse almost pure bleached sands often with finer texture overly usually with poor natural fertility			The zone moisture characteristics is influenced by flood regimes, drainage variability,
C5		5-7	29-31 19-23	Flat to gently undulating plains, slope range 0-3% developed on old alluvial terrace no longer flooded. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in subsoil, weak structure and very low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with weak structure and very low natural fertility; and imperfectly to poorly drained due to flat topography and ponding above ironstone pans in subsoil (0-7 to 1.5 m deep) which prevent deep percolation and are able to maintain perched water tables stable enough rice cultivation.	< 200	1000-1200 Monomodal	One dependable growing period per year with duration of 3-4½months. Mainly covered by deep, medium to heavy textured soils with moderate to high AWC (80-150 mm/m) and favourable moisture storing properties (Smax 150-350 mm). Topographical favours runoff additions and promote flood risk.
SI		5-7	29-31 19-23	Mainly gently undulating to rolling plateaux developed on Karroo sandstones and Neogene sandy sediments; low altitude. Major soils are well drained, moderately deep to deep, red, yellowish or red or orange sands and loamy sands with sands with sandy loams in depth, with weak structure and very low natural fertility; and important proportion of moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with weak structure and very low natural fertility.	200-500	800-1000 Monomodal	One DGP per year with duration of 3-4½ months, varying by 3-4 weeks depending on soil moisture storing capacity and crop rooting habits. Unreliable onset dates. The zone is covered by well drained loamy sands with low fertility and poor to moderate moisture storing properties.

AGRO-ECOLOGICAL ZONES FOR KITETO DISTRICT (MANYARA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
E1		5-7	27-30 15-18	Mainly well drained, gently undulating to rolling plains and plateaux with altitude variability, developed on gneissic rocks, includes some poorly drained, flat and wide topographical depressions developed on young alluvium. Dominant soils are well drained, moderately deep to deep, dark reddish brown, yellowish red or red sandy clay loams and sandy clays with weak or moderate structure and low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with poor structure with very low natural fertility.	500 - 1200	400-500 Monomodal	One DGP per year with duration of less than 2 month, varying by less than 1 week in response to soil moisture storage properties and crop rooting habits. Onset dates are very unreliable. Soils are medium to heavy textured with moderate AWC (70-120mm/m) and poor moisture acceptance to due to surface sealing (Smax 40-60mm)
E2		5-7	27-30 15-18	Mainly well drained, gently undulating to rolling plains and plateaux, altitude 500-1200	500-1200	800-1000 Monomodal	One DGP per year with duration of 2 - 2½ months varying by less than 2 weeks in response

				m developed on gneissic rocks. There are poorly drained flat wide topographical depressions developed on young alluvium. Sloppy areas are strongly dissected, often rocky and severely eroded. Dominant soils are well drained, moderately deep to deep, dark reddish brown, yellowish red or red sandy clay loams and sandy clays with weak or moderate structure and low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with poor structure with very low natural fertility (Pare, Usambara and Lower Kilimnajaro)			to soil moisture storage capacity crop rooting habits. Unreliable onset dates. Soils are medium to heavy textured with moderate to high AWC (AWC 80-150 mm/m) but with poor moisture acceptance properties due to tendency for surface sealing (Smax 40-60 mm).

AGRO-ECOLOGICAL ZONES FOR KONDOA DISTRICT (DODOMA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	**Temperature (^{0}c)**	**Soils and Topography**	**Altitude (m)**	**Rainfall total (mm/Year) / Patten**	**Length of Growing Period and Soil Moisture Properties**
EI		5-7	27-30 15-18	Mainly well drained, gently undulating to rolling plains and plateaux with altitude variability, developed on gneissic rocks, includes some poorly drained, flat and wide topographical depressions developed on young alluvium. Dominant soils are well drained, moderately deep to deep, dark reddish brown, yellowish red or red sandy clay loams and sandy clays with weak or moderate structure and low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with poor structure with very low natural fertility.	500 - 1200	400-500 Monomodal	One DGP per year with duration of less than 2 month, varying by less than 1 week in response to soil moisture storage properties and crop rooting habits. Onset dates are very unreliable. Soils are medium to heavy textured with moderate AWC (70-120mm/m) and poor moisture acceptance to due to surface sealing (Smax 40-60mm)
E2		5-7	27-30 15-18	Mainly well drained, gently undulating to rolling plains and plateaux, altitude 500-1200 m developed on gneissic rocks. There are poorly drained flat wide topographical depressions developed on young alluvium. Sloppy areas are strongly dissected, often rocky and severely eroded. Dominant soils are well drained, moderately deep to deep, dark	500-1200	800-1000 Monomodal	One DGP per year with duration of 2 - 2½ months varying by less than 2 weeks in response to soil moisture storage capacity crop rooting habits. Unreliable onset dates. Soils are medium to heavy textured with moderate to high AWC (AWC 80-150 mm/m) but with poor moisture acceptance properties due to tendency for surface sealing (Smax 40-60 mm).

				reddish brown, yellowish red or red sandy clay loams and sandy clays with weak or moderate structure and low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with poor structure with very low natural fertility (Pare, Usambara and Lower Kilimnajaro)			
PI		5-7	27-30 15-18	Mainly gently undulating plains with some rocky hill-footslope association at medium altitude, developed on granites. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are complexes of rock outcrops, surface ironstone, very stony, and very shallow (< 25 cm); and good proportion of well drained, very shallow to moderately deep, black or dark grey sandy loams to sandy clay loams with strong topsoil structure and high natural fertility.	1100 - 1300	600-700 Monomodal	One DGP per year with duration of 2-2½ months depending soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Soils are generally moderately deep sandy or loamy with low to moderate AWC (30-100 mm/m) and poor moisture storing properties mostly for sandy and loamy soils susceptible to surface capping (Smax 50-150mm); and favourable for other loamy soils (Smax 150-300 mm).
P9		4-6	27-30 15-18	Mainly gently undulating to plains formed on 'continental deposits' overlying granites. Major soils are somewhat excessively to moderately well drained, moderately deep to deep, reddish, brown or grey loamy sands, sandy loams and sandy clay loams with poor structure with very low natural fertility; and well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with weak structure and low natural fertility.	1100-1400	500-600 Monomodal	One DGP per year with duration of 3-3½ months depending on moisture storage capacity and crop rooting habits. Reliable onset dates. Heterogeneous soils with dominance of light and medium textured soils with poor to moderate moisture storing properties (AWC 50-100 mm/m; Smax 50-200 mm) without chemical barriers.
PI0		4-6	27-30 15-18	Gently undulating plains formed on 'continental deposits' overlying granite. Major soils are somewhat excessively to moderately well drained, moderately deep to deep, reddish, brown or grey loamy sands, sandy loams and sandy clay loams with poor structure with very low natural fertility; and	1100-1400	600-800 Monomodal	One DGP per year with duration of 3-3½ months, depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils are mainly moderately deep with low to moderate AWC (50-100 mm/m) that may present chemical barriers to root development in which case moisture reserve that can be used by

				well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility			crop is very low (Smax 30-50 mm). Where on chemical barriers exist, the moisture storing properties are moderate (Smax 100-200 mm).
PII		6½-7	27-30 15-18	Flat plains at medium altitude developed mainly on alluvium. Major soils are imperfectly drained, shallow, dark grey or brown sands to sandy clays with hardpan within 50 cm from the surface, often calcareous and sodic in the subsoil (ESP 10-15) with moderate natural fertility; and soils of varying colour, texture, structure, consistence and drainage but with fertility status and moisture storing properties adversely affected by presence of exchangeable sodium and/or soluble salts at levels that are high enough to interfere with growth of most crops (ESP>15, pH>8.5, EC>4	900	400-600 Monomodal	For upland areas comparable to those of zone P10 above. However most of the zone DGP is influenced by flooding, water-logging, runoff losses or additions and presence of salinity.

AGRO-ECOLOGICAL ZONES FOR KONGWA DISTRICT (DODOMA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
E2		5-7	27-30 15-18	Mainly well drained, gently undulating to rolling plains and plateaux, altitude 500-1200 m developed on gneissic rocks. There are poorly drained flat wide topographical depressions developed on young alluvium. Sloppy areas are strongly dissected, often rocky and severely eroded. Dominant soils are well drained, moderately deep to deep, dark reddish brown, yellowish red or red sandy clay loams and sandy clays with weak or moderate structure and low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with poor structure with very low natural fertility (Pare, Usambara and Lower Kilimnajaro)	500-1200	800-1000 Monomodal	One DGP per year with duration of 2 - 2½ months varying by less than 2 weeks in response to soil moisture storage capacity crop rooting habits. Unreliable onset dates. Soils are medium to heavy textured with moderate to high AWC (AWC 80-150 mm/m) but with poor moisture acceptance properties due to tendency for surface sealing (Smax 40-60 mm).
H7		4½-7	22-25 10-15	Mainly mountainous topography at high altitude, either with extensive, undulating to hilly plateau crests or strongly dissected with limited plateau crests. Major soils are well drained, deep yellowish or reddish sandy clays to clays with moderate to strong structure with moderate natural fertility and complex of rock outcrops, surface ironstone, very stony soils and very shallow soils.	1500-2300	800-1000 Monomodal	One DGP per year with duration of 5-7 months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils have moderate AWC (120 mm/m) and favourable moisture storing properties (Smax 300-400).
R		na	na	Rocky teraaain	na	na	na

AGRO-ECOLOGICAL ZONES FOR KOROGWE DISTRICT (TANGA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties

C1		5-7	29-31 19-23	Nearly level to rolling plains of slope range 0-10%, developed on Quaternary, Neogene, Jurrasic and Cretaceous sediments. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure, and very low natural fertility; and moderately well to imperfectly drained, shallow to deep usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and moderate natural fertility.	< 200	1000-1200 Bimodal	2 dependable growing periods (DGP) per year. Variation of DGP length as function of soil moisture storage capcity and crop rooting habits. Duration is 3-4 months. Main DGP is March-April, while the secondary DGP is October – November. The zone has deep sandy soils with low AWC (30-80 mm/m) and moderate soil depth (1-2m). Poor to moderate moisture storing capacity (Smax 50-150mm)
E1		5-7	27-30 15-18	Mainly well drained, gently undulating to rolling plains and plateaux with altitude variability, developed on gneissic rocks, includes some poorly drained, flat and wide topographical depressions developed on young alluvium. Dominant soils are well drained, moderately deep to deep, dark reddish brown, yellowish red or red sandy clay loams and sandy clays with weak or moderate structure and low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with poor structure with very low natural fertility.	500 - 1200	400-500 Monomodal	One DGP per year with duration of less than 2 month, varying by less than 1 week in response to soil moisture storage properties and crop rooting habits. Onset dates are very unreliable. Soils are medium to heavy textured with moderate AWC (70-120mm/m) and poor moisture acceptance to due to surface sealing (Smax 40-60mm)
E2		5-7	27-30 15-18	Mainly well drained, gently undulating to rolling plains and plateaux, altitude 500-1200 m developed on gneissic rocks. There are poorly drained flat wide topographical depressions developed on young alluvium. Sloppy areas are strongly dissected, often rocky and severely eroded. Dominant soils are well drained, moderately deep to deep, dark reddish brown, yellowish red or red sandy clay loams and sandy clays with weak or moderate structure and low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with poor structure with very low natural fertility (Pare, Usambara and Lower Kilimnajaro)	500-1200	800-1000 Monomodal	One DGP per year with duration of 2 - 2½ months varying by less than 2 weeks in response to soil moisture storage capacity crop rooting habits. Unreliable onset dates. Soils are medium to heavy textured with moderate to high AWC (AWC 80-150 mm/m) but with poor moisture acceptance properties due to tendency for surface sealing (Smax 40-60 mm).
E3		4-7	29-31 19-23	Mainly well drained, flat to rolling plains, low altitude developed on intermediate metamorphic rocks. Major soils are well drained, moderately deep to deep, reddish and yellowish sandy clay loams and sandy clays, often with more sandy topsoil, with weak	200-750	800-1000 Monomodal	Mainly one DGP 3 - 4½ months varying by 1-4 weeks depending on soil moisture storing properties and crop rooting habits. Onset dates are unreliable. Soil texture varies from medium to heavy textured alluvial with moderate to high AWC (80-150 mm/m) and favourable moisture

				structure and low natural fertility; and somewhat excessively to moderately well drained, moderately deep to deep, reddish, brown or grey loamy sands, sandy loams and sandy clay loams with weak structure and low natural fertility; and well drained, moderately deep to deep, yellowish or reddish sandy clays with weak structure, very low to low natural fertility.			storing properties (Smax 200-350mm). Natural soil fertility shows marked differences between sites, and soil acidity may be common
E6		4-7	29-31 19-23	Well drained, undulating to rolling plains at low altitude (150-500 m) developed on intermediate metamorphic rocks. Major soils are well drained, moderately deep to deep, yellowish or reddish sandy clays to clays with moderate to low natural fertility, and some units low pH values with possibilities for aluminium toxicity.	150-500	1000-1200 Bimodal	Two DGP per year, with duration of 4-4½ months for the main growing period which has reliable onset dates and 2½ - 3 months for the short growing season, with unreliable onset dates, both varying by 2-3 weeks depending on soil moisture storage capacity and crop rooting habits. There is possibility of double cropping in many years. Soils are well drained, moderately deep, medium to heavy textured soils with moderate AWC (70-120mm/m) and poor moisture acceptance to due to surface sealing (Smax 40-60mm). Smax in areas without surface capping and or chemical barrier ranges from 150 – 300 mm.
R		na	na	Rocky terrain	na	na	na

AGRO-ECOLOGICAL ZONES FOR KUSINI DISTRICT (KUSINI UNGUJA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
C7		5-7	29-31 19-23	Nearly level to undulating and rolling plains developed on Neogene's and Quaternary limestone, sandstones, marls, sands, clays. Soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in subsoil, weak structure and very low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands but with more clayey or stratified subsoils (sandy loams to sandy clays) with weak structure, somewhat higher organic matter content and very low	< 100	1400-1600 Bimodal	Two dependable growing periods (DGP), duration of 4-5 months for the main growing period with reliable onset dates and 1½ to 2½ for the secondary growing period with unreliable onset dates. Soil moisture properties same as C6.

				natural fertility; and windblown sands patterned into dunes stabilized by vegetation.			
O		na	na	Ocean	na	na	na

AGRO-ECOLOGICAL ZONES FOR KWIMBA DISTRICT (MWANZA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
P4		5-7	27-30 15-18	Mainly flat to gently undulating plains with scattered hill-footslope associations at medium altitude, developed on granites, banded ironstones and young alluvium. Soils exhibit heterogeneous pattern with important proportions of well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are complexes of rock outcrops, surface ironstone, very stony, and very shallow; and moderately well to imperfectly drained, shallow to deep frequently calcareous, black, dark grey or brown cracking clays often overlying paler	1200-1300	800-1000 Monomodal	One DGP per year with duration of 3½-5 months depending on soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Soils are moderately deep to deep with low to moderate AWC (50-100 mm/m) that may present 'chemical barriers' (e.g. salts) to root development in which case moisture reserve that can be used by crops is very low (Smax 30-50 mm). Where no chemical barriers exist, the moisture storing properties are moderate (Smax 100-200 mm).

				subsoil with ephemeral structure and high natural fertility.			
P8		6½-7	27-30 15-18	Flat to gently undulating plains developed partly on granites, partly on old colluvium; medium altitude. Major soils are imperfectly drained, shallow, dark grey or brown sands to sandy clays with hardpan within 50 cm from the surface, often calcareous and sodic in the subsoil (ESP 10-15) with moderate natural fertility; and moderately well to imperfectly drained, shallow to deeper, usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and with high natural fertility; and well drained, moderately deep to deep, red or brown often gravely, sandy loams and sandy clay loams, with weak structure and low natural fertility.	1000-1200	600-1200 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storage capacity and crop rooting habits. Onset dates unreliable. The zone mainly covered by hardpan soils with poor moisture storing properties AWC (30-100), with important proportions of dark cracking clays of topographical depressions with moderate moisture storing properties AWC 150 mm/m; Smax 75-150 mm; and sandy and medium textured with moderate to high moisture storing properties (AWC 50 – 100 mm/m; Smax 50-300 mm).

AGRO-ECOLOGICAL ZONES FOR KYELA DISTRICT (MBEYA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
H4		5½-7½	29-31 19-23	Flat to very gently undulating lacustrine plain at low altitude. Major soils are imperfectly to poorly drained, deep, dark grey or grey brown clays, sandy clays or clay loams often mottled; high natural fertility; and well to moderately well drained, deep, brownish fine sands to sandy clay loams with high textural variability over short distances and highly stratified with more sandy or more clayey layers. High natural fertility.	500	1600-2400 Mnonomdal	One DGP per year, often merging into next without intermediate dry period. Duration DGP 8-10 months, varying depending soil moisture storage capacity and crop rooting habits. Onset dates difficult to determine because of overlap of growing periods. AWC is moderate to high (80-150 mm/m) with moderate to high soil moisture storing properties (Smax 150 – 300 mm)
H5		5-7	22-25 10-15	Volcanic landforms ranging from undulating to rolling, medium to high altitude plains and plateaux; to strongly dissected hills, mountains, plateaux and plains at medium altitude. Major soils are well drained, deep, dark grey brown loamy sands, sandy loams and loams rich in allophanic clays with weak structure, low bulk density and with high natural fertility; and well drained, deep yellowish or reddish sandy clays to clays with moderate to strong structure with moderate natural fertility.	1200-2400	1000-2000 Monomodal	One DGP per year, increasing in duration from 6-9 months to 9-12 months, depending on altitude and soil moisture storage capacity. Onset dates difficult to determine because of overlap of growing periods. Soil moisture characteristics vary between physiographic units ranging from moderate to high AWC (100-200 mm/m) with favourable moisture storing properties (Smax 300-400).
R		na	na	Rocky terrain	na	na	na
L		na	na	Lake	na	na	na

AGRO-ECOLOGICAL ZONES FOR LINDI DISTRICT (LINDI REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
C2		5-7	29-31 19-23	Nearly level to gently rolling plains and plateaux, slopes ranging from 0-10%, developed on Quaternary, Neogene, Jurrasic and Cretaceous sediment. Soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in subsoil and poor structure and with very low natural fertility; and moderately well to imperfectly drained, shallow to deep usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and moderate natural fertility.	< 500	800-1000 Monomodal	One DGP per year with duration of 3-4½ months, with variation of 3-4 weeks depending soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Soils have moderate to high AWC (80-150 mm/m) and favourable moisture storing characteristics (Smax 150-350 mm).
C3		5-7	29-31 19-23	Strongly dissected uplands and rolling to steep hills, slope range of 10-45%, developed on Jurassic, sandstones, shales, limestones, Paleogene limestone and marls and Neogene sandy clays. Soils are mainly well drained, moderately deep to deep, reddish and yellowish sandy clay loams and sandy clays, often with more sandy topsoils, with weak structure and low natural fertility; and complex of rock outcrops, surface ironstone, very stony and very shallow soils; and important proportion of moderately well to imperfectly drained, shallow to deep, usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and moderately high natural fertility.	<500	800-1000 Monomodal	One DGP per year with duration of 3-4½ months, with variation of 3-4 weeks depending soil moisture storage capacity and crop rooting habits. Unreliable onset dates Soils in the zone are characterised to be of low to moderate AWC (80-100 mm/m) and poor to moderate moisture storing properties (Smax 50-150 mm) according to rainfall acceptanece.
E3		4-7	29-31 19-23	Mainly well drained, flat to rolling plains, low altitude developed on intermediate metamorphic rocks. Major soils are well drained, moderately deep to deep, reddish and yellowish sandy clay loams and sandy clays, often with more sandy topsoil, with weak structure and low natural fertility; and	200-750	800-1000 Monomodal	Mainly one DGP 3 - 4½ months varying by 1-4 weeks depending on soil moisture storing properties and crop rooting habits. Onset dates are unreliable. Soil texture varies from medium to heavy textured alluvial with moderate to high AWC (80-150 mm/m) and favourable moisture storing properties (Smax 200-350mm). Natural

				somewhat excessively to moderately well drained, moderately deep to deep, reddish, brown or grey loamy sands, sandy loams and sandy clay loams with weak structure and low natural fertility; and well drained, moderately deep to deep, yellowish or reddish sandy clays with weak structure, very low to low natural fertility.			soil fertility shows marked differences between sites, and soil acidity may be common
E5		5-7	29-31 19-23	Well drained, level to rolling plains at low altitude (200-500 m) developed on acid intermediate metamorphic rocks. Major soils are well drained, moderately deep to deep, reddish and yellowish sandy loams and sandy clays, often with more sandy topsoils. Other soils well drained, moderately deep to deep dark red to red, friable clays with moderate to strong structure and evidence of clay illuviation, with low natural fertility.	200-500	800-1000 Monomodal	One DGP per year, with duration of 5-6 months, varying by 3-5 weeks depending on soil moisture storing properties and crop rooting habits. Onset dates are reliable. Soils are well drained, moderately deep, medium to heavy textured soils with moderate AWC (70-120mm/m) and poor moisture acceptance to due to surface sealing (Smax 40-60mm). Smax in areas without surface capping and or chemical barrier ranges from 150 – 300 mm.
R		na	na	Rocky terrain	na	na	na
O		na	na	Ocean	na	na	na

AGRO-ECOLOGICAL ZONES FOR LIWALE DISTRICT (LINDI REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	**Temperature (^{0}c)**	**Soils and Topography**	**Altitude (m)**	**Rainfall total (mm/Year) / Patten**	**Length of Growing Period and Soil Moisture Properties**
C2		5-7	29-31	Nearly level to gently rolling plains and	< 500	800-1000	One DGP per year with duration of 3-4½

			19-23	plateaux, slopes ranging from 0-10%, developed on Quaternary, Neogene, Jurrasic and Cretaceous sediment. Soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in subsoil and poor structure and with very low natural fertility; and moderately well to imperfectly drained, shallow to deep usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and moderate natural fertility.		Monomodal	months, with variation of 3-4 weeks depending soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Soils have moderate to high AWC (80-150 mm/m) and favourable moisture storing characteristics (Smax 150-350 mm).
C3		5-7	29-31 19-23	Strongly dissected uplands and rolling to steep hills, slope range of 10-45%, developed on Jurassic, sandstones, shales, limestones, Paleogene limestone and marls and Neogene sandy clays. Soils are mainly well drained, moderately deep to deep, reddish and yellowish sandy clay loams and sandy clays, often with more sandy topsoils, with weak structure and low natural fertility; and complex of rock outcrops, surface ironstone, very stony and very shallow soils; and important proportion of moderately well to imperfectly drained, shallow to deep, usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and moderately high natural fertility.	<500	800-1000 Monomodal	One DGP per year with duration of 3-4½ months, with variation of 3-4 weeks depending soil moisture storage capacity and crop rooting habits. Unreliable onset dates Soils in the zone are characterised to be of low to moderate AWC (80-100 mm/m) and poor to moderate moisture storing properties (Smax 50-150 mm) according to rainfall acceptanece.
C5	8,569	5-7	29-31 19-23	Flat to gently undulating plains, slope range 0-3% developed on old alluvial terrace no longer flooded. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in subsoil, weak structure and very low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with weak structure and very low natural fertility; and imperfectly to poorly drained due to flat topography and ponding above ironstone pans in subsoil (0-7 to 1.5 m deep) which prevent deep percolation and are able to maintain perched water tables stable enough rice cultivation.	< 200	1000-1200 Monomodal	One dependable growing period per year with duration of 3-4½months. Mainly covered by deep, medium to heavy textured soils with moderate to high AWC (80-150 mm/m) and favourable moisture storing properties (Smax 150-350 mm). Topographical favours runoff additions and promote flood risk.
E3		4-7	29-31 19-23	Mainly well drained, flat to rolling plains, low altitude developed on intermediate metamorphic rocks. Major soils are well	200-750	800-1000 Monomodal	Mainly one DGP 3 - 4½ months varying by 1-4 weeks depending on soil moisture storing properties and crop rooting habits. Onset dates

				drained, moderately deep to deep, reddish and yellowish sandy clay loams and sandy clays, often with more sandy topsoil, with weak structure and low natural fertility; and somewhat excessively to moderately well drained, moderately deep to deep, reddish, brown or grey loamy sands, sandy loams and sandy clay loams with weak structure and low natural fertility; and well drained, moderately deep to deep, yellowish or reddish sandy clays with weak structure, very low to low natural fertility.			are unreliable. Soil texture varies from medium to heavy textured alluvial with moderate to high AWC (80-150 mm/m) and favourable moisture storing properties (Smax 200-350mm). Natural soil fertility shows marked differences between sites, and soil acidity may be common
E5		5-7	29-31 19-23	Well drained, level to rolling plains at low altitude (200-500 m) developed on acid intermediate metamorphic rocks. Major soils are well drained, moderately deep to deep, reddish and yellowish sandy loams and sandy clays, often with more sandy topsoils. Other soils well drained, moderately deep to deep dark red to red, friable clays with moderate to strong structure and evidence of clay illuviation, with low natural fertility.	200-500	800-1000 Monomodal	One DGP per year, with duration of 5-6 months, varying by 3-5 weeks depending on soil moisture storing properties and crop rooting habits. Onset dates are reliable. Soils are well drained, moderately deep, medium to heavy textured soils with moderate AWC (70-120mm/m) and poor moisture acceptance to due to surface sealing (Smax 40-60mm). Smax in areas without surface capping and or chemical barrier ranges from 150 – 300 mm.
SI		5-7	29-31 19-23	Mainly gently undulating to rolling plateaux developed on Karroo sandstones and Neogene sandy sediments; low altitude. Major soils are well drained, moderately deep to deep, red, yellowish or red or orange sands and loamy sands with sands with sandy loams in depth, with weak structure and very low natural fertility; and important proportion of moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with weak structure and very low natural fertility.	200-500	800-1000 Monomodal	One DGP per year with duration of 3-4½ months, varying by 3-4 weeks depending on soil moisture storing capacity and crop rooting habits. Unreliable onset dates. The zone is covered by well drained loamy sands with low fertility and poor to moderate moisture storing properties.
S2		5-7	27-31 15-23	Mainly gently undulating to rolling plateaux developed on Karroo sediments. Some parts of the zone strongly dissected terrain. Dominant soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, weak structure and very low natural fertility; and proportion of moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with weak structure and very low natural fertility	200-1000	1000-1200 Monomodal	One DGP per year with duration of 5-7 months, varying by 1-2 months depending on soil moisture storing capacity and crop rooting habits. Reliable onset dates. The zone is mainly covered by moderately deep sandy and loamy soils with low to moderate AWC (50-80 mm/m) and poor to moderate moisture storing properties.

AGRO-ECOLOGICAL ZONES FOR LUDEWA DISTRICT (IRINGA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
EII		5-7	27-31 15-23	Complex depressions composed of dissected ridges, fault scarps and alluvial plains; low to medium altitude. Mainly covered by well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth. Natural fertility is low to very low.	500-1000	1000-1200, Monomodal	One DGP per year with duration of 5 – 6 months, varying by 1 month depending on soil moisture storage capacity and crop rooting habits. Onset dates are reliable. Moisture storing properties ranges from low to moderate (AWC 50-80 mm/m, Smax 50-150 m). The soils have goof rainfall acceptance.
H3		4½-7	22-25 10-15	Mainly strongly dissected hills and mountains at high altitude strongly susceptible to erosion and landslides. Major soils are well drained, moderately deep to deep, reddish and yellowish sandy loams and sandy clays, often with more sandy topsoils, with weak structure and low natural fertility.	1500-2300	1000-1400 Monomodal	One DGP per year with duration of 6-9 months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates, moderate AWC (120 mm/m) and favourable moisture storing properties (Smax 300-400 m).
R		na	na	Rocky terrain	na	na	na
L		na	na	Lake	na	na	na

AGRO-ECOLOGICAL ZONES FOR LUSHOTO DISTRICT (TANGA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
EI		5-7	27-30 15-18	Mainly well drained, gently undulating to rolling plains and plateaux with altitude variability, developed on gneissic rocks, includes some poorly drained, flat and wide topographical depressions developed on young alluvium. Dominant soils are well drained, moderately deep to deep, dark reddish brown, yellowish red or red sandy clay loams and sandy clays with weak or moderate structure and low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with poor structure with very low natural fertility.	500 - 1200	400-500 Monomodal	One DGP per year with duration of less than 2 month, varying by less than 1 week in response to soil moisture storage properties and crop rooting habits. Onset dates are very unreliable. Soils are medium to heavy textured with moderate AWC (70-120mm/m) and poor moisture acceptance to due to surface sealing (Smax 40-60mm)
E2		5-7	27-30 15-18	Mainly well drained, gently undulating to rolling plains and plateaux, altitude 500-1200 m developed on gneissic rocks. There are poorly drained flat wide topographical depressions developed on young alluvium. Sloppy areas are strongly dissected, often rocky and severely eroded. Dominant soils are well drained, moderately deep to deep, dark reddish brown, yellowish red or red sandy clay loams and sandy clays with weak or moderate structure and low natural fertility;	500-1200	800-1000 Monomodal	One DGP per year with duration of 2 - 2½ months varying by less than 2 weeks in response to soil moisture storage capacity crop rooting habits. Unreliable onset dates. Soils are medium to heavy textured with moderate to high AWC (AWC 80-150 mm/m) but with poor moisture acceptance properties due to tendency for surface sealing (Smax 40-60 mm).

				and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with poor structure with very low natural fertility (Pare, Usambara and Lower Kilimnajaro)			
E3		4-7	29-31 19-23	Mainly well drained, flat to rolling plains, low altitude developed on intermediate metamorphic rocks. Major soils are well drained, moderately deep to deep, reddish and yellowish sandy clay loams and sandy clays, often with more sandy topsoil, with weak structure and low natural fertility; and somewhat excessively to moderately well drained, moderately deep to deep, reddish, brown or grey loamy sands, sandy loams and sandy clay loams with weak structure and low natural fertility; and well drained, moderately deep to deep, yellowish or reddish sandy clays with weak structure, very low to low natural fertility.	200-750	800-1000 Monomodal	Mainly one DGP 3 - 4½ months varying by 1-4 weeks depending on soil moisture storing properties and crop rooting habits. Onset dates are unreliable. Soil texture varies from medium to heavy textured alluvial with moderate to high AWC (80-150 mm/m) and favourable moisture storing properties (Smax 200-350mm). Natural soil fertility shows marked differences between sites, and soil acidity may be common
EI2		4½-7	22-25 10-15	Dissected, rolling to hilly mountains plateaux, slope range 10 – 40%, in parts affected by severe water erosion. Mainly covered by well drained, deep yellowish or reddish sandy clays with moderate to strong structure, with moderate natural fertility; and well drained, moderately deep to deep, yellowish or reddish sandy clays to clays with weak structure with very low to low natural fertility.	1000-2000	2000-3500 Monomodal	One DGP per year duration of 5-6½ months, varying by 1½ months according to soil moisture storage capacity and crop rooting habits. Onset dates are unreliable. The soils have moderate AWC 70-120 mm/m and favourable moisture storing properties (Smax 200-400mm). Chemical barriers to root development may occur in some soils.

AGRO-ECOLOGICAL ZONES FOR MAFIA DISTRICT (COAST REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
C7		5-7	29-31 19-23	Nearly level to undulating and rolling plains developed on Neogene's and Quaternary limestone, sandstones, marls, sands, clays. Soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in subsoil, weak structure and very low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands but with more clayey or stratified subsoils (sandy loams to sandy clays) with weak structure, somewhat higher organic matter content and very low natural fertility; and windblown sands patterned into dunes stabilized by vegetation.	< 100	1400-1600 Bimodal	Two dependable growing periods (DGP), duration of 4-5 months for the main growing period with reliable onset dates and 1½ to 2½ for the secondary growing period with unreliable onset dates. Soil moisture properties same as C6.
O		na	na	Ocean	na	na	na

AGRO-ECOLOGICAL ZONES FOR MAGU DISTRICT (MWANZA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
N9		7-8½	22-30 10-18	Undulating plains at medium to high altitude, developed on sodic volcanic ash. Major soils are well drained, deep, reddish friable or firm clay loams and clays with strong structure and high natural fertility; and moderately well to imperfectly drained, mostly calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure with high natural fertility.	1100-1800	600-800 Monomodal	One DGP per year with duration of 3-3½ months, varying depending on soil moisture storage capacity and crop rooting habits. Onset dates are unreliable. Soils are heavy textured with high sodicity and poor moisture storing properties (Smax 30-50).
P8		6½-7	27-30 15-18	Flat to gently undulating plains developed partly on granites, partly on old colluvium; medium altitude. Major soils are imperfectly drained, shallow, dark grey or brown sands to sandy clays with hardpan within 50 cm from the surface, often calcareous and sodic in the subsoil (ESP 10-15) with moderate natural fertility; and moderately well to imperfectly drained, shallow to deeper, usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and with high natural fertility; and well drained, moderately deep to deep, red or brown often gravely, sandy loams and sandy clay loams, with weak structure and low natural fertility.	1000-1200	600-1200 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storage capacity and crop rooting habits. Onset dates unreliable. The zone mainly covered by hardpan soils with poor moisture storing properties AWC (30-100), with important proportions of dark cracking clays of topographical depressions with moderate moisture storing properties AWC 150 mm/m; Smax 75-150 mm; and sandy and medium textured with moderate to high moisture storing properties (AWC 50 – 100 mm/m; Smax 50-300 mm).
L		na	na	Lake	na	na	na

AGRO-ECOLOGICAL ZONES FOR MAGHARIBI DISTRICT (MAGHARIBI UNGUJA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
C7		5-7	29-31 19-23	Nearly level to undulating and rolling plains developed on Neogene's and Quaternary	< 100	1400-1600 Bimodal	Two dependable growing periods (DGP), duration of 4-5 months for the main growing

				limestone, sandstones, marls, sands, clays. Soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in subsoil, weak structure and very low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands but with more clayey or stratified subsoils (sandy loams to sandy clays) with weak structure, somewhat higher organic matter content and very low natural fertility; and windblown sands patterned into dunes stabilized by vegetation.			period with reliable onset dates and 1½ to 2½ for the secondary growing period with unreliable onset dates. Soil moisture properties same as C6.
O		na	na	Ocean	na	na	na

AGRO-ECOLOGICAL ZONES FOR MAKETE DISTRICT (IRINGA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
HI	13,137	5-7	22-25 10-15	Mainly flat and undulating to rolling plains and plateaux at high altitude, developed on granites and gneisses. Major soils are well drained, deep yellowish or reddish sandy clays to clays with moderate to strong structure, with moderate natural fertility; and well drained, moderately deep to deep, reddish and yellowish sandy loams and sandy clays, often	1500-2000	600-1600 Monomdal	One DGP per year with duration of 5-6 months depending on soil moisture storage capacity and crop rooting habits. The zone has reliable onset dates, moderate AWC (120 mm/m) and favourable moisture storing properties (Smax 300-400 m).

				with more sandy topsoils, with weak structure and low natural fertility.			
H3	13,137	4½-7	22-25 10-15	Mainly strongly dissected hills and mountains at high altitude strongly susceptible to erosion and landslides. Major soils are well drained, moderately deep to deep, reddish and yellowish sandy loams and sandy clays, often with more sandy topsoils, with weak structure and low natural fertility.	1500-2300	1000-1400 Monomodal	One DGP per year with duration of 6-9 months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates, moderate AWC (120 mm/m) and favourable moisture storing properties (Smax 300-400 m).
H5	9,300	5-7	22-25 10-15	Volcanic landforms ranging from undulating to rolling, medium to high altitude plains and plateaux; to strongly dissected hills, mountains, plateaux and plains at medium altitude. Major soils are well drained, deep, dark grey brown loamy sands, sandy loams and loams rich in allophanic clays with weak structure, low bulk density and with high natural fertility; and well drained, deep yellowish or reddish sandy clays to clays with moderate to strong structure with moderate natural fertility.	1200-2400	1000-2000 Monomodal	One DGP per year, increasing in duration from 6-9 months to 9-12 months, depending on altitude and soil moisture storage capacity. Onset dates difficult to determine because of overlap of growing periods. Soil moisture characteristics vary between physiographic units ranging from moderate to high AWC (100-200 mm/m) with favourable moisture storing properties (Smax 300-400).
H6	790	5-7	16-19 5-10	Undulating to hilly plateau at very high altitude, developed on volcanic ash and pumices, covering basement complex and volcanic rocks. Major soils are well drained, deep, dark grey brown loamy sands, sandy loams and loams rich in allophanic clays with weak structure, low bulk density and with high natural fertility; and well drained, deep yellowish or reddish sandy clays to clays with moderate to strong structure with moderate natural fertility	2300-2700	1000-1200 Monomodal	One DGP per year, often merging into next without intermediate dry period. Duration DGP 8-10 months, varying depending soil moisture storage capacity and crop rooting habits. Onset dates difficult to determine because of overlap of growing periods. Mainly covered by volcanic ash soils with high AWC (100-200 mm/m) and very favourable moisture storing properties.
R		na	na	Rocky terrain	na	na	na

AGRO-ECOLOGICAL ZONES FOR MANYONI DISTRICT (SINGIDA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
P2		5-7	27-30 15-18	Mainly gently undulating plains, for the most part well drained, at medium altitude, developed on granites and gneisses. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are complexes of rock outcrops, surface ironstone, very stony, and very shallow (< 25 cm); and moderately well to imperfectly drained, shallow to deep frequently calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and high natural fertility.	1100-1300	550-600 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils are generally moderately deep sandy or loamy with low to moderate AWC (30-100 mm/m) and poor moisture storing properties mostly for sandy and loamy soils susceptible to surface capping (Smax 50-150mm); and favourable for other loamy soils (Smax 150-300 mm). In some units with salt affected soils effective soil depth is restricted by impervious subsoil, often high ESP.
P3		5-7	27-30 15-18	Mainly gently undulating plains, for the most part well drained, at medium altitude, developed on granites and gneisses. Major	1100-1300	600-1000 Monomodal	One DGP per year with duration of 4-5 months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates.

				soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are complexes of rock outcrops, surface ironstone, very stony, and very shallow (< 25 cm); and moderately well to imperfectly drained, shallow to deep frequently calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and high natural fertility.			Soils are generally moderately deep sandy or loamy with low to moderate AWC (30-100 mm/m) and poor moisture storing properties mostly for sandy and loamy soils susceptible to surface capping (Smax 50-150mm); and favourable for other loamy soils (Smax 150-300 mm). In some units with salt affected soils effective soil depth is restricted by impervious subsoil, often high ESP.
PI0		4-6	27-30 15-18	Gently undulating plains formed on 'continental deposits' overlying granite. Major soils are somewhat excessively to moderately well drained, moderately deep to deep, reddish, brown or grey loamy sands, sandy loams and sandy clay loams with poor structure with very low natural fertility; and well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility	1100-1400	600-800 Monomodal	One DGP per year with duration of 3-3½ months, depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils are mainly moderately deep with low to moderate AWC (50-100 mm/m) that may present chemical barriers to root development in which case moisture reserve that can be used by crop is very low (Smax 30-50 mm). Where on chemical barriers exist, the moisture storing properties are moderate (Smax 100-200 mm).
PI1		6½-7	27-30 15-18	Flat plains at medium altitude developed mainly on alluvium. Major soils are imperfectly drained, shallow, dark grey or brown sands to sandy clays with hardpan within 50 cm from the surface, often calcareous and sodic in the subsoil (ESP 10-15) with moderate natural fertility; and soils of varying colour, texture, structure, consistence and drainage but with fertility status and moisture storing properties adversely affected by presence of exchangeable sodium and/or soluble salts at levels that are high enough to interfere with growth of most crops (ESP>15, pH>8.5, EC>4	900	400-600 Monomodal	For upland areas comparable to those of zone P10 above. However most of the zone DGP is influenced by flooding, water-logging, runoff losses or additions and presence of salinity.
R		na	na	Rocky terrain	na	na	na

AGRO-ECOLOGICAL ZONES FOR MASASI DISTRICT (MTWARA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
C2	27,900	5-7	29-31 19-23	Nearly level to gently rolling plains and plateaux, slopes ranging from 0-10%, developed on Quaternary, Neogene, Jurrasic and Cretaceous sediment. Soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in subsoil and poor structure and with very low natural fertility; and moderately well to imperfectly drained, shallow to deep usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and moderate natural fertility.	< 500	800-1000 Monomodal	One DGP per year with duration of 3-4½ months, with variation of 3-4 weeks depending soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Soils have moderate to high AWC (80-150 mm/m) and favourable moisture storing characteristics (Smax 150-350 mm).
E5	15,291	5-7	29-31 19-23	Well drained, level to rolling plains at low altitude (200-500 m) developed on acid intermediate metamorphic rocks. Major soils are well drained, moderately deep to deep, reddish and yellowish sandy loams and sandy clays, often with more sandy topsoils. Other soils well drained, moderately deep to deep dark red to red, friable clays with moderate to strong structure and evidence of clay illuviation, with low natural fertility.	200-500	800-1000 Monomodal	One DGP per year, with duration of 5-6 months, varying by 3-5 weeks depending on soil moisture storing properties and crop rooting habits. Onset dates are reliable. Soils are well drained, moderately deep, medium to heavy textured soils with moderate AWC (70-120mm/m) and poor moisture acceptance to due to surface sealing (Smax 40-60mm). Smax in areas without surface capping and or chemical barrier ranges from 150 – 300 mm.
R		na	na	Rocky terrain	na	na	na

AGRO-ECOLOGICAL ZONES FOR MASWA DISTRICT (SHINYANGA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
P4		5-7	27-30 15-18	Mainly flat to gently undulating plains with scattered hill-footslope associations at medium altitude, developed on granites, banded ironstones and young alluvium. Soils exhibit heterogeneous pattern with important proportions of well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are complexes of rock outcrops, surface ironstone, very stony, and very shallow; and moderately well to imperfectly drained, shallow to deep frequently calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and high natural fertility.	1200-1300	800-1000 Monomodal	One DGP per year with duration of 3½-5 months depending on soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Soils are moderately deep to deep with low to moderate AWC (50-100 mm/m) that may present 'chemical barriers' (e.g. salts) to root development in which case moisture reserve that can be used by crops is very low (Smax 30-50 mm). Where no chemical barriers exist, the moisture storing properties are moderate (Smax 100-200 mm).
P7		7-8½	27-30 15-18	Flat to very gently undulating plains developed in old lake sediments. Major soils are well to moderately well drained, shallow to moderately deep, grey or brown, friable calcareous clay loams and clays, with moderate to strong structure and high natural fertility; and imperfectly drained, shallow, dark grey or brown sands to sandy clays with hardpan within 50 cm from the surface, often calcareous and sodic in the subsoil (ESP 10-15) with moderate natural fertility.	1000-1100	600-800 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Soils are shallow to moderately deep (0.5 – 1.5 m) friable clays with high AWC (150). Favourable moisture storing properties (Smax 200-250).
P8		6½-7	27-30 15-18	Flat to gently undulating plains developed partly on granites, partly on old colluvium; medium altitude. Major soils are imperfectly drained, shallow, dark grey or brown sands to sandy clays with hardpan within 50 cm from the surface, often calcareous and sodic in the	1000-1200	600-1200 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storage capacity and crop rooting habits. Onset dates unreliable. The zone mainly covered by hardpan soils with poor moisture storing properties AWC (30-100), with important proportions of dark cracking

				subsoil (ESP 10-15) with moderate natural fertility; and moderately well to imperfectly drained, shallow to deeper, usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and with high natural fertility; and well drained, moderately deep to deep, red or brown often gravely, sandy loams and sandy clay loams, with weak structure and low natural fertility.			clays of topographical depressions with moderate moisture storing properties AWC 150 mm/m; Smax 75-150 mm; and sandy and medium textured with moderate to high moisture storing properties (AWC 50 – 100 mm/m; Smax 50-300 mm).

AGRO-ECOLOGICAL ZONES FOR MBARALI DISTRICT (MBEYA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	**Temperature (^{0}c)**	**Soils and Topography**	**Altitude (m)**	**Rainfall total (mm/Year) / Patten**	**Length of Growing Period and Soil Moisture Properties**
HI		5-7	22-25 10-15	Mainly flat and undulating to rolling plains and plateaux at high altitude, developed on granites and gneisses. Major soils are well drained, deep yellowish or reddish sandy clays	1500-2000	600-1600 Monomdal	One DGP per year with duration of 5-6 months depending on soil moisture storage capacity and crop rooting habits. The zone has reliable onset dates, moderate AWC (120 mm/m) and

				to clays with moderate to strong structure, with moderate natural fertility; and well drained, moderately deep to deep, reddish and yellowish sandy loams and sandy clays, often with more sandy topsoils, with weak structure and low natural fertility.			favourable moisture storing properties (Smax 300-400 m).
P2		5-7	27-30 15-18	Mainly gently undulating plains, for the most part well drained, at medium altitude, developed on granites and gneisses. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are complexes of rock outcrops, surface ironstone, very stony, and very shallow (< 25 cm); and moderately well to imperfectly drained, shallow to deep frequently calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and high natural fertility.	1100-1300	550-600 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils are generally moderately deep sandy or loamy with low to moderate AWC (30-100 mm/m) and poor moisture storing properties mostly for sandy and loamy soils susceptible to surface capping (Smax 50-150mm); and favourable for other loamy soils (Smax 150-300 mm). In some units with salt affected soils effective soil depth is restricted by impervious subsoil, often high ESP.
P3		5-7	27-30 15-18	Mainly gently undulating plains, for the most part well drained, at medium altitude, developed on granites and gneisses. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are complexes of rock outcrops, surface ironstone, very stony, and very shallow (< 25 cm); and moderately well to imperfectly drained, shallow to deep frequently calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and high natural fertility.	1100-1300	600-1000 Monomodal	One DGP per year with duration of 4-5 months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils are generally moderately deep sandy or loamy with low to moderate AWC (30-100 mm/m) and poor moisture storing properties mostly for sandy and loamy soils susceptible to surface capping (Smax 50-150mm); and favourable for other loamy soils (Smax 150-300 mm). In some units with salt affected soils effective soil depth is restricted by impervious subsoil, often high ESP.
P5		5-7	27-30 15-18	Mainly gently undulating plains, for the most part well drained, at medium altitude, developed on granites and gneisses. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with	1100-1300	800-1000 Monomodal	One DGP per year with duration of 5-6 months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils are generally moderately deep sandy or loamy with low to moderate AWC (30-100 mm/m) and poor moisture storing properties

				poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are complexes of rock outcrops, surface ironstone, very stony, and very shallow (< 25 cm); and moderately well to imperfectly drained, shallow to deep frequently calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and high natural fertility.			mostly for sandy and loamy soils susceptible to surface capping (Smax 50-150mm); and favourable for other loamy soils (Smax 150-300 mm). In some units with salt affected soils effective soil depth is restricted by impervious subsoil, often high ESP.
R2			27-30 15-18	Flat to very gently undulating plains covered by lacustrine alluvium or by alluvial fans, levees, piedmonts and tributaries floodplains, medium altitude mostly below 1000 m. Major soils are imperfectly to poorly drained, deep, dark grey or grey brown, often mottled clays. They have usually higher clay content than the young alluvial clays (clay % 40-70), are more compact and contain fewer sand strata, contain sodicity and soluble salts in subsoil, and usually lower natural fertility; and salt affected soils with varying colour, texture, structure, consistence and drainage but with fertility and moisture storing characteristics adversely affected by presence of exchangeable sodium and/or soluble salts at levels that are high enough to interfere with growth of most crops (ESP>15, pH>8.5, EC>4);	800 - 1200	800-1200 Monomodal	One DGP per year with duration of 4-5 months depending on soil moisture storing capacity and crop rooting habits. Actual growing period is strongly influenced by flooding regime and salinity and highly variable in the zone. Reliable onset dates. Soils covering the zone exhibits moderate to high AWC (80-150 mm/m) and moderate to high moisture storing properties (Smax 150-350 mm). Ability of crops to extract moisture is negatively affected by strong salinity or alkalinity
R3		>8½	27-30 15-18	Complex terrain, formed partly by flat to very gently undulating plains of lacustrine origin and partly by undulating plains of very old surface, at medium altitude. Covered by heterogeneous soils, ranging from sodic salt affected soils with varying colour, texture, structure, consistence and drainage but with fertility and moisture storing characteristics adversely affected by presence of exchangeable sodium and/or soluble salts at levels that are high enough to interfere with growth of most crops (ESP>15, pH>8.5, EC>4); well drained, moderate deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams depth with weak structure and very low natural fertility; and hardpan soils, and seasonally waterlogged soils with moderate fertility.	900-1400	600-1000 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storing capacity and crop rooting habits. Reliable onset dates. Heterogeneous soils with low to moderate moisture storing properties and seasonally waterlogged soils. ,

R4		5½-7	27-30 15-18	Flat plains covered by riverine alluvium and regularly flooded, with complex sedimentation pattern; medium altitude. Dominant soils are well to moderately drained, deep, brownish fine sands to sandy clay loams with high textural variability over short distances and high stratified with more sandy or clayey layers. High natural fertility; and imperfectly to poorly drained, deep, dark grey or grey brown clays, sandy clays or clay loams often mottled and usually with more sandy horizons within the profile and moderate topsoil structure and high natural fertility.	800-1000	1200-1400 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storing capacity and crop rooting habits. Reliable onset dates. In most of the zone growing period mainly determined by flooding regime which shows considerable spatial and temporal variability. The zone is mainly covered by heavy textured soils with moderate to high AWC (80-150 mm/m) and moderate moisture storing properties (Smax 150-350 mm).
R		na	na	Rocky terrain	na	na	na

AGRO-ECOLOGICAL ZONES FOR MBEYA DISTRICT (MBEYA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
HI		5-7	22-25 10-15	Mainly flat and undulating to rolling plains and plateaux at high altitude, developed on granites and gneisses. Major soils are well drained, deep yellowish or reddish sandy clays to clays with moderate to strong structure, with moderate natural fertility; and well drained, moderately deep to deep, reddish and yellowish sandy loams and sandy clays, often with more sandy topsoils, with weak structure and low natural fertility.	1500-2000	600-1600 Monomdal	One DGP per year with duration of 5-6 months depending on soil moisture storage capacity and crop rooting habits. The zone has reliable onset dates, moderate AWC (120 mm/m) and favourable moisture storing properties (Smax 300-400 m).
H5		5-7	22-25 10-15	Volcanic landforms ranging from undulating to rolling, medium to high altitude plains and plateaux; to strongly dissected hills, mountains, plateaux and plains at medium altitude. Major soils are well drained, deep, dark grey brown loamy sands, sandy loams and loams rich in allophanic clays with weak structure, low bulk density and with high natural fertility; and well drained, deep yellowish or reddish sandy clays to clays with moderate to strong structure with moderate natural fertility.	1200-2400	1000-2000 Monomodal	One DGP per year, increasing in duration from 6-9 months to 9-12 months, depending on altitude and soil moisture storage capacity. Onset dates difficult to determine because of overlap of growing periods. Soil moisture characteristics vary between physiographic units ranging from moderate to high AWC (100-200 mm/m) with favourable moisture storing properties (Smax 300-400).
H6		5-7	16-19 5-10	Undulating to hilly plateau at very high altitude, developed on volcanic ash and pumices, covering basement complex and volcanic rocks. Major soils are well drained, deep, dark grey brown loamy sands, sandy loams and loams rich in allophanic clays with weak structure, low bulk density and with high natural fertility; and well drained, deep	2300-2700	1000-1200 Monomodal	One DGP per year, often merging into next without intermediate dry period. Duration DGP 8-10 months, varying depending soil moisture storage capacity and crop rooting habits. Onset dates difficult to determine because of overlap of growing periods. Mainly covered by volcanic ash soils with high AWC (100-200 mm/m) and very favourable

				yellowish or reddish sandy clays to clays with moderate to strong structure with moderate natural fertility			moisture storing properties.
RI		>8½	27-30 15-18	Mainly flat plains covered by riverine or lacustrine alluvium, strongly affected by salinity or sodicity and by variable flooding conditions, medium altitude, mostly below 1000 m. Mainly covered by salt affected soils which are soils of varying colour, texture, structure, consistence and drainage but with fertility and moisture storing characteristics adversely affected by presence of exchangeable sodium and/or soluble salts at levels that are high enough to interfere with growth of most crops (ESP>15, pH>8.5, EC>4); and well drained, moderately deep to deep, reddish and yellowish sandy clay loams and sandy clays, often with more sandy topsoil, weak structure and low natural fertility; and well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with weak structure and very low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with weak structure and very low natural fertility.	900 - 1200	850-1300 Monomodal	One DGP per year with duration of 5-6 months around Lake Rukwa and 6-9 months in the Northwest (Karema depression). Growing period in the zone varies with rain-shadow effects in the lee of hill ranges or escarpments and variable flooding conditions. Reliable onset dates. Major soils covering the zone are characterized with moderate to high AWC (80-150 mm/m) and moderate to high moisture storing properties (Smax 150-350 mm). In 35% of the zone the ability of crops to extract moisture is negatively affected by strong salinity or alkalinity.
R2			27-30 15-18	Flat to very gently undulating plains covered by lacustrine alluvium or by alluvial fans, levees, piedmonts and tributaries floodplains, medium altitude mostly below 1000 m. Major soils are imperfectly to poorly drained, deep, dark grey or grey brown, often mottled clays. They have usually higher clay content than the young alluvial clays (clay % 40-70), are more compact and contain fewer sand strata, contain sodicity and soluble salts in subsoil, and usually lower natural fertility; and salt affected soils with varying colour, texture, structure, consistence and drainage but with fertility and moisture storing characteristics adversely affected by presence of exchangeable sodium and/or soluble salts at levels that are high enough to interfere with growth of most crops (ESP>15, pH>8.5, EC>4);	800 - 1200	800-1200 Monomodal	One DGP per year with duration of 4-5 months depending on soil moisture storing capacity and crop rooting habits. Actual growing period is strongly influenced by flooding regime and salinity and highly variable in the zone. Reliable onset dates. Soils covering the zone exhibits moderate to high AWC (80-150 mm/m) and moderate to high moisture storing properties (Smax 150-350 mm). Ability of crops to extract moisture is negatively affected by strong salinity or alkalinity
R		na	na	Rocky terrain	na	na	na

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
P4		5-7	27-30 15-18	Mainly flat to gently undulating plains with scattered hill-footslope associations at medium altitude, developed on granites, banded ironstones and young alluvium. Soils exhibit heterogeneous pattern with important proportions of well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are complexes of rock outcrops, surface ironstone, very stony, and very shallow; and moderately well to imperfectly drained, shallow to deep frequently calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and high natural fertility.	1200-1300	800-1000 Monomodal	One DGP per year with duration of 3½-5 months depending on soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Soils are moderately deep to deep with low to moderate AWC (50-100 mm/m) that may present 'chemical barriers' (e.g. salts) to root development in which case moisture reserve that can be used by crops is very low (Smax 30-50 mm). Where no chemical barriers exist, the moisture storing properties are moderate (Smax 100-200 mm).
P8		6½-7	27-30 15-18	Flat to gently undulating plains developed partly on granites, partly on old colluvium; medium altitude. Major soils are imperfectly drained, shallow, dark grey or brown sands to sandy clays with hardpan within 50 cm from the surface, often calcareous and sodic in the subsoil (ESP 10-15) with moderate natural fertility; and moderately well to imperfectly drained, shallow to deeper, usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and with high natural fertility; and well drained, moderately deep to deep, red or brown often gravely, sandy loams and sandy clay loams, with weak structure and low natural fertility.	1000-1200	600-1200 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storage capacity and crop rooting habits. Onset dates unreliable. The zone mainly covered by hardpan soils with poor moisture storing properties AWC (30-100), with important proportions of dark cracking clays of topographical depressions with moderate moisture storing properties AWC 150 mm/m; Smax 75-150 mm; and sandy and medium textured with moderate to high moisture storing properties (AWC 50 – 100 mm/m; Smax 50-300 mm).
L		na	na	Lake	na	na	na

AGRO-ECOLOGICAL ZONES FOR NACHINGWEA DISTRICT (LINDI REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
E3		4-7	29-31 19-23	Mainly well drained, flat to rolling plains, low altitude developed on intermediate metamorphic rocks. Major soils are well drained, moderately deep to deep, reddish and yellowish sandy clay loams and sandy clays, often with more sandy topsoil, with weak structure and low natural fertility; and somewhat excessively to moderately well	200-750	800-1000 Monomodal	Mainly one DGP 3 - 4½ months varying by 1-4 weeks depending on soil moisture storing properties and crop rooting habits. Onset dates are unreliable. Soil texture varies from medium to heavy textured alluvial with moderate to high AWC (80-150 mm/m) and favourable moisture storing properties (Smax 200-350mm). Natural soil fertility shows marked differences between

				drained, moderately deep to deep, reddish, brown or grey loamy sands, sandy loams and sandy clay loams with weak structure and low natural fertility; and well drained, moderately deep to deep, yellowish or reddish sandy clays with weak structure, very low to low natural fertility.			sites, and soil acidity may be common
E5		5-7	29-31 19-23	Well drained, level to rolling plains at low altitude (200-500 m) developed on acid intermediate metamorphic rocks. Major soils are well drained, moderately deep to deep, reddish and yellowish sandy loams and sandy clays, often with more sandy topsoils. Other soils well drained, moderately deep to deep dark red to red, friable clays with moderate to strong structure and evidence of clay illuviation, with low natural fertility.	200-500	800-1000 Monomodal	One DGP per year, with duration of 5-6 months, varying by 3-5 weeks depending on soil moisture storing properties and crop rooting habits. Onset dates are reliable. Soils are well drained, moderately deep, medium to heavy textured soils with moderate AWC (70-120mm/m) and poor moisture acceptance to due to surface sealing (Smax 40-60mm). Smax in areas without surface capping and or chemical barrier ranges from 150 – 300 mm.
S2		5-7	27-31 15-23	Mainly gently undulating to rolling plateaux developed on Karroo sediments. Some parts of the zone strongly dissected terrain. Dominant soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, weak structure and very low natural fertility; and proportion of moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with weak structure and very low natural fertility	200-1000	1000-1200 Monomodal	One DGP per year with duration of 5-7 months, varying by 1-2 months depending on soil moisture storing capacity and crop rooting habits. Reliable onset dates. The zone is mainly covered by moderately deep sandy and loamy soils with low to moderate AWC (50-80 mm/m) and poor to moderate moisture storing properties.
R		na	na	Rocky terrain	na	na	**na**

AGRO-ECOLOGICAL ZONES FOR NEWALA DISTRICT (MTWARA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
C2		5-7	29-31 19-23	Nearly level to gently rolling plains and plateaux, slopes ranging from 0-10%, developed on Quaternary, Neogene, Jurrasic and Cretaceous sediment. Soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in subsoil and poor structure and with very low natural fertility; and moderately well to imperfectly drained, shallow to deep usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and moderate natural fertility.	< 500	800-1000 Monomodal	One DGP per year with duration of 3-4½ months, with variation of 3-4 weeks depending soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Soils have moderate to high AWC (80-150 mm/m) and favourable moisture storing characteristics (Smax 150-350 mm).
E5		5-7	29-31 19-23	Well drained, level to rolling plains at low altitude (200-500 m) developed on acid intermediate metamorphic rocks. Major soils are well drained, moderately deep to deep, reddish and yellowish sandy loams and sandy clays, often with more sandy topsoils. Other soils well drained, moderately deep to deep	200-500	800-1000 Monomodal	One DGP per year, with duration of 5-6 months, varying by 3-5 weeks depending on soil moisture storing properties and crop rooting habits. Onset dates are reliable. Soils are well drained, moderately deep, medium to heavy textured soils with moderate AWC (70-120mm/m) and poor moisture acceptance to due to surface sealing

				dark red to red, friable clays with moderate to strong structure and evidence of clay illuviation, with low natural fertility.			(Smax 40-60mm). Smax in areas without surface capping and or chemical barrier ranges from 150 – 300 mm.
R		na	na	Rocky terrain	na	na	na

AGRO-ECOLOGICAL ZONES FOR NGARA DISTRICT (KAGERA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
WI		4-7	22-25 10-15	Mainly strongly dissected hills formed by parallel ridges of sandstone and quartzites and deep, broad or narrow valleys developed on phyllites, often with permanent samps at high altitude. Major soils are well drained, moderately deep or deep, yellowish or reddish sandy clays to clays with weak structure and very low to low natural fertility; and complex of undifferentiated very shallow soils (< 25 cm deep) with rock outcrops.	1300-1800	1000-1500 Monomodal	One DGP per year often merged into the next, with duration of 7-9 months depending on soils moisture storage capacity and crop rooting habits. Unreliable onset dates. Major soils are well drained, clayey soils with moderate AWC (70-120 mm/m) and with favourable moisture storing properties (Smax 200-400 mm). Existence of chemical barriers may hamper utilisation of soil moisture reserves (Smax 50-80 mm).
W4		4-7	27-30 15-18	Undulating to rolling upland plains developed on phyllite with protruding ridges of quartzite capped ironstone. Include a large flat to undulating central valley developed on alluvium and colluvium derived phyllites. Contains also flat riverine plain regularly flooded. Major soils are well drained, moderately deep or deep, yellowish or reddish sandy clays to clays with weak structure and very low to low natural fertility; and complex of undifferentiated very shallow soils (< 25 cm deep) with rock outcrops; and well drained, young and fertile alluvial soils, sandy and loamy soils.	1400-1500	1000->1500 Monomodal	One DGP per year often merged into next, with duration of 9-12 months depending on soil moisture storing capacity and crop rooting habits. Onset dates difficult to establish because of overlap of growing period. The zone is mainly covered by sandy and loamy soils with low to moderate AWC (50-100 mm/m) and with moderate moisture storing properties (Smax 100-200 mm). Chemical barriers may prevent roots to utilize moisture reserves (Smax 50-80 mm).

AGRO-ECOLOGICAL ZONES FOR NJOMBE DISTRICT (IRINGA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
E7		5-6½	27-30 15-18	Mainly well drained, flat to rolling plains, locally hilly at medium altitude (750-1300 m). 30% is strongly dissected uplands and low hills transitional to the medium altitude plateau. Major soils are well drained, moderately deep to deep dark red to red to friable clays with moderate to strong structure and evidence of clay illuviation. Natural soil fertility is low to moderate, with common problem of soil acidity.	800-1500	800-1000 Monomodal	One medium to long DGP with reliable onsets per year with duration of 5-7 months in most of the zone, varying by 1½-2 months depending on soil moisture storing capacity and crop rooting habits. Moderate moisture storing properties (good rainfall acceptance, lateral seepage water addition) poor to moderate water storing properties depending on the presence of chemical barriers (AWC 80-120 mm/m, Smax 30-70 with chemical barriers, Smax 100-300 without chemical barriers)
HI		5-7	22-25 10-15	Mainly flat and undulating to rolling plains and plateaux at high altitude, developed on granites and gneisses. Major soils are well drained, deep yellowish or reddish sandy clays to clays with moderate to strong structure, with moderate natural fertility; and well drained, moderately deep to deep, reddish and yellowish sandy loams and sandy clays, often with more sandy topsoils, with weak structure and low natural fertility.	1500-2000	600-1600 Monomdal	One DGP per year with duration of 5-6 months depending on soil moisture storage capacity and crop rooting habits. The zone has reliable onset dates, moderate AWC (120 mm/m) and favourable moisture storing properties (Smax 300-400 m).
H2		5-7	22-25 10-15	Undulating to rolling plains at the high altitude developed on granites. Major soils are well drained, deep yellowish or reddish sandy clays to clays with moderate to strong structure, with moderate natural fertility; and well drained, moderately deep to deep, reddish and yellowish sandy loams and sandy clays, often with more sandy topsoils, with weak structure and low natural fertility.	1500-2100	1400-1600 Monomodal	One DGP per year with duration of 6-9 months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates, moderate AWC (120 mm/m) and favourable moisture storing properties (Smax 300-400 m).
H3		4½-7	22-25 10-15	Mainly strongly dissected hills and mountains at high altitude strongly susceptible to erosion	1500-2300	1000-1400 Monomodal	One DGP per year with duration of 6-9 months depending on soil moisture storage capacity and

				and landslides. Major soils are well drained, moderately deep to deep, reddish and yellowish sandy loams and sandy clays, often with more sandy topsoils, with weak structure and low natural fertility.			crop rooting habits. Reliable onset dates, moderate AWC (120 mm/m) and favourable moisture storing properties (Smax 300-400 m).
H5		5-7	22-25 10-15	Volcanic landforms ranging from undulating to rolling, medium to high altitude plains and plateaux; to strongly dissected hills, mountains, plateaux and plains at medium altitude. Major soils are well drained, deep, dark grey brown loamy sands, sandy loams and loams rich in allophanic clays with weak structure, low bulk density and with high natural fertility; and well drained, deep yellowish or reddish sandy clays to clays with moderate to strong structure with moderate natural fertility.	1200-2400	1000-2000 Monomodal	One DGP per year, increasing in duration from 6-9 months to 9-12 months, depending on altitude and soil moisture storage capacity. Onset dates difficult to determine because of overlap of growing periods. Soil moisture characteristics vary between physiographic units ranging from moderate to high AWC (100-200 mm/m) with favourable moisture storing properties (Smax 300-400).
R		na	na	Rocky terrain	na	na	na

AGRO-ECOLOGICAL ZONES FOR MBINGA DISTRICT (RUVUMA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-	pH (H_2O)	**Temperature (^{0}c)**	**Soils and Topography**	**Altitude (m)**	**Rainfall total (mm/Year) /**	**Length of Growing Period and Soil Moisture Properties**

	Km)					Patten	
E7		5-6½	27-30 15-18	Mainly well drained, flat to rolling plains, locally hilly at medium altitude (750-1300 m). 30% is strongly dissected uplands and low hills transitional to the medium altitude plateau. Major soils are well drained, moderately deep to deep dark red to red to friable clays with moderate to strong structure and evidence of clay illuviation. Natural soil fertility is low to moderate, with common problem of soil acidity.	800-1500	800-1000 Monomodal	One medium to long DGP with reliable onsets per year with duration of 5-7 months in most of the zone, varying by 1½-2 months depending on soil moisture storing capacity and crop rooting habits. Moderate moisture storing properties (good rainfall acceptance, lateral seepage water addition) poor to moderate water storing properties depending on the presence of chemical barriers (AWC 80-120 mm/m, Smax 30-70 with chemical barriers, Smax 100-300 without chemical barriers)
EI1		5-7	27-31 15-23	Complex depressions composed of dissected ridges, fault scarps and alluvial plains; low to medium altitude. Mainly covered by well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth. Natural fertility is low to very low.	500-1000	1000-1200, Monomodal	One DGP per year with duration of 5 – 6 months, varying by 1 month depending on soil moisture storage capacity and crop rooting habits. Onset dates are reliable. Moisture storing properties ranges from low to moderate (AWC 50-80 mm/m, Smax 50-150 m). The soils have goof rainfall acceptance.
H3		4½-7	22-25 10-15	Mainly strongly dissected hills and mountains at high altitude strongly susceptible to erosion and landslides. Major soils are well drained, moderately deep to deep, reddish and yellowish sandy loams and sandy clays, often with more sandy topsoils, with weak structure and low natural fertility.	1500-2300	1000-1400 Monomodal	One DGP per year with duration of 6-9 months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates, moderate AWC (120 mm/m) and favourable moisture storing properties (Smax 300-400 m).
S2		5-7	27-31 15-23	Mainly gently undulating to rolling plateaux developed on Karroo sediments. Some parts of the zone strongly dissected terrain. Dominant soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, weak structure and very low natural fertility; and proportion of moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with weak structure and very low natural fertility	200-1000	1000-1200 Monomodal	One DGP per year with duration of 5-7 months, varying by 1-2 months depending on soil moisture storing capacity and crop rooting habits. Reliable onset dates. The zone is mainly covered by moderately deep sandy and loamy soils with low to moderate AWC (50-80 mm/m) and poor to moderate moisture storing properties.
R		na	na	Rocky terrain	na	na	na
L		na	na	Lake	na	na	na

AGRO-ECOLOGICAL ZONES FOR MBOZI DISTRICT (MBEYA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
H5		5-7	22-25 10-15	Volcanic landforms ranging from undulating to rolling, medium to high altitude plains and plateaux; to strongly dissected hills, mountains, plateaux and plains at medium altitude. Major soils are well drained, deep, dark grey brown loamy sands, sandy loams and loams rich in allophanic clays with weak structure, low bulk density and with high natural fertility; and well drained, deep yellowish or reddish sandy clays to clays with	1200-2400	1000-2000 Monomodal	One DGP per year, increasing in duration from 6-9 months to 9-12 months, depending on altitude and soil moisture storage capacity. Onset dates difficult to determine because of overlap of growing periods. Soil moisture characteristics vary between physiographic units ranging from moderate to high AWC (100-200 mm/m) with favourable moisture storing properties (Smax 300-400).

				moderate to strong structure with moderate natural fertility.			
RI		>8½	27-30 15-18	Mainly flat plains covered by riverine or lacustrine alluvium, strongly affected by salinity or sodicity and by variable flooding conditions, medium altitude, mostly below 1000 m. Mainly covered by salt affected soils which are soils of varying colour, texture, structure, consistence and drainage but with fertility and moisture storing characteristics adversely affected by presence of exchangeable sodium and/or soluble salts at levels that are high enough to interfere with growth of most crops (ESP>15, pH>8.5, EC>4); and well drained, moderately deep to deep, reddish and yellowish sandy clay loams and sandy clays, often with more sandy topsoil, weak structure and low natural fertility; and well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with weak structure and very low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with weak structure and very low natural fertility.	900 - 1200	850-1300 Monomodal	One DGP per year with duration of 5-6 months around Lake Rukwa and 6-9 months in the Northwest (Karema depression). Growing period in the zone varies with rain-shadow effects in the lee of hill ranges or escarpments and variable flooding conditions. Reliable onset dates. Major soils covering the zone are characterized with moderate to high AWC (80-150 mm/m) and moderate to high moisture storing properties (Smax 150-350 mm). In 35% of the zone the ability of crops to extract moisture is negatively affected by strong salinity or alkalinity.
U		5-7	22-25 10-15	Complex of flat to gently undulating plains developed on various parent rocks (gneiss, schist, sandstones, acid volcanics, and granites) but mostly well drained and located at high altitude. Major soils are well drained, moderately deep to deep, reddish and yellowish sandy clay loams and sandy clays, often with more sandy topsoil, weak structure and low natural fertility; and well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, weak structure and very low natural fertility; and important proportions of moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with poor structure and very low natural fertility.	800-1800	800-1200 Monomodal	One DGP per year with duration of 5-6½ months depending on soil moisture storage capacity and crop rooting habits. In the northwest corner of the zone growing period may be 6-8½ months. Reliable onset dates. The zone is mainly covered by (moderately) deep sandy and loamy soils with low to moderate AWC (30-100 mm/m) and poor to moderate moisture storing properties (Smax 50-300 mm).
R		na	na	Rocky terrain	na	na	na
L		na	na	Lake	na	na	na

AGRO-ECOLOGICAL ZONES FOR MBULU DISTRICT (MANYARA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
E2		5-7	27-30 15-18	Mainly well drained, gently undulating to rolling plains and plateaux, altitude 500-1200 m developed on gneissic rocks. There are poorly drained flat wide topographical depressions developed on young alluvium. Sloppy areas are strongly dissected, often rocky and severely eroded. Dominant soils are well drained, moderately deep to deep, dark reddish brown, yellowish red or red sandy clay loams and sandy clays with weak or moderate structure and low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with poor structure with very low natural fertility (Pare, Usambara and Lower Kilimnajaro)	500-1200	800-1000 Monomodal	One DGP per year with duration of 2 - 2½ months varying by less than 2 weeks in response to soil moisture storage capacity crop rooting habits. Unreliable onset dates. Soils are medium to heavy textured with moderate to high AWC (AWC 80-150 mm/m) but with poor moisture acceptance properties due to tendency for surface sealing (Smax 40-60 mm).
NI		4½-7	22-25 10-15	Mainly rolling to hilly, dissected plateaux at high altitude developed on volcanic ash, lavas and on gneisses. Mainly covered by heterogeneous soil types with important proportions of fertile, well drained, deep yellowish or reddish sandy clays to clay with	1500-2500	500-700 Monomodal	One DGP per year with duration of 3-5 months depending on soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Moderate to high AWC (70-150 mm/m) and favourable moisture storing properties (Smax 200-400).

				moderate to strong structure developed on volcanic ash and lavas, and strongly weathered, heavy – textured soils of low to medium fertility.			
N3		>8½	27-30 15-18	Flat lacustrine plains at medium altitude, with extensive salt and soda flats, often inundated. Major soils are of varying colour, texture, structure, consistence and drainage but with fertility status and moisture storing properties adversely affected by presence of exchangeable sodium and/or soluble salts at levels that are high enough to interfere with growth of most crops (ESP>15, pH>8.5, EC>4. Also, moderately well to imperfectly drained, shallow to deep usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and moderate to high natural fertility. Often high ESP in subsoil.	900 -1100	400-500 Monomodal	Very short to short growing periods, adversely influenced by dominance of salts in soil. The zone is mainly covered by salt affected soils with important proportion of dark cracking clays of topographical depressions with moderate moisture storing properties.
P1		5-7	27-30 15-18	Mainly gently undulating plains with some rocky hill-footslope association at medium altitude, developed on granites. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are complexes of rock outcrops, surface ironstone, very stony, and very shallow (< 25 cm); and good proportion of well drained, very shallow to moderately deep, black or dark grey sandy loams to sandy clay loams with strong topsoil structure and high natural fertility.	1100 - 1300	600-700 Monomodal	One DGP per year with duration of 2-2½ months depending soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Soils are generally moderately deep sandy or loamy with low to moderate AWC (30-100 mm/m) and poor moisture storing properties mostly for sandy and loamy soils susceptible to surface capping (Smax 50-150mm); and favourable for other loamy soils (Smax 150-300 mm).
P2		5-7	27-30 15-18	Mainly gently undulating plains, for the most part well drained, at medium altitude, developed on granites and gneisses. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are	1100-1300	550-600 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils are generally moderately deep sandy or loamy with low to moderate AWC (30-100 mm/m) and poor moisture storing properties mostly for sandy and loamy soils susceptible to surface capping (Smax 50-150mm); and favourable for other loamy soils (Smax 150-300 mm). In some units with salt affected soils effective soil depth is restricted by impervious

				complexes of rock outcrops, surface ironstone, very stony, and very shallow (< 25 cm); and moderately well to imperfectly drained, shallow to deep frequently calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and high natural fertility.			subsoil, often high ESP.
R		na	na	Rocky terrain	na	na	na
L		na	na	Lake	na	na	na

AGRO-ECOLOGICAL ZONES FOR MEATU DISTRICT (SHINYANGA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
NI		4½-7	22-25 10-15	Mainly rolling to hilly, dissected plateaux at high altitude developed on volcanic ash, lavas and on gneisses. Mainly covered by heterogeneous soil types with important proportions of fertile, well drained, deep yellowish or reddish sandy clays to clay with moderate to strong structure developed on volcanic ash and lavas, and strongly weathered, heavy – textured soils of low to medium fertility.	1500-2500	500-700 Monomodal	One DGP per year with duration of 3-5 months depending on soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Moderate to high AWC (70-150 mm/m) and favourable moisture storing properties (Smax 200-400).
N7		6½-8½	22-30 10-18	Level to rolling plains medium to high altitude, developed on slightly weathered volcanic ash. Major soils are well drained, shallow to deep, dark brown or dark grey calcareous sandy loams with weak structure with moderate natural fertility; and well drained, deep, dark grey or brown loamy sands, sandy loams and loams rich in allophanic clays with weak structure, low bulk density and high natural fertility	1300-1800	500-800 Monomodal	One DGP per year with duration of 2 - 3½ months depending on soil moisture storage capacity and crop rooting habits and exposure to rain shadow of Ngorongoro highlands. Onset dates unreliable. Soils developed from volcanic ash with characterized by moderate AWC (50-100 mm/m) and moderate moisture storing properties (Smax 100-200).
P7		7-8½	27-30 15-18	Flat to very gently undulating plains developed in old lake sediments. Major soils are well to moderately well drained, shallow to moderately deep, grey or brown, friable calcareous clay loams and clays, with moderate to strong structure and high natural fertility; and imperfectly drained, shallow, dark grey or brown sands to sandy clays with hardpan within 50 cm from the surface, often calcareous and sodic in the subsoil (ESP 10-15) with moderate natural fertility.	1000-1100	600-800 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Soils are shallow to moderately deep (0.5 – 1.5 m) friable clays with high AWC (150). Favourable moisture storing properties (Smax 200-250).
P8		6½-7	27-30 15-18	Flat to gently undulating plains developed partly on granites, partly on old colluvium; medium altitude. Major soils are imperfectly drained, shallow, dark grey or brown sands to sandy clays with hardpan within 50 cm from the surface, often calcareous and sodic in the subsoil (ESP 10-15) with moderate natural fertility; and moderately well to imperfectly drained, shallow to deeper, usually calcareous,	1000-1200	600-1200 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storage capacity and crop rooting habits. Onset dates unreliable. The zone mainly covered by hardpan soils with poor moisture storing properties AWC (30-100), with important proportions of dark cracking clays of topographical depressions with moderate moisture storing properties AWC 150 mm/m; Smax 75-150 mm; and sandy and medium

				black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and with high natural fertility; and well drained, moderately deep to deep, red or brown often gravely, sandy loams and sandy clay loams, with weak structure and low natural fertility.			textured with moderate to high moisture storing properties (AWC 50 – 100 mm/m; Smax 50-300 mm).
PI2		5½ - 9	27-30 15-18	Flat seasonally inundated, lowland plains developed on young alluvium. Major soils are moderately well to imperfectly drained, shallow to deep often calcareous, black, dark grey or brown cracking clays mostly overlying paler subsoil with ephemeral structure and high natural fertility; and imperfectly drained, shallow, dark grey or brown sands to sandy clays with hardpan within 50 cm from the surface, often calcareous and sodic in subsoil (ESP 10-15), with moderate natural fertility.	900-1200	600-700 Monomodal	DGP varies with Physiography. For upland areas one DGP per year with duration of 3-3½ months depending soil moisture storing capacity and crop rooting habits. For most of the zone growing period in determined by duration of depth of flooding. Soil moisture storage is poor to moderate AWC 30-150 mm/m, Smax 75-150 mm.
L		na	na	Lake	na	na	na

AGRO-ECOLOGICAL ZONES FOR MICHEWENI DISTRICT (KASKAZINI PEMBA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
C6		5-7	29-31 19-23	Nearly level to undulating and rolling plains developed on Neogene and Quaternary limestone, sandstones, marls, sands, clays. Soils are well drained, moderately deep to deep, red, yellowish red or orange sands and	<100	1600-2000 Monomodal	Long growing periods (5-10 months) depending on crop rooting habits and soil moisture storage characteristics. Onset dates are reliable. The physiographic units has low AWC (30-80 mm/m) and poor to moderate moisture storing

				loamy sands with sandy loams in subsoil, weak structure and very low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands but with more clayey or stratified subsoils (sandy loams to sandy clays) with weak structure, somewhat higher organic matter content and very low natural fertility; and windblown sands patterned into dunes stabilized by vegetation.			capacity (Smax 50-150mm) but dry conditions are minimized by long rainy season.
O		na	na	Ocean	na	na	na

AGRO-ECOLOGICAL ZONES FOR MJINI DISTRICT (MAGJHARIBI UNGUJA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
C7		5-7	29-31 19-23	Nearly level to undulating and rolling plains developed on Neogene's and Quaternary limestone, sandstones, marls, sands, clays. Soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in subsoil, weak structure and very low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands but with more clayey or stratified subsoils (sandy loams to	< 100	1400-1600 Bimodal	Two dependable growing periods (DGP), duration of 4-5 months for the main growing period with reliable onset dates and 1½ to 2½ for the secondary growing period with unreliable onset dates. Soil moisture properties same as C6.

				sandy clays) with weak structure, somewhat higher organic matter content and very low natural fertility; and windblown sands patterned into dunes stabilized by vegetation.			
O		na	na	Ocean	na	na	na

AGRO-ECOLOGICAL ZONES FOR MKOANI DISTRICT (KUSINI PEMBA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
C6		5-7	29-31 19-23	Nearly level to undulating and rolling plains developed on Neogene and Quaternary limestone, sandstones, marls, sands, clays. Soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in subsoil, weak structure and very low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands but with more clayey or stratified subsoils (sandy loams to sandy clays) with weak structure, somewhat higher organic matter content and very low natural fertility; and windblown sands patterned into dunes stabilized by vegetation.	<100	1600-2000 Monomodal	Long growing periods (5-10 months) depending on crop rooting habits and soil moisture storage characteristics. Onset dates are reliable. The physiographic units has low AWC (30-80 mm/m) and poor to moderate moisture storing capacity (Smax 50-150mm) but dry conditions are minimized by long rainy season.
O		na	na	Ocean	na	na	na

AGRO-ECOLOGICAL ZONES FOR MKURANGA DISTRICT (COAST REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
C2		5-7	29-31 19-23	Nearly level to gently rolling plains and plateaux, slopes ranging from 0-10%, developed on Quaternary, Neogene, Jurrasic and Cretaceous sediment. Soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in subsoil and poor structure and with very low natural fertility; and moderately well to imperfectly drained, shallow to deep usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and moderate natural fertility.	< 500	800-1000 Monomodal	One DGP per year with duration of 3-4½ months, with variation of 3-4 weeks depending soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Soils have moderate to high AWC (80-150 mm/m) and favourable moisture storing characteristics (Smax 150-350 mm).
C3		5-7	29-31 19-23	Strongly dissected uplands and rolling to steep hills, slope range of 10-45%, developed on Jurassic, sandstones, shales, limestones, Paleogene limestone and marls and Neogene sandy clays. Soils are mainly well drained, moderately deep to deep, reddish and yellowish sandy clay loams and sandy clays, often with more sandy topsoils, with weak structure and low natural fertility; and	<500	800-1000 Monomodal	One DGP per year with duration of 3-4½ months, with variation of 3-4 weeks depending soil moisture storage capacity and crop rooting habits. Unreliable onset dates Soils in the zone are characterised to be of low to moderate AWC (80-100 mm/m) and poor to moderate moisture storing properties (Smax 50-150 mm) according to rainfall acceptanece.

				complex of rock outcrops, surface ironstone, very stony and very shallow soils; and important proportion of moderately well to imperfectly drained, shallow to deep, usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and moderately high natural fertility.			
C5		5-7	29-31 19-23	Flat to gently undulating plains, slope range 0-3% developed on old alluvial terrace no longer flooded. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in subsoil, weak structure and very low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with weak structure and very low natural fertility; and imperfectly to poorly drained due to flat topography and ponding above ironstone pans in subsoil (0-7 to 1.5 m deep) which prevent deep percolation and are able to maintain perched water tables stable enough rice cultivation.	< 200	1000-1200 Monomodal	One dependable growing period per year with duration of 3-4½months. Mainly covered by deep, medium to heavy textured soils with moderate to high AWC (80-150 mm/m) and favourable moisture storing properties (Smax 150-350 mm). Topographical favours runoff additions and promote flood risk.
O		na	na	Ocean	na	na	na

AGRO-ECOLOGICAL ZONES FOR MONDULI DISTRICT (ARUSHA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
EI		5-7	27-30 15-18	Mainly well drained, gently undulating to rolling plains and plateaux with altitude variability, developed on gneissic rocks, includes some poorly drained, flat and wide topographical depressions developed on young alluvium. Dominant soils are well drained, moderately deep to deep, dark reddish brown, yellowish red or red sandy clay loams and sandy clays with weak or moderate structure and low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with poor structure with very low natural fertility.	500 - 1200	400-500 Monomodal	One DGP per year with duration of less than 2 month, varying by less than 1 week in response to soil moisture storage properties and crop rooting habits. Onset dates are very unreliable. Soils are medium to heavy textured with moderate AWC (70-120mm/m) and poor moisture acceptance to due to surface sealing (Smax 40-60mm)
E2		5-7	27-30 15-18	Mainly well drained, gently undulating to rolling plains and plateaux, altitude 500-1200 m developed on gneissic rocks. There are poorly drained flat wide topographical depressions developed on young alluvium. Sloppy areas are strongly dissected, often rocky and severely eroded. Dominant soils are well drained, moderately deep to deep, dark reddish brown, yellowish red or red sandy clay loams and sandy clays with weak or moderate structure and low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with poor structure with very low natural fertility (Pare, Usambara and Lower Kilimnajaro)	500-1200	800-1000 Monomodal	One DGP per year with duration of 2 - 2½ months varying by less than 2 weeks in response to soil moisture storage capacity crop rooting habits. Unreliable onset dates. Soils are medium to heavy textured with moderate to high AWC (AWC 80-150 mm/m) but with poor moisture acceptance properties due to tendency for surface sealing (Smax 40-60 mm).
NI		4½-7	22-25 10-15	Mainly rolling to hilly, dissected plateaux at high altitude developed on volcanic ash, lavas and on gneisses. Mainly covered by heterogeneous soil types with important	1500-2500	500-700 Monomodal	One DGP per year with duration of 3-5 months depending on soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Moderate to high AWC (70-150 mm/m) and

				proportions of fertile, well drained, deep yellowish or reddish sandy clays to clay with moderate to strong structure developed on volcanic ash and lavas, and strongly weathered, heavy – textured soils of low to medium fertility.			favourable moisture storing properties (Smax 200-400).
N2		6½-7	16-19 5-10	Rolling to hilly, high altitude with calderas and volcanic cones. Major soils are well drained, deep, dark brown non-calcareous loams, silty loams and clay loams with moderate structure, high natural fertility with proportion of shallow soils which are complex of rock outcrops, surface ironstone, very stony soils and very shallow soils; and shallow, stony, black sandy loams to sandy clay loams developed on lavas and lahars.	2000-2500	800-1000 Monomodal	One DGP per year with duration of 3-5 months depending on soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Moderate to high AWC (70-150 mm/m) and favourable moisture storing properties (Smax 200-400).
N3		>8½	27-30 15-18	Flat lacustrine plains at medium altitude, with extensive salt and soda flats, often inundated. Major soils are of varying colour, texture, structure, consistence and drainage but with fertility status and moisture storing properties adversely affected by presence of exchangeable sodium and/or soluble salts at levels that are high enough to interfere with growth of most crops (ESP>15, pH>8.5, EC>4. Also, moderately well to imperfectly drained, shallow to deep usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and moderate to high natural fertility. Often high ESP in subsoil.	900 -1100	400-500 Monomodal	Very short to short growing periods, adversely influenced by dominance of salts in soil. The zone is mainly covered by salt affected soils with important proportion of dark cracking clays of topographical depressions with moderate moisture storing properties.
N4			16-30 5-10	Volcanic mountains with gentle to steep ash and lava slopes stretching from medium (900-1600 m) to high altitude (2000-3500 m). Major soils are well drained, deep, reddish friable or firm clay loams and clays with strong structure with high natural fertility and accumulation of partly decayed plant material in permanent swamps or alpine meadows.	900-3500	500-1400 Monomodal	One DGP per year with duration increasing from 3-5 months to 6-11 months with altitude, soil moisture storage capacity and crop rooting habits. Onset dates are unreliable. The zone mainly covered by volcanic ash soils with low to moderate AWC (50-100 mm/m) and moderate moisture storing properties (Smax 100-200).
N5		6½-8½	27-30 15-18	Mainly flat to rolling plains at medium altitude, developed on volcanic ash and sediments. Major soils are well drained, shallow to deep, dark brown or dark grey calcareous sandy loams with weak structure with moderate natural fertility; and well drained, deep, dark grey or brown loamy sands, sandy loams and loams rich in	1300-1700	600-1200 Monomodal	One DGP per year with duration decreasing toward south from 4-6 months to 2-2½ months. Unreliable onset dates. The zone mainly covered by volcanic ash soils with low to very high AWC (50-200mm/m) and moderate to very favourable (high) moisture storing properties (Smax 100 – 600mm).

				allophanic clays with weak structure, low bulk density and high natural fertility.			
N6		6½-8½	27-30 15-18	Mainly flat to rolling plains at medium altitude, developed on volcanic ash or lava or lahars. Soils are heterogeneous with important proportions of shallow soils, well drained, dark (sandy) loams on volcanic ash and pumice and dark cracking clays of topographical depressions.	1300-1700	400-500 Monomodal	One DGP per year with duration of less than 2 - 2½ months depending on soil moisture storage capacity and crop rooting habits and exposure to rain shadow effect of Mt Kilimanjaro and Mt Meru. Onset dates unreliable, with low to moderate AWC (50-100 mm/m) and moderate soil moisture storing properties (Smax 100-200 mm).
N7		6½-8½	22-30 10-18	Level to rolling plains medium to high altitude, developed on slightly weathered volcanic ash. Major soils are well drained, shallow to deep, dark brown or dark grey calcareous sandy loams with weak structure with moderate natural fertility; and well drained, deep, dark grey or brown loamy sands, sandy loams and loams rich in allophanic clays with weak structure, low bulk density and high natural fertility	1300-1800	500-800 Monomodal	One DGP per year with duration of 2 - 3½ months depending on soil moisture storage capacity and crop rooting habits and exposure to rain shadow of Ngorongoro highlands. Onset dates unreliable. Soils developed from volcanic ash with characterized by moderate AWC (50-100 mm/m) and moderate moisture storing properties (Smax 100-200).
N8		6½-7	22-30 10-18	Level to undulating or rolling plains at medium to high altitude developed on volcanic ash and sediments, often with steep hills. Major soils are well drained, deep, dark brown non-calcareous loams, silty loams and clay loams with moderate structure with high natural fertility; and moderately well to imperfectly drained, shallow to deep mostly calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure with high natural fertility.	1300-2300	800-1000 Monomodal	One DGP per year with duration of 3-3½ months, varying depending on soil moisture storage capacity and crop rooting habits. Onset dates are unreliable. Volcanic ash soils, mostly well drained clays with moderate to high AWC (70-150 mm/m) and favourable moisture storing properties (Smax 200-400 mm).
R		na	na	Rocky terrain	na	na	na

AGRO-ECOLOGICAL ZONES FOR MOROGORO DISTRICT (MOROGORO REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
CI		5-7	29-31 19-23	Nearly level to rolling plains of slope range 0-10%, developed on Quaternary, Neogene, Jurrasic and Cretaceous sediments. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with	< 200	1000-1200 Bimodal	2 dependable growing periods (DGP) per year. Variation of DGP length as function of soil moisture storage capcity and crop rooting habits. Duration is 3-4 months. Main DGP is March-April, while the secondary DGP is October – November. The zone has deep

				poor structure, and very low natural fertility; and moderately well to imperfectly drained, shallow to deep usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and moderate natural fertility.			sandy soils with low AWC (30-80 mm/m) and moderate soil depth (1-2m). Poor to moderate moisture storing capacity (Smax 50-150mm)
C4		5.5-7	29-31 19-23	Flat, low altitude riverine floodplains (84%) and deltas (16%) with spatially and temporally varying flooding regimes and sedimentation patterns; mainly covered by young alluvial soils with variable drainage and flooding conditions. Dominant soils are well to moderately well drained, deep, brownish fine sands to sandy clay loams with high textural variability over short distances and highly stratified with more sandy or more clayey layers; and imperfectly to poorly drained, deep, (dark) grey, or grey brown clays, sandy clays or clay laoms often mottled and usually with more sandy horizons within the profile and moderate toposoil structure, with high natural fertility; and imperfectly to poorly drained, deep, coarse almost pure bleached sands often with finer texture overly usually with poor natural fertility	<200	1200-14000 Varible	Growing period mainly determined by flooding regime. The zone moisture characteristics is influenced by flood regimes, drainage variability,
C5		5-7	29-31 19-23	Flat to gently undulating plains, slope range 0-3% developed on old alluvial terrace no longer flooded. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in subsoil, weak structure and very low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with weak structure and very low natural fertility; and imperfectly to poorly drained due to flat topography and ponding above ironstone pans in subsoil (0-7 to 1.5 m deep) which prevent deep percolation and are able to maintain perched water tables stable enough rice cultivation.	< 200	1000-1200 Monomodal	One dependable growing period per year with duration of 3-4½months. Mainly covered by deep, medium to heavy textured soils with moderate to high AWC (80-150 mm/m) and favourable moisture storing properties (Smax 150-350 mm). Topographical favours runoff additions and promote flood risk.
E2		5-7	27-30 15-18	Mainly well drained, gently undulating to rolling plains and plateaux, altitude 500-1200 m developed on gneissic rocks. There are poorly drained flat wide topographical depressions developed on young alluvium. Sloppy areas are strongly dissected, often rocky and severely eroded. Dominant soils are	500-1200	800-1000 Monomodal	One DGP per year with duration of 2 - 2½ months varying by less than 2 weeks in response to soil moisture storage capacity crop rooting habits. Unreliable onset dates. Soils are medium to heavy textured with moderate to high AWC (AWC 80-150 mm/m) but with poor moisture acceptance properties due to

				well drained, moderately deep to deep, dark reddish brown, yellowish red or red sandy clay loams and sandy clays with weak or moderate structure and low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with poor structure with very low natural fertility (Pare, Usambara and Lower Kilimnajaro)			tendency for surface sealing (Smax 40-60 mm).
E3		4-7	29-31 19-23	Mainly well drained, flat to rolling plains, low altitude developed on intermediate metamorphic rocks. Major soils are well drained, moderately deep to deep, reddish and yellowish sandy clay loams and sandy clays, often with more sandy topsoil, with weak structure and low natural fertility; and somewhat excessively to moderately well drained, moderately deep to deep, reddish, brown or grey loamy sands, sandy loams and sandy clay loams with weak structure and low natural fertility; and well drained, moderately deep to deep, yellowish or reddish sandy clays with weak structure, very low to low natural fertility.	200-750	800-1000 Monomodal	Mainly one DGP 3 - 4½ months varying by 1-4 weeks depending on soil moisture storing properties and crop rooting habits. Onset dates are unreliable. Soil texture varies from medium to heavy textured alluvial with moderate to high AWC (80-150 mm/m) and favourable moisture storing properties (Smax 200-350mm). Natural soil fertility shows marked differences between sites, and soil acidity may be common
E4		4-7	29-31 19-23	Physiographic units range from well drained, level to rolling plains at low altitude (200-500m) to strongly dissected uplands and low hills transitional to mountains at altitude 500 – 1000 m; mainly developed on intermediate metamorphic rocks. Major soils are well drained, moderately deep to deep, yellowish or reddish sandy clays to clays with moderate to very low natural fertility.	200-1000	800-1000 Monomodal	One DGP per year which is 4½ to 6 month long, varying by 6 weeks depending soil moisture characteristics and crop rooting habits. Onsets are not reliable. In less dissected and less steep parts covered by well drained, deep clays, AWC is moderate (70-120 mm/m) and favourable moisture storing properties (Smax 200-400 mm). There are areas with soil toxicities which hinder root development and hence reduce ability of crop to extract stored soil moisture to (Smax 50-80 mm).
E9		≥ 7	29-31 19-23	Flat alluvial plains with homogenous sedimentation pattern. Major soils are imperfectly to poorly drained, deep, dark grey or grey brown, often mottled clays (clay 40-70%), more compact and contain fewer sandy strata. Natural fertility status is low to moderate.	400 - 500	800-1000 Monomodal	One DGP per year with duration of 4½ - 6½ months, varying by 2 months depending on soil moisture storing capacity and crop rooting habits. Onset dates are unreliable, and the growing period is influenced by rainfall ponding and runoff collection. Moisture storing properties less favourable due to poor internal drainage (AWC 150, Smax 150-225).
EI4		4½-7	22-25 10-15	Mainly 67% of the physiographic units are very strongly dissected mountain block with steep to very steep slopes (15-60%), narrow valleys; altitude 1000 – 2000 m; includes 33% of strongly dissected foothills at low	500-2000	1000-1200 Monomdal	One DGP per year but often transition from into next growing period without intermediate dry period. Duration 5½ - 7 months, varying depending on soil moisture storage capacity and crop rooting habits.

				altitude (500-1000 m). Zone, particularly foothills, strongly affected by soil creep, gully erosion and landslides. Major soils are well drained, deep yellowish or reddish sandy clays to clays with moderate to strong structure and moderate natural fertility; and well drained, deep yellowish or reddish sandy clays to clays with weak structure and with low to very low natural fertility			Onset dates difficult to establish because of overlapping growing period. AWC (80-120 mm/m) moderate and moisture storage capacity is favourable (Smax 200-400 mm)
H7		4½-7	22-25 10-15	Mainly mountainous topography at high altitude, either with extensive, undulating to hilly plateau crests or strongly dissected with limited plateau crests. Major soils are well drained, deep yellowish or reddish sandy clays to clays with moderate to strong structure with moderate natural fertility and complex of rock outcrops, surface ironstone, very stony soils and very shallow soils.	1500-2300	800-1000 Monomodal	One DGP per year with duration of 5-7 months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils have moderate AWC (120 mm/m) and favourable moisture storing properties (Smax 300-400).
S1		5-7	29-31 19-23	Mainly gently undulating to rolling plateaux developed on Karroo sandstones and Neogene sandy sediments; low altitude. Major soils are well drained, moderately deep to deep, red, yellowish or red or orange sands and loamy sands with sands with sandy loams in depth, with weak structure and very low natural fertility; and important proportion of moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with weak structure and very low natural fertility.	200-500	800-1000 Monomodal	One DGP per year with duration of 3-4½ months, varying by 3-4 weeks depending on soil moisture storing capacity and crop rooting habits. Unreliable onset dates. The zone is covered by well drained loamy sands with low fertility and poor to moderate moisture storing properties.
S2		5-7	27-31 15-23	Mainly gently undulating to rolling plateaux developed on Karroo sediments. Some parts of the zone strongly dissected terrain. Dominant soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, weak structure and very low natural fertility; and proportion of moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with weak structure and very low natural fertility	200-1000	1000-1200 Monomodal	One DGP per year with duration of 5-7 months, varying by 1-2 months depending on soil moisture storing capacity and crop rooting habits. Reliable onset dates. The zone is mainly covered by moderately deep sandy and loamy soils with low to moderate AWC (50-80 mm/m) and poor to moderate moisture storing properties.
R		na	na	Rocky terrain	na	na	**na**

AGRO-ECOLOGICAL ZONES FOR MOSHI DISTRICT (KILIMANJARO REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
EI		5-7	27-30 15-18	Mainly well drained, gently undulating to rolling plains and plateaux with altitude variability, developed on gneissic rocks, includes some poorly drained, flat and wide topographical depressions developed on young alluvium. Dominant soils are well drained, moderately deep to deep, dark reddish brown, yellowish red or red sandy clay loams and sandy clays with weak or moderate structure and low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with poor structure with very low natural fertility.	500 - 1200	400-500 Monomodal	One DGP per year with duration of less than 2 month, varying by less than 1 week in response to soil moisture storage properties and crop rooting habits. Onset dates are very unreliable. Soils are medium to heavy textured with moderate AWC (70-120mm/m) and poor moisture acceptance to due to surface sealing (Smax 40-60mm)
E2		5-7	27-30 15-18	Mainly well drained, gently undulating to rolling plains and plateaux, altitude 500-1200 m developed on gneissic rocks. There are poorly drained flat wide topographical depressions developed on young alluvium. Sloppy areas are strongly dissected, often rocky and severely eroded. Dominant soils are well drained, moderately deep to deep, dark reddish brown, yellowish red or red sandy clay loams and sandy clays with weak or moderate structure and low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with poor structure with very low natural fertility (Pare, Usambara and Lower Kilimnajaro)	500-1200	800-1000 Monomodal	One DGP per year with duration of 2 - 2½ months varying by less than 2 weeks in response to soil moisture storage capacity crop rooting habits. Unreliable onset dates. Soils are medium to heavy textured with moderate to high AWC (AWC 80-150 mm/m) but with poor moisture acceptance properties due to tendency for surface sealing (Smax 40-60 mm).
E8		5½ >8½	27-31 15-23	Flat (flood plains) alluvial plains with poorly drained, clayey soils, severely affected by	1200	500-600 Monomodal	One DGP per year with onset date mostly determined by flooding regime. Soils are

				salinity. Major soils are alkaline and saline with different colours, textures, structures, consistence and drainage but with fertility status and moisture storing properties adversely affected by presence of exchangeable sodium and or soluble salts at high levels enough to interfere with growth of most crops (ESP >15, pH>8½, EC>4), an important proportion of dark cracking clays of topographical depressions with moderate to high natural fertility.			moderately well to imperfectly well drained, shallow to deep usually calcareous, with moisture storing properties with effective rooting depth restricted by impervious subsoil, AWC 150, Smax 75 – 150, often high ESP.
N4			16-30 5-10	Volcanic mountains with gentle to steep ash and lava slopes stretching from medium (900-1600 m) to high altitude (2000-3500 m). Major soils are well drained, deep, reddish friable or firm clay loams and clays with strong structure with high natural fertility and accumulation of partly decayed plant material in permanent swamps or alpine meadows.	900-3500	500-1400 Monomodal	One DGP per year with duration increasing from 3-5 months to 6-11 months with altitude, soil moisture storage capacity and crop rooting habits. Onset dates are unreliable. The zone mainly covered by volcanic ash soils with low to moderate AWC (50-100 mm/m) and moderate moisture storing properties (Smax 100-200).
R		na	na	Rocky terrain	na	na	na

AGRO-ECOLOGICAL ZONES FOR MPANDA DISTRICT (RUKWA REGION)

AEZ	SUB	pH	Temperatur		Altitude	Rainfall	Length of Growing Period and Soil

CODE	ZONE-AREA (Sq-Km)	(H_2O)	e (^{0}c)	Soils and Topography	(m)	total (mm/Year) / Patten	Moisture Properties
P5		5-7	27-30 15-18	Mainly gently undulating plains, for the most part well drained, at medium altitude, developed on granites and gneisses. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are complexes of rock outcrops, surface ironstone, very stony, and very shallow (< 25 cm); and moderately well to imperfectly drained, shallow to deep frequently calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and high natural fertility.	1100-1300	800-1000 Monomodal	One DGP per year with duration of 5-6 months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils are generally moderately deep sandy or loamy with low to moderate AWC (30-100 mm/m) and poor moisture storing properties mostly for sandy and loamy soils susceptible to surface capping (Smax 50-150mm); and favourable for other loamy soils (Smax 150-300 mm). In some units with salt affected soils effective soil depth is restricted by impervious subsoil, often high ESP.
P6		5-7	27-30 15-18	Mainly undulating plains and plateaux developed on sandstones, shales and quartzites medium altitude. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, deep, reddish or brown sandy loams and sandy clay loams and sandy clays often with more sandy topsoil, weak structure and low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with poor structure and very low natural fertility.	800-1800	850-1700 Monomodal	One DGP per year with duration of 6-8½ months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils are heterogeneous with low to moderate AWC (50-100 mm/m) and poor to moderate moisture storing properties (Smax 30-150 mm).
PI3		5 - 8½	27-30 15-18	Flat, seasonally inundated lowland plains with important proportion of permanent or semi-permanent swamps. . Major soils are moderately well to imperfectly drained, shallow to deep often calcareous, black, dark grey or brown cracking clays mostly overlying paler subsoil with ephemeral structure and high natural fertility; and imperfectly to poorly drained, deep, non-calcareous, grey or brown sandy loams to sandy clays with strongly mottled and compact subsoil but with more sandy, more friable and darker	900-1200	800-1000 Monomodal	DGP varies with Physiography. For upland areas, one DGP per year with duration of 5-6 months depending on soil moisture storage capacity and crop rooting habits. However, in most of the zone, growing period condition determined by duration and depth of flooding.

				toposoil. Moderate natural fertility; sodic subsoil possible.			
RI		>8½	27-30 15-18	Mainly flat plains covered by riverine or lacustrine alluvium, strongly affected by salinity or sodicity and by variable flooding conditions, medium altitude, mostly below 1000 m. Mainly covered by salt affected soils which are soils of varying colour, texture, structure, consistence and drainage but with fertility and moisture storing characteristics adversely affected by presence of exchangeable sodium and/or soluble salts at levels that are high enough to interfere with growth of most crops (ESP>15, pH>8.5, EC>4); and well drained, moderately deep to deep, reddish and yellowish sandy clay loams and sandy clays, often with more sandy topsoil, weak structure and low natural fertility; and well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with weak structure and very low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with weak structure and very low natural fertility.	900 - 1200	850-1300 Monomodal	One DGP per year with duration of 5-6 months around Lake Rukwa and 6-9 months in the Northwest (Karema depression). Growing period in the zone varies with rain-shadow effects in the lee of hill ranges or escarpments and variable flooding conditions. Reliable onset dates. Major soils covering the zone are characterized with moderate to high AWC (80-150 mm/m) and moderate to high moisture storing properties (Smax 150-350 mm). In 35% of the zone the ability of crops to extract moisture is negatively affected by strong salinity or alkalinity.
U		5-7	22-25 10-15	Complex of flat to gently undulating plains developed on various parent rocks (gneiss, schist, sandstones, acid volcanics, and granites) but mostly well drained and located at high altitude. Major soils are well drained, moderately deep to deep, reddish and yellowish sandy clay loams and sandy clays, often with more sandy topsoil, weak structure and low natural fertility; and well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, weak structure and very low natural fertility; and important proportions of moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with poor structure and very low natural fertility.	800-1800	800-1200 Monomodal	One DGP per year with duration of 5-6½ months depending on soil moisture storage capacity and crop rooting habits. In the northwest corner of the zone growing period may be 6-8½ months. Reliable onset dates. The zone is mainly covered by (moderately) deep sandy and loamy soils with low to moderate AWC (30-100 mm/m) and poor to moderate moisture storing properties (Smax 50-300 mm).
W2		4-7	22-25 10-15	Dissected hilly plateaux developed on basalt, argilclaceous sandstones and shales, with flat or gently undulating tablelands bounded by steep scarps and valleys often strongly affected by erosion, at high altitude. Mainly	1500-1700	1000-1500 Monomdal	One DGP per year with duration of 6½ - 8 months depending on moisture storage capacity and crop rooting habits. Reliable onset dates. Major soils are well drained, clayey soils with moderate AWC (70-120 mm/m) and with

				covered by equal proportions of heavy – textured soils with high organic matter contents which are well drained, moderately deep or deep, yellowish or reddish sandy clays to clays with weak structure and very low to low natural fertility; and well drained, deep yellowish or reddish sandy clays to clays with moderate to strong structure and moderate natural fertility.			favourable moisture storing properties (Smax 200-400 mm). Existence of chemical barriers may hamper utilisation of soil moisture reserves (Smax 50-80 mm).
R		na	na	Rocky terrain	na	na	**na**
L		na	na	Rocky terrain	na	na	**na**

AGRO-ECOLOGICAL ZONES FOR MPWAPWA DISTRICT (DODOMA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	**Temperature (^{0}c)**	**Soils and Topography**	**Altitude (m)**	**Rainfall total (mm/Year) / Patten**	**Length of Growing Period and Soil Moisture Properties**
E2		5-7	27-30 15-18	Mainly well drained, gently undulating to rolling plains and plateaux, altitude 500-1200 m developed on gneissic rocks. There are poorly drained flat wide topographical depressions developed on young alluvium. Sloppy areas are strongly dissected, often rocky and severely eroded. Dominant soils are well drained, moderately deep to deep, dark reddish brown, yellowish red or red sandy clay loams and sandy clays with weak or moderate structure and low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with poor structure with very low natural fertility (Pare, Usambara and Lower Kilimnajaro)	500-1200	800-1000 Monomodal	One DGP per year with duration of 2 - 2½ months varying by less than 2 weeks in response to soil moisture storage capacity crop rooting habits. Unreliable onset dates. Soils are medium to heavy textured with moderate to high AWC (AWC 80-150 mm/m) but with poor moisture acceptance properties due to tendency for surface sealing (Smax 40-60 mm).
H7		4½-7	22-25	Mainly mountainous topography at high	1500-2300	800-1000	One DGP per year with duration of 5-7 months

			10-15	altitude, either with extensive, undulating to hilly plateau crests or strongly dissected with limited plateau crests. Major soils are well drained, deep yellowish or reddish sandy clays to clays with moderate to strong structure with moderate natural fertility and complex of rock outcrops, surface ironstone, very stony soils and very shallow soils.		Monomodal	depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils have moderate AWC (120 mm/m) and favourable moisture storing properties (Smax 300-400).
P2		5-7	27-30 15-18	Mainly gently undulating plains, for the most part well drained, at medium altitude, developed on granites and gneisses. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are complexes of rock outcrops, surface ironstone, very stony, and very shallow (< 25 cm); and moderately well to imperfectly drained, shallow to deep frequently calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and high natural fertility.	1100-1300	550-600 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils are generally moderately deep sandy or loamy with low to moderate AWC (30-100 mm/m) and poor moisture storing properties mostly for sandy and loamy soils susceptible to surface capping (Smax 50-150mm); and favourable for other loamy soils (Smax 150-300 mm). In some units with salt affected soils effective soil depth is restricted by impervious subsoil, often high ESP.
P9		4-6	27-30 15-18	Mainly gently undulating to plains formed on 'continental deposits' overlying granites. Major soils are somewhat excessively to moderately well drained, moderately deep to deep, reddish, brown or grey loamy sands, sandy loams and sandy clay loams with poor structure with very low natural fertility; and well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with weak structure and low natural fertility.	1100-1400	500-600 Monomodal	One DGP per year with duration of 3-3½ months depending on moisture storage capacity and crop rooting habits. Reliable onset dates. Heterogeneous soils with dominance of light and medium textured soils with poor to moderate moisture storing properties (AWC 50-100 mm/m; Smax 50-200 mm) without chemical barriers.
R3		>8½	27-30 15-18	Complex terrain, formed partly by flat to very gently undulating plains of lacustrine origin and partly by undulating plains of very old surface, at medium altitude. Covered by heterogeneous soils, ranging from sodic salt affected soils with varying colour, texture, structure, consistence and drainage but with	900-1400	600-1000 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storing capacity and crop rooting habits. Reliable onset dates. Heterogeneous soils with low to moderate moisture storing properties and seasonally waterlogged soils. ,

				fertility and moisture storing characteristics adversely affected by presence of exchangeable sodium and/or soluble salts at levels that are high enough to interfere with growth of most crops (ESP>15, pH>8.5, EC>4); well drained, moderate deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams depth with weak structure and very low natural fertility; and hardpan soils, and seasonally waterlogged soils with moderate fertility.			
R		na	na	Rocky terrrain	na	na	na

AGRO-ECOLOGICAL ZONES FOR MTWARA DISTRICT (MTWARA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
C2		5-7	29-31 19-23	Nearly level to gently rolling plains and plateaux, slopes ranging from 0-10%, developed on Quaternary, Neogene, Jurrasic and Cretaceous sediment. Soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in subsoil and poor structure and with very low natural fertility; and moderately well to imperfectly drained, shallow to deep usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and moderate natural fertility.	< 500	800-1000 Monomodal	One DGP per year with duration of 3-4½ months, with variation of 3-4 weeks depending soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Soils have moderate to high AWC (80-150 mm/m) and favourable moisture storing characteristics (Smax 150-350 mm).
O		na	na	Ocean	na	na	na

AGRO-ECOLOGICAL ZONES FOR MUFINDI DISTRICT (IRINGA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
E7		5-6½	27-30 15-18	Mainly well drained, flat to rolling plains, locally hilly at medium altitude (750-1300 m). 30% is strongly dissected uplands and low hills transitional to the medium altitude plateau. Major soils are well drained, moderately deep to deep dark red to red to friable clays with moderate to strong structure and evidence of clay illuviation. Natural soil fertility is low to moderate, with common problem of soil acidity.	800-1500	800-1000 Monomodal	One medium to long DGP with reliable onsets per year with duration of 5-7 months in most of the zone, varying by 1½-2 months depending on soil moisture storing capacity and crop rooting habits. Moderate moisture storing properties (good rainfall acceptance, lateral seepage water addition) poor to moderate water storing properties depending on the presence of chemical barriers (AWC 80-120 mm/m, Smax 30-70 with chemical barriers, Smax 100-300 without chemical barriers)
EI0		5½-7½	29-31 19-23	Flat alluvial plains with complex sedimentation pattern, subject to regular flood from braiding rivers. The physiographic units are mainly covered by young alluvial, well to moderately well drained, deep, brownish fine sands to sandy clay loams with high textural variability over short distances and highly stratified with more sandy than more clayey layers, with high natural fertility. About 30% of the soils covering the unit are imperfectly to poorly drained, deep, dark grey or grey brown clays, sandy clays or clay loams often mottled, with high natural fertility.	400-600	1400-1600 Monomdal	On non-flooding land, one DGP per year with duration of 5½ - 8 months, varying by 2½ months according to soil moisture storage capacity and crop rooting habits. Moisture storing properties ranges from moderate to high (more stable water table, AWC 80-150 mm/m, Smax 150-300 m). Onset dates are not reliable.
HI		5-7	22-25 10-15	Mainly flat and undulating to rolling plains and plateaux at high altitude, developed on granites and gneisses. Major soils are well drained, deep yellowish or reddish sandy clays to clays with moderate to strong structure, with moderate natural fertility; and well drained, moderately deep to deep, reddish and yellowish sandy loams and sandy clays, often with more sandy topsoils, with weak structure and low natural fertility.	1500-2000	600-1600 Monomdal	One DGP per year with duration of 5-6 months depending on soil moisture storage capacity and crop rooting habits. The zone has reliable onset dates, moderate AWC (120 mm/m) and favourable moisture storing properties (Smax 300-400 m).
H2		5-7	22-25 10-15	Undulating to rolling plains at the high altitude developed on granites. Major soils are well drained, deep yellowish or reddish sandy clays to clays with moderate to strong structure, with moderate natural fertility; and well drained, moderately deep to deep,	1500-2100	1400-1600 Monomodal	One DGP per year with duration of 6-9 months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates, moderate AWC (120 mm/m) and favourable moisture storing properties (Smax 300-400 m).

				reddish and yellowish sandy loams and sandy clays, often with more sandy topsoils, with weak structure and low natural fertility.			
H7		4½-7	22-25 10-15	Mainly mountainous topography at high altitude, either with extensive, undulating to hilly plateau crests or strongly dissected with limited plateau crests. Major soils are well drained, deep yellowish or reddish sandy clays to clays with moderate to strong structure with moderate natural fertility and complex of rock outcrops, surface ironstone, very stony soils and very shallow soils.	1500-2300	800-1000 Monomodal	One DGP per year with duration of 5-7 months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils have moderate AWC (120 mm/m) and favourable moisture storing properties (Smax 300-400).
R		na	na	Rocky terrain	na	na	na

AGRO-ECOLOGICAL ZONES FOR MUHEZA DISTRICT (TANGA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	**Temperature (^{0}c)**	**Soils and Topography**	**Altitude (m)**	**Rainfall total (mm/Year) / Patten**	**Length of Growing Period and Soil Moisture Properties**
CI		5-7	29-31 19-23	Nearly level to rolling plains of slope range 0-10%, developed on Quaternary, Neogene, Jurrasic and Cretaceous sediments. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with	< 200	1000-1200 Bimodal	2 dependable growing periods (DGP) per year. Variation of DGP length as function of soil moisture storage capcity and crop rooting habits. Duration is 3-4 months. Main DGP is March-April, while the secondary DGP is October – November. The zone has deep

				poor structure, and very low natural fertility; and moderately well to imperfectly drained, shallow to deep usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and moderate natural fertility.			sandy soils with low AWC (30-80 mm/m) and moderate soil depth (1-2m). Poor to moderate moisture storing capacity (Smax 50-150mm)
C4		5.5-7	29-31 19-23	Flat, low altitude riverine floodplains (84%) and deltas (16%) with spatially and temporally varying flooding regimes and sedimentation patterns; mainly covered by young alluvial soils with variable drainage and flooding conditions. Dominant soils are well to moderately well drained, deep, brownish fine sands to sandy clay loams with high textural variability over short distances and highly stratified with more sandy or more clayey layers; and imperfectly to poorly drained, deep, (dark) grey, or grey brown clays, sandy clays or clay laoms often mottled and usually with more sandy horizons within the profile and moderate toposoil structure, with high natural fertility; and imperfectly to poorly drained, deep, coarse almost pure bleached sands often with finer texture overly usually with poor natural fertility	<200	1200-14000 Varible	Growing period mainly determined by flooding regime. The zone moisture characteristics is influenced by flood regimes, drainage variability,
EI		5-7	27-30 15-18	Mainly well drained, gently undulating to rolling plains and plateaux with altitude variability, developed on gneissic rocks, includes some poorly drained, flat and wide topographical depressions developed on young alluvium. Dominant soils are well drained, moderately deep to deep, dark reddish brown, yellowish red or red sandy clay loams and sandy clays with weak or moderate structure and low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with poor structure with very low natural fertility.	500 - 1200	400-500 Monomodal	One DGP per year with duration of less than 2 month, varying by less than 1 week in response to soil moisture storage properties and crop rooting habits. Onset dates are very unreliable. Soils are medium to heavy textured with moderate AWC (70-120mm/m) and poor moisture acceptance to due to surface sealing (Smax 40-60mm)
E2		5-7	27-30 15-18	Mainly well drained, gently undulating to rolling plains and plateaux, altitude 500-1200 m developed on gneissic rocks. There are poorly drained flat wide topographical depressions developed on young alluvium. Sloppy areas are strongly dissected, often rocky and severely eroded. Dominant soils are well drained, moderately deep to deep, dark reddish brown, yellowish red or red sandy	500-1200	800-1000 Monomodal	One DGP per year with duration of 2 - 2½ months varying by less than 2 weeks in response to soil moisture storage capacity crop rooting habits. Unreliable onset dates. Soils are medium to heavy textured with moderate to high AWC (AWC 80-150 mm/m) but with poor moisture acceptance properties due to tendency for surface sealing (Smax 40-60 mm).

				clay loams and sandy clays with weak or moderate structure and low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with poor structure with very low natural fertility (Pare, Usambara and Lower Kilimnajaro)			
E3		4-7	29-31 19-23	Mainly well drained, flat to rolling plains, low altitude developed on intermediate metamorphic rocks. Major soils are well drained, moderately deep to deep, reddish and yellowish sandy clay loams and sandy clays, often with more sandy topsoil, with weak structure and low natural fertility; and somewhat excessively to moderately well drained, moderately deep to deep, reddish, brown or grey loamy sands, sandy loams and sandy clay loams with weak structure and low natural fertility; and well drained, moderately deep to deep, yellowish or reddish sandy clays with weak structure, very low to low natural fertility.	200-750	800-1000 Monomodal	Mainly one DGP 3 - 4½ months varying by 1-4 weeks depending on soil moisture storing properties and crop rooting habits. Onset dates are unreliable. Soil texture varies from medium to heavy textured alluvial with moderate to high AWC (80-150 mm/m) and favourable moisture storing properties (Smax 200-350mm). Natural soil fertility shows marked differences between sites, and soil acidity may be common
E6		4-7	29-31 19-23	Well drained, undulating to rolling plains at low altitude (150-500 m) developed on intermediate metamorphic rocks. Major soils are well drained, moderately deep to deep, yellowish or reddish sandy clays to clays with moderate to low natural fertility, and some units low pH values with possibilities for aluminium toxicity.	150-500	1000-1200 Bimodal	Two DGP per year, with duration of 4-4½ months for the main growing period which has reliable onset dates and 2½ - 3 months for the short growing season, with unreliable onset dates, both varying by 2-3 weeks depending on soil moisture storage capacity and crop rooting habits. There is possibility of double cropping in many years. Soils are well drained, moderately deep, medium to heavy textured soils with moderate AWC (70-120mm/m) and poor moisture acceptance to due to surface sealing (Smax 40-60mm). Smax in areas without surface capping and or chemical barrier ranges from 150 – 300 mm.
O		na	na	Ocen	na	na	na

AGRO-ECOLOGICAL ZONES FOR MULEBA DISTRICT (KAGERA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
N9		7-8½	22-30 10-18	Undulating plains at medium to high altitude, developed on sodic volcanic ash. Major soils are well drained, deep, reddish friable or firm clay loams and clays with strong structure and high natural fertility; and moderately well to imperfectly drained, mostly calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure with high natural fertility.	1100-1800	600-800 Monomodal	One DGP per year with duration of 3-3½ months, varying depending on soil moisture storage capacity and crop rooting habits. Onset dates are unreliable. Soils are heavy textured with high sodicity and poor moisture storing properties (Smax 30-50).
P8		6½-7	27-30 15-18	Flat to gently undulating plains developed partly on granites, partly on old colluvium; medium altitude. Major soils are imperfectly drained, shallow, dark grey or brown sands to sandy clays with hardpan within 50 cm from the surface, often calcareous and sodic in the subsoil (ESP 10-15) with moderate natural fertility; and moderately well to imperfectly drained, shallow to deeper, usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and with high natural fertility; and well drained, moderately deep to deep, red or brown often gravely, sandy loams and sandy clay loams, with weak structure and low natural fertility.	1000-1200	600-1200 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storage capacity and crop rooting habits. Onset dates unreliable. The zone mainly covered by hardpan soils with poor moisture storing properties AWC (30-100), with important proportions of dark cracking clays of topographical depressions with moderate moisture storing properties AWC 150 mm/m; Smax 75-150 mm; and sandy and medium textured with moderate to high moisture storing properties (AWC 50 – 100 mm/m; Smax 50-300 mm).

L		na	na	Lake	na	na	na

AGRO-ECOLOGICAL ZONES FOR MUSOMA DISTRICT (MARA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
P8		6½-7	27-30 15-18	Flat to gently undulating plains developed partly on granites, partly on old colluvium; medium altitude. Major soils are imperfectly drained, shallow, dark grey or brown sands to sandy clays with hardpan within 50 cm from the surface, often calcareous and sodic in the subsoil (ESP 10-15) with moderate natural fertility; and moderately well to imperfectly drained, shallow to deeper, usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and with high natural fertility; and well drained, moderately deep to deep, red or brown often gravely, sandy loams and sandy clay loams, with weak structure and low natural fertility.	1000-1200	600-1200 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storage capacity and crop rooting habits. Onset dates unreliable. The zone mainly covered by hardpan soils with poor moisture storing properties AWC (30-100), with important proportions of dark cracking clays of topographical depressions with moderate moisture storing properties AWC 150 mm/m; Smax 75-150 mm; and sandy and medium textured with moderate to high moisture storing properties (AWC 50 – 100 mm/m; Smax 50-300 mm).
R		na	na	Rocky terrain	na	na	na
L		na	na	Lake	na	na	na

AGRO-ECOLOGICAL ZONES FOR MWANGA DISTRICT (KILIMANJARO REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
EI		5-7	27-30 15-18	Mainly well drained, gently undulating to rolling plains and plateaux with altitude variability, developed on gneissic rocks, includes some poorly drained, flat and wide topographical depressions developed on young alluvium. Dominant soils are well drained, moderately deep to deep, dark reddish brown, yellowish red or red sandy clay loams and sandy clays with weak or moderate structure and low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with poor structure with very low natural fertility.	500 - 1200	400-500 Monomodal	One DGP per year with duration of less than 2 month, varying by less than 1 week in response to soil moisture storage properties and crop rooting habits. Onset dates are very unreliable. Soils are medium to heavy textured with moderate AWC (70-120mm/m) and poor moisture acceptance to due to surface sealing (Smax 40-60mm)
E8		5½ >8½	27-31 15-23	Flat (flood plains) alluvial plains with poorly drained, clayey soils, severely affected by salinity. Major soils are alkaline and saline with different colours, textures, structures, consistence and drainage but with fertility status and moisture storing properties adversely affected by presence of exchangeable sodium and or soluble salts at high levels enough to interfere with growth of most crops (ESP >15, pH>8½, EC>4), an important proportion of dark cracking clays of topographical depressions with moderate to high natural fertility.	1200	500-600 Monomodal	One DGP per year with onset date mostly determined by flooding regime. Soils are moderately well to imperfectly well drained, shallow to deep usually calcareous, with moisture storing properties with effective rooting depth restricted by impervious subsoil, AWC 150, Smax 75 – 150, often high ESP.
EI2		4½-7	22-25 10-15	Dissected, rolling to hilly mountains plateaux, slope range 10 – 40%, in parts affected by severe water erosion. Mainly covered by well drained, deep yellowish or reddish sandy clays with moderate to strong structure, with moderate natural fertility; and well drained, moderately deep to deep, yellowish or reddish sandy clays to clays with weak structure with very low to low natural fertility.	1000-2000	2000-3500 Monomodal	One DGP per year duration of 5-6½ months, varying by 1½ months according to soil moisture storage capacity and crop rooting habits. Onset dates are unreliable. The soils have moderate AWC 70-120 mm/m and favourable moisture storing properties (Smax 200-400mm). Chemical barriers to root development may occur in some soils.

R		na	na	Rocky terrain	na	na	**na**

AGRO-ECOLOGICAL ZONES FOR NKASI DISTRICT (RUKWA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	**Temperature (^{0}c)**	**Soils and Topography**	**Altitude (m)**	**Rainfall total (mm/Year) / Patten**	**Length of Growing Period and Soil Moisture Properties**
RI		>8½	27-30 15-18	Mainly flat plains covered by riverine or lacustrine alluvium, strongly affected by	900 - 1200	850-1300 Monomodal	One DGP per year with duration of 5-6 months around Lake Rukwa and 6-9 months in the

				salinity or sodicity and by variable flooding conditions, medium altitude, mostly below 1000 m. Mainly covered by salt affected soils which are soils of varying colour, texture, structure, consistence and drainage but with fertility and moisture storing characteristics adversely affected by presence of exchangeable sodium and/or soluble salts at levels that are high enough to interfere with growth of most crops (ESP>15, pH>8.5, EC>4); and well drained, moderately deep to deep, reddish and yellowish sandy clay loams and sandy clays, often with more sandy topsoil, weak structure and low natural fertility; and well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with weak structure and very low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with weak structure and very low natural fertility.			Northwest (Karema depression). Growing period in the zone varies with rain-shadow effects in the lee of hill ranges or escarpments and variable flooding conditions. Reliable onset dates. Major soils covering the zone are characterized with moderate to high AWC (80-150 mm/m) and moderate to high moisture storing properties (Smax 150-350 mm). In 35% of the zone the ability of crops to extract moisture is negatively affected by strong salinity or alkalinity.
U		5-7	22-25 10-15	Complex of flat to gently undulating plains developed on various parent rocks (gneiss, schist, sandstones, acid volcanics, and granites) but mostly well drained and located at high altitude. Major soils are well drained, moderately deep to deep, reddish and yellowish sandy clay loams and sandy clays, often with more sandy topsoil, weak structure and low natural fertility; and well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, weak structure and very low natural fertility; and important proportions of moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with poor structure and very low natural fertility.	800-1800	800-1200 Monomodal	One DGP per year with duration of 5-6½ months depending on soil moisture storage capacity and crop rooting habits. In the northwest corner of the zone growing period may be 6-8½ months. Reliable onset dates. The zone is mainly covered by (moderately) deep sandy and loamy soils with low to moderate AWC (30-100 mm/m) and poor to moderate moisture storing properties (Smax 50-300 mm).
R		na	na	Rocky terrain	na	na	na
O		na	na	Ocean	na	na	na

AGRO-ECOLOGICAL ZONES FOR NZEGA DISTRICT (TABORA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
P3		5-7	27-30 15-18	Mainly gently undulating plains, for the most part well drained, at medium altitude, developed on granites and gneisses. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are complexes of rock outcrops, surface ironstone, very stony, and very shallow (< 25 cm); and moderately well to imperfectly	1100-1300	600-1000 Monomodal	One DGP per year with duration of 4-5 months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils are generally moderately deep sandy or loamy with low to moderate AWC (30-100 mm/m) and poor moisture storing properties mostly for sandy and loamy soils susceptible to surface capping (Smax 50-150mm); and favourable for other loamy soils (Smax 150-300 mm). In some units with salt affected soils effective soil depth is restricted by impervious subsoil, often high ESP.

				drained, shallow to deep frequently calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and high natural fertility.			
P5		5-7	27-30 15-18	See P3 Mainly gently undulating plains, for the most part well drained, at medium altitude, developed on granites and gneisses. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are complexes of rock outcrops, surface ironstone, very stony, and very shallow (< 25 cm); and moderately well to imperfectly drained, shallow to deep frequently calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and high natural fertility.	1100-1300	800-1000 Monomodal	One DGP per year with duration of 5-6 months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils are generally moderately deep sandy or loamy with low to moderate AWC (30-100 mm/m) and poor moisture storing properties mostly for sandy and loamy soils susceptible to surface capping (Smax 50-150mm); and favourable for other loamy soils (Smax 150-300 mm). In some units with salt affected soils effective soil depth is restricted by impervious subsoil, often high ESP.
P7		7-8½	27-30 15-18	Flat to very gently undulating plains developed in old lake sediments. Major soils are well to moderately well drained, shallow to moderately deep, grey or brown, friable calcareous clay loams and clays, with moderate to strong structure and high natural fertility; and imperfectly drained, shallow, dark grey or brown sands to sandy clays with hardpan within 50 cm from the surface, often calcareous and sodic in the subsoil (ESP 10-15) with moderate natural fertility.	1000-1100	600-800 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Soils are shallow to moderately deep (0.5 – 1.5 m) friable clays with high AWC (150). Favourable moisture storing properties (Smax 200-250).
P8		6½-7	27-30 15-18	Flat to gently undulating plains developed partly on granites, partly on old colluvium; medium altitude. Major soils are imperfectly drained, shallow, dark grey or brown sands to sandy clays with hardpan within 50 cm from the surface, often calcareous and sodic in the subsoil (ESP 10-15) with moderate natural fertility; and moderately well to imperfectly drained, shallow to deeper, usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and with high natural fertility; and well drained, moderately deep to deep, red or brown often gravely, sandy loams and sandy	1000-1200	600-1200 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storage capacity and crop rooting habits. Onset dates unreliable. The zone mainly covered by hardpan soils with poor moisture storing properties AWC (30-100), with important proportions of dark cracking clays of topographical depressions with moderate moisture storing properties AWC 150 mm/m; Smax 75-150 mm; and sandy and medium textured with moderate to high moisture storing properties (AWC 50 – 100 mm/m; Smax 50-300 mm).

				clay loams, with weak structure and low natural fertility.			
R		na	na	Rocky terrain	na	na	na

AGRO-ECOLOGICAL ZONES FOR PANGANI DISTRICT (TANGA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
CI		5-7	29-31 19-23	Nearly level to rolling plains of slope range 0-10%, developed on Quaternary, Neogene, Jurrasic and Cretaceous sediments. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure, and very low natural fertility; and moderately well to imperfectly drained, shallow to deep usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and moderate natural fertility.	< 200	1000-1200 Bimodal	2 dependable growing periods (DGP) per year. Variation of DGP length as function of soil moisture storage capcity and crop rooting habits. Duration is 3-4 months. Main DGP is March-April, while the secondary DGP is October – November. The zone has deep sandy soils with low AWC (30-80 mm/m) and moderate soil depth (1-2m). Poor to moderate moisture storing capacity (Smax 50-150mm)
C4		5.5-7	29-31 19-23	Flat, low altitude riverine floodplains (84%) and deltas (16%) with spatially and temporally varying flooding regimes and sedimentation patterns; mainly covered by young alluvial soils with variable drainage and flooding conditions. Dominant soils are well to moderately well drained, deep, brownish fine sands to sandy clay loams with high textural variability over short distances and highly stratified with more sandy or more clayey layers; and imperfectly to poorly drained, deep, (dark) grey, or grey brown clays, sandy clays or clay laoms often mottled and usually with more sandy horizons within the profile and moderate toposoil structure,	<200	1200-14000 Varible	Growing period mainly determined by flooding regime. The zone moisture characteristics is influenced by flood regimes, drainage variability,

				with high natural fertility; and imperfectly to poorly drained, deep, coarse almost pure bleached sands often with finer texture overly usually with poor natural fertility			
E3		4-7	29-31 19-23	Mainly well drained, flat to rolling plains, low altitude developed on intermediate metamorphic rocks. Major soils are well drained, moderately deep to deep, reddish and yellowish sandy clay loams and sandy clays, often with more sandy topsoil, with weak structure and low natural fertility; and somewhat excessively to moderately well drained, moderately deep to deep, reddish, brown or grey loamy sands, sandy loams and sandy clay loams with weak structure and low natural fertility; and well drained, moderately deep to deep, yellowish or reddish sandy clays with weak structure, very low to low natural fertility.	200-750	800-1000 Monomodal	Mainly one DGP 3 - 4½ months varying by 1-4 weeks depending on soil moisture storing properties and crop rooting habits. Onset dates are unreliable. Soil texture varies from medium to heavy textured alluvial with moderate to high AWC (80-150 mm/m) and favourable moisture storing properties (Smax 200-350mm). Natural soil fertility shows marked differences between sites, and soil acidity may be common
E6		4-7	29-31 19-23	Well drained, undulating to rolling plains at low altitude (150-500 m) developed on intermediate metamorphic rocks. Major soils are well drained, moderately deep to deep, yellowish or reddish sandy clays to clays with moderate to low natural fertility, and some units low pH values with possibilities for aluminium toxicity.	150-500	1000-1200 Bimodal	Two DGP per year, with duration of 4-4½ months for the main growing period which has reliable onset dates and 2½ - 3 months for the short growing season, with unreliable onset dates, both varying by 2-3 weeks depending on soil moisture storage capacity and crop rooting habits. There is possibility of double cropping in many years. Soils are well drained, moderately deep, medium to heavy textured soils with moderate AWC (70-120mm/m) and poor moisture acceptance to due to surface sealing (Smax 40-60mm). Smax in areas without surface capping and or chemical barrier ranges from 150 – 300 mm.
O		na	na	Ocean	na	na	na

AGRO-ECOLOGICAL ZONES FOR ROMBO DISTRICT (KILIMANJARO REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
EI		5-7	27-30 15-18	Mainly well drained, gently undulating to rolling plains and plateaux with altitude variability, developed on gneissic rocks, includes some poorly drained, flat and wide topographical depressions developed on young alluvium. Dominant soils are well drained, moderately deep to deep, dark reddish brown, yellowish red or red sandy clay loams and sandy clays with weak or moderate structure and low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with poor structure with very low natural fertility.	500 - 1200	400-500 Monomodal	One DGP per year with duration of less than 2 month, varying by less than 1 week in response to soil moisture storage properties and crop rooting habits. Onset dates are very unreliable. Soils are medium to heavy textured with moderate AWC (70-120mm/m) and poor moisture acceptance to due to surface sealing (Smax 40-60mm)
N4			16-30 5-10	Volcanic mountains with gentle to steep ash and lava slopes stretching from medium (900-1600 m) to high altitude (2000-3500 m). Major soils are well drained, deep, reddish friable or firm clay loams and clays with strong structure with high natural fertility and accumulation of partly decayed plant material in permanent swamps or alpine meadows.	900-3500	500-1400 Monomodal	One DGP per year with duration increasing from 3-5 months to 6-11 months with altitude, soil moisture storage capacity and crop rooting habits. Onset dates are unreliable. The zone mainly covered by volcanic ash soils with low to moderate AWC (50-100 mm/m) and moderate moisture storing properties (Smax 100-200).

AGRO-ECOLOGICAL ZONES FOR RUANGWA DISTRICT (LINDI REGION)

AEZ	SUB	pH	Temperatur		Altitude	Rainfall	Length of Growing Period and Soil

CODE	ZONE-AREA (Sq-Km)	(H_2O)	e (^{0}c)	Soils and Topography	(m)	total (mm/Year) / Patten	Moisture Properties
C2		5-7	29-31 19-23	Nearly level to gently rolling plains and plateaux, slopes ranging from 0-10%, developed on Quaternary, Neogene, Jurrasic and Cretaceous sediment. Soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in subsoil and poor structure and with very low natural fertility; and moderately well to imperfectly drained, shallow to deep usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and moderate natural fertility.	< 500	800-1000 Monomodal	One DGP per year with duration of 3-4½ months, with variation of 3-4 weeks depending soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Soils have moderate to high AWC (80-150 mm/m) and favourable moisture storing characteristics (Smax 150-350 mm).
E3		4-7	29-31 19-23	Mainly well drained, flat to rolling plains, low altitude developed on intermediate metamorphic rocks. Major soils are well drained, moderately deep to deep, reddish and yellowish sandy clay loams and sandy clays, often with more sandy topsoil, with weak structure and low natural fertility; and somewhat excessively to moderately well drained, moderately deep to deep, reddish, brown or grey loamy sands, sandy loams and sandy clay loams with weak structure and low natural fertility; and well drained, moderately deep to deep, yellowish or reddish sandy clays with weak structure, very low to low natural fertility.	200-750	800-1000 Monomodal	Mainly one DGP 3 - 4½ months varying by 1-4 weeks depending on soil moisture storing properties and crop rooting habits. Onset dates are unreliable. Soil texture varies from medium to heavy textured alluvial with moderate to high AWC (80-150 mm/m) and favourable moisture storing properties (Smax 200-350mm). Natural soil fertility shows marked differences between sites, and soil acidity may be common
E5		5-7	29-31 19-23	Well drained, level to rolling plains at low altitude (200-500 m) developed on acid intermediate metamorphic rocks. Major soils are well drained, moderately deep to deep, reddish and yellowish sandy loams and sandy clays, often with more sandy topsoils. Other soils well drained, moderately deep to deep dark red to red, friable clays with moderate to strong structure and evidence of clay illuviation, with low natural fertility.	200-500	800-1000 Monomodal	One DGP per year, with duration of 5-6 months, varying by 3-5 weeks depending on soil moisture storing properties and crop rooting habits. Onset dates are reliable. Soils are well drained, moderately deep, medium to heavy textured soils with moderate AWC (70-120mm/m) and poor moisture acceptance to due to surface sealing (Smax 40-60mm). Smax in areas without surface capping and or chemical barrier ranges from 150 – 300 mm.
R		na	na	Rocky terrain	na	na	na

AGRO-ECOLOGICAL ZONES FOR RUFIJI DISTRICT (COAST REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
C2		5-7	29-31 19-23	Nearly level to gently rolling plains and plateaux, slopes ranging from 0-10%, developed on Quaternary, Neogene, Jurrasic and Cretaceous sediment. Soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in subsoil and poor structure and with very low natural fertility; and moderately well to imperfectly drained,	< 500	800-1000 Monomodal	One DGP per year with duration of 3-4½ months, with variation of 3-4 weeks depending soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Soils have moderate to high AWC (80-150 mm/m) and favourable moisture storing characteristics (Smax 150-350 mm).

				shallow to deep usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and moderate natural fertility.			
C3		5-7	29-31 19-23	Strongly dissected uplands and rolling to steep hills, slope range of 10-45%, developed on Jurassic, sandstones, shales, limestones, Paleogene limestone and marls and Neogene sandy clays. Soils are mainly well drained, moderately deep to deep, reddish and yellowish sandy clay loams and sandy clays, often with more sandy topsoils, with weak structure and low natural fertility; and complex of rock outcrops, surface ironstone, very stony and very shallow soils; and important proportion of moderately well to imperfectly drained, shallow to deep, usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and moderately high natural fertility.	<500	800-1000 Monomodal	One DGP per year with duration of 3-4½ months, with variation of 3-4 weeks depending soil moisture storage capacity and crop rooting habits. Unreliable onset dates Soils in the zone are characterised to be of low to moderate AWC (80-100 mm/m) and poor to moderate moisture storing properties (Smax 50-150 mm) according to rainfall acceptanece.
C4		5.5-7	29-31 19-23	Flat, low altitude riverine floodplains (84%) and deltas (16%) with spatially and temporally varying flooding regimes and sedimentation patterns; mainly covered by young alluvial soils with variable drainage and flooding conditions. Dominant soils are well to moderately well drained, deep, brownish fine sands to sandy clay loams with high textural variability over short distances and highly stratified with more sandy or more clayey layers; and imperfectly to poorly drained, deep, (dark) grey, or grey brown clays, sandy clays or clay laoms often mottled and usually with more sandy horizons within the profile and moderate toposoil structure, with high natural fertility; and imperfectly to poorly drained, deep, coarse almost pure bleached sands often with finer texture overly usually with poor natural fertility	<200	1200-14000 Varible	Growing period mainly determined by flooding regime. The zone moisture characteristics is influenced by flood regimes, drainage variability,
C5		5-7	29-31 19-23	Flat to gently undulating plains, slope range 0-3% developed on old alluvial terrace no longer flooded. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in subsoil, weak structure and very low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow,	< 200	1000-1200 Monomodal	One dependable growing period per year with duration of 3-4½months. Mainly covered by deep, medium to heavy textured soils with moderate to high AWC (80-150 mm/m) and favourable moisture storing properties (Smax 150-350 mm). Topographical favours runoff additions and promote flood risk.

				light grey or white mottled sands and loamy sands with weak structure and very low natural fertility; and imperfectly to poorly drained due to flat topography and ponding above ironstone pans in subsoil (0-7 to 1.5 m deep) which prevent deep percolation and are able to maintain perched water tables stable enough rice cultivation.			
E4		4-7	29-31 19-23	Physiographic units range from well drained, level to rolling plains at low altitude (200-500m) to strongly dissected uplands and low hills transitional to mountains at altitude 500 – 1000 m; mainly developed on intermediate metamorphic rocks. Major soils are well drained, moderately deep to deep, yellowish or reddish sandy clays to clays with moderate to very low natural fertility.	200-1000	800-1000 Monomodal	One DGP per year which is 4½ to 6 month long, varying by 6 weeks depending soil moisture characteristics and crop rooting habits. Onsets are not reliable. In less dissected and less steep parts covered by well drained, deep clays, AWC is moderate (70-120 mm/m) and favourable moisture storing properties (Smax 200-400 mm). There are areas with soil toxicities which hinder root development and hence reduce ability of crop to extract stored soil moisture to (Smax 50-80 mm).
SI		5-7	29-31 19-23	Mainly gently undulating to rolling plateaux developed on Karroo sandstones and Neogene sandy sediments; low altitude. Major soils are well drained, moderately deep to deep, red, yellowish or red or orange sands and loamy sands with sands with sandy loams in depth, with weak structure and very low natural fertility; and important proportion of moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with weak structure and very low natural fertility.	200-500	800-1000 Monomodal	One DGP per year with duration of 3-4½ months, varying by 3-4 weeks depending on soil moisture storing capacity and crop rooting habits. Unreliable onset dates. The zone is covered by well drained loamy sands with low fertility and poor to moderate moisture storing properties.
O		na	na	Ocean	na	na	na

AGRO-ECOLOGICAL ZONES FOR RUNGWE DISTRICT (MBEYA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
H4		5½-7½	29-31 19-23	Flat to very gently undulating lacustrine plain at low altitude. Major soils are imperfectly to poorly drained, deep, dark grey or grey brown clays, sandy clays or clay loams often mottled; high natural fertility; and well to moderately well drained, deep, brownish fine sands to sandy clay loams with high textural variability over short distances and highly stratified with more sandy or more clayey layers. High natural fertility.	500	1600-2400 Mnonomdal	One DGP per year, often merging into next without intermediate dry period. Duration DGP 8-10 months, varying depending soil moisture storage capacity and crop rooting habits. Onset dates difficult to determine because of overlap of growing periods. AWC is moderate to high (80-150 mm/m) with moderate to high soil moisture storing properties (Smax 150 – 300 mm)
H5		5-7	22-25 10-15	Volcanic landforms ranging from undulating to rolling, medium to high altitude plains and plateaux; to strongly dissected hills, mountains, plateaux and plains at medium altitude. Major soils are well drained, deep, dark grey brown loamy sands, sandy loams and loams rich in allophanic clays with weak structure, low bulk density and with high natural fertility; and well drained, deep yellowish or reddish sandy clays to clays with moderate to strong structure with moderate natural fertility.	1200-2400	1000-2000 Monomodal	One DGP per year, increasing in duration from 6-9 months to 9-12 months, depending on altitude and soil moisture storage capacity. Onset dates difficult to determine because of overlap of growing periods. Soil moisture characteristics vary between physiographic units ranging from moderate to high AWC (100-200 mm/m) with favourable moisture storing properties (Smax 300-400).
R		na	na	Rocky terrain	na	na	na

AGRO-ECOLOGICAL ZONES FOR SAME DISTRICT (KILIMANJARO REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
EI		5-7	27-30 15-18	Mainly well drained, gently undulating to rolling plains and plateaux with altitude variability, developed on gneissic rocks, includes some poorly drained, flat and wide topographical depressions developed on young alluvium. Dominant soils are well drained, moderately deep to deep, dark reddish brown, yellowish red or red sandy clay loams and sandy clays with weak or moderate structure and low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with poor structure with very low natural fertility.	500 - 1200	400-500 Monomodal	One DGP per year with duration of less than 2 month, varying by less than 1 week in response to soil moisture storage properties and crop rooting habits. Onset dates are very unreliable. Soils are medium to heavy textured with moderate AWC (70-120mm/m) and poor moisture acceptance to due to surface sealing (Smax 40-60mm)
E8		5½ >8½	27-31 15-23	Flat (flood plains) alluvial plains with poorly drained, clayey soils, severely affected by salinity. Major soils are alkaline and saline with different colours, textures, structures, consistence and drainage but with fertility status and moisture storing properties adversely affected by presence of exchangeable sodium and or soluble salts at high levels enough to interfere with growth of most crops (ESP >15, pH>8½, EC>4), an important proportion of dark cracking clays of topographical depressions with moderate to high natural fertility.	1200	500-600 Monomodal	One DGP per year with onset date mostly determined by flooding regime. Soils are moderately well to imperfectly well drained, shallow to deep usually calcareous, with moisture storing properties with effective rooting depth restricted by impervious subsoil, AWC 150, Smax 75 – 150, often high ESP.
EI2		4½-7	22-25 10-15	Dissected, rolling to hilly mountains plateaux, slope range 10 – 40%, in parts affected by severe water erosion. Mainly covered by well drained, deep yellowish or reddish sandy clays with moderate to strong structure, with moderate natural fertility; and well drained, moderately deep to deep, yellowish or reddish	1000-2000	2000-3500 Monomodal	One DGP per year duration of 5-6½ months, varying by 1½ months according to soil moisture storage capacity and crop rooting habits. Onset dates are unreliable. The soils have moderate AWC 70-120 mm/m and favourable moisture storing properties (Smax 200-400mm). Chemical barriers to root development may occur in some

				sandy clays to clays with weak structure with very low to low natural fertility.			soils.
R		na	na	Rocky terrain	na	na	na

AGRO-ECOLOGICAL ZONES FOR SENGERAMA DISTRICT (MWANZA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-	pH (H_2O)	**Temperature (^{0}c)**	**Soils and Topography**	**Altitude (m)**	**Rainfall total (mm/Year) /**	**Length of Growing Period and Soil Moisture Properties**

	Km)					Patten	
P4		5-7	27-30 15-18	Mainly flat to gently undulating plains with scattered hill-footslope associations at medium altitude, developed on granites, banded ironstones and young alluvium. Soils exhibit heterogeneous pattern with important proportions of well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are complexes of rock outcrops, surface ironstone, very stony, and very shallow; and moderately well to imperfectly drained, shallow to deep frequently calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and high natural fertility.	1200-1300	800-1000 Monomodal	One DGP per year with duration of 3½-5 months depending on soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Soils are moderately deep to deep with low to moderate AWC (50-100 mm/m) that may present 'chemical barriers' (e.g. salts) to root development in which case moisture reserve that can be used by crops is very low (Smax 30-50 mm). Where no chemical barriers exist, the moisture storing properties are moderate (Smax 100-200 mm).
L		na	na	Lake	na	na	na

AGRO-ECOLOGICAL ZONES FOR SERENGETI DISTRICT (MARA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
N7		6½-8½	22-30 10-18	Level to rolling plains medium to high altitude, developed on slightly weathered volcanic ash. Major soils are well drained,	1300-1800	500-800 Monomodal	One DGP per year with duration of 2 - 3½ months depending on soil moisture storage capacity and crop rooting habits and exposure to

				shallow to deep, dark brown or dark grey calcareous sandy loams with weak structure with moderate natural fertility; and well drained, deep, dark grey or brown loamy sands, sandy loams and loams rich in allophanic clays with weak structure, low bulk density and high natural fertility			rain shadow of Ngorongoro highlands. Onset dates unreliable. Soils developed from volcanic ash with characterized by moderate AWC (50-100 mm/m) and moderate moisture storing properties (Smax 100-200).
N8		6½-7	22-30 10-18	Level to undulating or rolling plains at medium to high altitude developed on volcanic ash and sediments, often with steep hills. Major soils are well drained, deep, dark brown non-calcareous loams, silty loams and clay loams with moderate structure with high natural fertility; and moderately well to imperfectly drained, shallow to deep mostly calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure with high natural fertility.	1300-2300	800-1000 Monomodal	One DGP per year with duration of 3-3½ months, varying depending on soil moisture storage capacity and crop rooting habits. Onset dates are unreliable. Volcanic ash soils, mostly well drained clays with moderate to high AWC (70-150 mm/m) and favourable moisture storing properties (Smax 200-400 mm).
N9		7-8½	22-30 10-18	Undulating plains at medium to high altitude, developed on sodic volcanic ash. Major soils are well drained, deep, reddish friable or firm clay loams and clays with strong structure and high natural fertility; and moderately well to imperfectly drained, mostly calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure with high natural fertility.	1100-1800	600-800 Monomodal	One DGP per year with duration of 3-3½ months, varying depending on soil moisture storage capacity and crop rooting habits. Onset dates are unreliable. Soils are heavy textured with high sodicity and poor moisture storing properties (Smax 30-50).
P8		6½-7	27-30 15-18	Flat to gently undulating plains developed partly on granites, partly on old colluvium; medium altitude. Major soils are imperfectly drained, shallow, dark grey or brown sands to sandy clays with hardpan within 50 cm from the surface, often calcareous and sodic in the subsoil (ESP 10-15) with moderate natural fertility; and moderately well to imperfectly drained, shallow to deeper, usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and with high natural fertility; and well drained, moderately deep to deep, red or brown often gravely, sandy loams and sandy clay loams, with weak structure and low natural fertility.	1000-1200	600-1200 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storage capacity and crop rooting habits. Onset dates unreliable. The zone mainly covered by hardpan soils with poor moisture storing properties AWC (30-100), with important proportions of dark cracking clays of topographical depressions with moderate moisture storing properties AWC 150 mm/m; Smax 75-150 mm; and sandy and medium textured with moderate to high moisture storing properties (AWC 50 – 100 mm/m; Smax 50-300 mm).
R		na	na	Lake	na	na	na

AGRO-ECOLOGICAL ZONES FOR SHINYANGA DISTRICT (SHINYANGA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
P3		5-7	27-30 15-18	Mainly gently undulating plains, for the most part well drained, at medium altitude, developed on granites and gneisses. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are complexes of rock outcrops, surface ironstone, very stony, and very shallow (< 25 cm); and moderately well to imperfectly drained, shallow to deep freqently calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and high natural fertility.	1100-1300	600-1000 Monomodal	One DGP per year with duration of 4-5 months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils are generally moderately deep sandy or loamy with low to moderate AWC (30-100 mm/m) and poor moisture storing properties mostly for sandy and loamy soils susceptible to surface capping (Smax 50-150mm); and favourable for other loamy soils (Smax 150-300 mm). In some units with salt affected soils effective soil depth is restricted by impervious subsoil, often high ESP.

P4		5-7	27-30 15-18	Mainly flat to gently undulating plains with scattered hill-footslope associations at medium altitude, developed on granites, banded ironstones and young alluvium. Soils exhibit heterogeneous patter with important proportions of well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are complexes of rock outcrops, surface ironstone, very stony, and very shallow; and moderately well to imperfectly drained, shallow to deep frequently calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and high natural fertility.	1200-1300	800-1000 Monomodal	One DGP per year with duration of 3½-5 months depending on soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Soils are moderately deep to deep with low to moderate AWC (50-100 mm/m) that may present 'chemical barriers' (e.g. salts) to root development in which case moisture reserve that can be used by crops is very low (Smax 30-50 mm). Where no chemical barriers exist, the moisture storing properties are moderate (Smax 100-200 mm).
P7		7-8½	27-30 15-18	Flat to very gently undulating plains developed in old lake sediments. Major soils are well to moderately well drained, shallow to moderately deep, grey or brown, friable calcareous clay loams and clays, with moderate to strong structure and high natural fertility; and imperfectly drained, shallow, dark grey or brown sands to sandy clays with hardpan within 50 cm from the surface, often calcareous and sodic in the subsoil (ESP 10-15) with moderate natural fertility.	1000-1100	600-800 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Soils are shallow to moderately deep (0.5 – 1.5 m) friable clays with high AWC (150). Favourable moisture storing properties (Smax 200-250).
P8		6½-7	27-30 15-18	Flat to gently undulating plains developed partly on granites, partly on old colluvium; medium altitude. Major soils are imperfectly drained, shallow, dark grey or brown sands to sandy clays with hardpan within 50 cm from the surface, often calcareous and sodic in the subsoil (ESP 10-15) with moderate natural fertility; and moderately well to imperfectly drained, shallow to deeper, usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and with high natural fertility; and well drained, moderately deep to deep, red or brown often gravely, sandy loams and sandy clay loams, with weak structure and low natural fertility.	1000-1200	600-1200 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storage capacity and crop rooting habits. Onset dates unreliable. The zone mainly covered by hardpan soils with poor moisture storing properties AWC (30-100), with important proportions of dark cracking clays of topographical depressions with moderate moisture storing properties AWC 150 mm/m; Smax 75-150 mm; and sandy and medium textured with moderate to high moisture storing properties (AWC 50 – 100 mm/m; Smax 50-300 mm).

PI2		5½ - 9	27-30 15-18	Flat seasonally inundated, lowland plains developed on young alluvium. Major soils are moderately well to imperfectly drained, shallow to deep often calcareous, black, dark grey or brown cracking clays mostly overlying paler subsoil with ephemeral structure and high natural fertility; and imperfectly drained, shallow, dark grey or brown sands to sandy clays with hardpan within 50 cm from the surface, often calcareous and sodic in subsoil (ESP 10-15), with moderate natural fertility.	900-1200	600-700 Monomodal	DGP varies with Physiography. For upland areas one DGP per year with duration of 3-3½ months depending soil moisture storing capacity and crop rooting habits. For most of the zone growing period in determined by duration of depth of flooding. Soil moisture storage is poor to moderate AWC 30-150 mm/m, Smax 75-150 mm.

AGRO-ECOLOGICAL ZONES FOR SIKONGE DISTRICT (TABORA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
P2		5-7	27-30 15-18	Mainly gently undulating plains, for the most part well drained, at medium altitude, developed on granites and gneisses. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are complexes of rock outcrops, surface ironstone, very stony, and very shallow (< 25 cm); and moderately well to imperfectly drained, shallow to deep frequently calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and high natural fertility.	1100-1300	550-600 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils are generally moderately deep sandy or loamy with low to moderate AWC (30-100 mm/m) and poor moisture storing properties mostly for sandy and loamy soils susceptible to surface capping (Smax 50-150mm); and favourable for other loamy soils (Smax 150-300 mm). In some units with salt affected soils effective soil depth is restricted by impervious subsoil, often high ESP.
P3		5-7	27-30 15-18	Mainly gently undulating plains, for the most part well drained, at medium altitude, developed on granites and gneisses. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are complexes of rock outcrops, surface ironstone, very stony, and very shallow (< 25 cm); and moderately well to imperfectly drained, shallow to deep frequently calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and high natural fertility.	1100-1300	600-1000 Monomodal	One DGP per year with duration of 4-5 months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils are generally moderately deep sandy or loamy with low to moderate AWC (30-100 mm/m) and poor moisture storing properties mostly for sandy and loamy soils susceptible to surface capping (Smax 50-150mm); and favourable for other loamy soils (Smax 150-300 mm). In some units with salt affected soils effective soil depth is restricted by impervious subsoil, often high ESP.
P5		5-7	27-30	See P3 Mainly gently undulating plains, for	1100-1300	800-1000	One DGP per year with duration of 5-6 months

			15-18	the most part well drained, at medium altitude, developed on granites and gneisses. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are complexes of rock outcrops, surface ironstone, very stony, and very shallow (< 25 cm); and moderately well to imperfectly drained, shallow to deep frequently calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and high natural fertility.		Monomodal	depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils are generally moderately deep sandy or loamy with low to moderate AWC (30-100 mm/m) and poor moisture storing properties mostly for sandy and loamy soils susceptible to surface capping (Smax 50-150mm); and favourable for other loamy soils (Smax 150-300 mm). In some units with salt affected soils effective soil depth is restricted by impervious subsoil, often high ESP.
PI0		4-6	27-30 15-18	Gently undulating plains formed on 'continental deposits' overlying granite. Major soils are somewhat excessively to moderately well drained, moderately deep to deep, reddish, brown or grey loamy sands, sandy loams and sandy clay loams with poor structure with very low natural fertility; and well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility	1100-1400	600-800 Monomodal	One DGP per year with duration of 3-3½ months, depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils are mainly moderately deep with low to moderate AWC (50-100 mm/m) that may present chemical barriers to root development in which case moisture reserve that can be used by crop is very low (Smax 30-50 mm). Where on chemical barriers exist, the moisture storing properties are moderate (Smax 100-200 mm).
PI3		5 - 8½	27-30 15-18	Flat, seasonally inundated lowland plains with important proportion of permanent or semi-permanent swamps. . Major soils are moderately well to imperfectly drained, shallow to deep often calcareous, black, dark grey or brown cracking clays mostly overlying paler subsoil with ephemeral structure and high natural fertility; and imperfectly to poorly drained, deep, non-calcareous, grey or brown sandy loams to sandy clays with strongly mottled and compact subsoil but with more sandy, more friable and darker toposoil. Moderate natural fertility; sodic subsoil possible.	900-1200	800-1000 Monomodal	DGP varies with Physiography. For upland areas, one DGP per year with duration of 5-6 months depending on soil moisture storage capacity and crop rooting habits. However, in most of the zone, growing period condition determined by duration and depth of flooding.
R		na	na	Rocky terraiin	na	na	na

AGRO-ECOLOGICAL ZONES FOR SIMANJIRO DISTRICT (MANYARA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
EI		5-7	27-30 15-18	Mainly well drained, gently undulating to rolling plains and plateaux with altitude variability, developed on gneissic rocks, includes some poorly drained, flat and wide topographical depressions developed on young alluvium. Dominant soils are well drained, moderately deep to deep, dark reddish brown, yellowish red or red sandy	500 - 1200	400-500 Monomodal	One DGP per year with duration of less than 2 month, varying by less than 1 week in response to soil moisture storage properties and crop rooting habits. Onset dates are very unreliable. Soils are medium to heavy textured with moderate AWC (70-120mm/m) and poor moisture acceptance to due to surface sealing (Smax 40-60mm)

				clay loams and sandy clays with weak or moderate structure and low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with poor structure with very low natural fertility.			
E2		5-7	27-30 15-18	Mainly well drained, gently undulating to rolling plains and plateaux, altitude 500-1200 m developed on gneissic rocks. There are poorly drained flat wide topographical depressions developed on young alluvium. Sloppy areas are strongly dissected, often rocky and severely eroded. Dominant soils are well drained, moderately deep to deep, dark reddish brown, yellowish red or red sandy clay loams and sandy clays with weak or moderate structure and low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with poor structure with very low natural fertility (Pare, Usambara and Lower Kilimnajaro)	500-1200	800-1000 Monomodal	One DGP per year with duration of 2 - 2½ months varying by less than 2 weeks in response to soil moisture storage capacity crop rooting habits. Unreliable onset dates. Soils are medium to heavy textured with moderate to high AWC (AWC 80-150 mm/m) but with poor moisture acceptance properties due to tendency for surface sealing (Smax 40-60 mm).
E3		4-7	29-31 19-23	Mainly well drained, flat to rolling plains, low altitude developed on intermediate metamorphic rocks. Major soils are well drained, moderately deep to deep, reddish and yellowish sandy clay loams and sandy clays, often with more sandy topsoil, with weak structure and low natural fertility; and somewhat excessively to moderately well drained, moderately deep to deep, reddish, brown or grey loamy sands, sandy loams and sandy clay loams with weak structure and low natural fertility; and well drained, moderately deep to deep, yellowish or reddish sandy clays with weak structure, very low to low natural fertility.	200-750	800-1000 Monomodal	Mainly one DGP 3 - 4½ months varying by 1-4 weeks depending on soil moisture storing properties and crop rooting habits. Onset dates are unreliable. Soil texture varies from medium to heavy textured alluvial with moderate to high AWC (80-150 mm/m) and favourable moisture storing properties (Smax 200-350mm). Natural soil fertility shows marked differences between sites, and soil acidity may be common
E8		5½ >8½	27-31 15-23	Flat (flood plains) alluvial plains with poorly drained, clayey soils, severely affected by salinity. Major soils are alkaline and saline with different colours, textures, structures, consistence and drainage but with fertility status and moisture storing properties adversely affected by presence of exchangeable sodium and or soluble salts at high levels enough to interfere with growth of most crops (ESP >15, pH>8½, EC>4), an important proportion of dark cracking clays	1200	500-600 Monomodal	One DGP per year with onset date mostly determined by flooding regime. Soils are moderately well to imperfectly well drained, shallow to deep usually calcareous, with moisture storing properties with effective rooting depth restricted by impervious subsoil, AWC 150, Smax 75 – 150, often high ESP.

				of topographical depressions with moderate to high natural fertility.			
N5		6½-8½	27-30 15-18	Mainly flat to rolling plains at medium altitude, developed on volcanic ash and sediments. Major soils are well drained, shallow to deep, dark brown or dark grey calcareous sandy loams with weak structure with moderate natural fertility; and well drained, deep, dark grey or brown loamy sands, sandy loams and loams rich in allophanic clays with weak structure, low bulk density and high natural fertility.	1300-1700	600-1200 Monomodal	One DGP per year with duration decreasing toward south from 4-6 months to 2-2½ months. Unreliable onset dates. The zone mainly covered by volcanic ash soils with low to very high AWC (50-200mm/m) and moderate to very favourable (high) moisture storing properties (Smax 100 – 600mm).
R		na	na	Rocky terain	na	na	na

AGRO-ECOLOGICAL ZONES FOR SINGIDA DISTRICT (SINGIDA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
EI		5-7	27-30 15-18	Mainly well drained, gently undulating to rolling plains and plateaux with altitude variability, developed on gneissic rocks, includes some poorly drained, flat and wide topographical depressions developed on young alluvium. Dominant soils are well drained, moderately deep to deep, dark reddish brown, yellowish red or red sandy clay loams and sandy clays with weak or moderate structure and low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with poor structure with very low natural fertility.	500 - 1200	400-500 Monomodal	One DGP per year with duration of less than 2 month, varying by less than 1 week in response to soil moisture storage properties and crop rooting habits. Onset dates are very unreliable. Soils are medium to heavy textured with moderate AWC (70-120mm/m) and poor moisture acceptance to due to surface sealing (Smax 40-60mm)
E2		5-7	27-30 15-18	Mainly well drained, gently undulating to rolling plains and plateaux, altitude 500-1200 m developed on gneissic rocks. There are poorly drained flat wide topographical depressions developed on young alluvium. Sloppy areas are strongly dissected, often rocky and severely eroded. Dominant soils are	500-1200	800-1000 Monomodal	One DGP per year with duration of 2 - 2½ months varying by less than 2 weeks in response to soil moisture storage capacity crop rooting habits. Unreliable onset dates. Soils are medium to heavy textured with moderate to high AWC (AWC 80-150 mm/m) but with poor moisture acceptance properties due to

				well drained, moderately deep to deep, dark reddish brown, yellowish red or red sandy clay loams and sandy clays with weak or moderate structure and low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with poor structure with very low natural fertility (Pare, Usambara and Lower Kilimnajaro)			tendency for surface sealing (Smax 40-60 mm).
NI		4½-7	22-25 10-15	Mainly rolling to hilly, dissected plateaux at high altitude developed on volcanic ash, lavas and on gneisses. Mainly covered by heterogeneous soil types with important proportions of fertile, well drained, deep yellowish or reddish sandy clays to clay with moderate to strong structure developed on volcanic ash and lavas, and strongly weathered, heavy – textured soils of low to medium fertility.	1500-2500	500-700 Monomodal	One DGP per year with duration of 3-5 months depending on soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Moderate to high AWC (70-150 mm/m) and favourable moisture storing properties (Smax 200-400).
PI		5-7	27-30 15-18	Mainly gently undulating plains with some rocky hill-footslope association at medium altitude, developed on granites. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are complexes of rock outcrops, surface ironstone, very stony, and very shallow (< 25 cm); and good proportion of well drained, very shallow to moderately deep, black or dark grey sandy loams to sandy clay loams with strong topsoil structure and high natural fertility.	1100 - 1300	600-700 Monomodal	One DGP per year with duration of 2-2½ months depending soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Soils are generally moderately deep sandy or loamy with low to moderate AWC (30-100 mm/m) and poor moisture storing properties mostly for sandy and loamy soils susceptible to surface capping (Smax 50-150mm); and favourable for other loamy soils (Smax 150-300 mm).
P2		5-7	27-30 15-18	Mainly gently undulating plains, for the most part well drained, at medium altitude, developed on granites and gneisses. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are	1100-1300	550-600 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils are generally moderately deep sandy or loamy with low to moderate AWC (30-100 mm/m) and poor moisture storing properties mostly for sandy and loamy soils susceptible to surface capping (Smax 50-150mm); and favourable for other loamy soils (Smax 150-300 mm). In some units with salt affected soils effective soil depth is restricted by impervious

				complexes of rock outcrops, surface ironstone, very stony, and very shallow (< 25 cm); and moderately well to imperfectly drained, shallow to deep frequently calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and high natural fertility.			subsoil, often high ESP.
P3		5-7	27-30 15-18	Mainly gently undulating plains, for the most part well drained, at medium altitude, developed on granites and gneisses. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are complexes of rock outcrops, surface ironstone, very stony, and very shallow (< 25 cm); and moderately well to imperfectly drained, shallow to deep frequently calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and high natural fertility.	1100-1300	600-1000 Monomodal	One DGP per year with duration of 4-5 months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils are generally moderately deep sandy or loamy with low to moderate AWC (30-100 mm/m) and poor moisture storing properties mostly for sandy and loamy soils susceptible to surface capping (Smax 50-150mm); and favourable for other loamy soils (Smax 150-300 mm). In some units with salt affected soils effective soil depth is restricted by impervious subsoil, often high ESP.
P9		4-6	27-30 15-18	Mainly gently undulating to plains formed on 'continental deposits' overlying granites. Major soils are somewhat excessively to moderately well drained, moderately deep to deep, reddish, brown or grey loamy sands, sandy loams and sandy clay loams with poor structure with very low natural fertility; and well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with weak structure and low natural fertility.	1100-1400	500-600 Monomodal	One DGP per year with duration of 3-3½ months depending on moisture storage capacity and crop rooting habits. Reliable onset dates. Heterogeneous soils with dominance of light and medium textured soils with poor to moderate moisture storing properties (AWC 50-100 mm/m; Smax 50-200 mm) without chemical barriers.
P10		4-6	27-30 15-18	Gently undulating plains formed on 'continental deposits' overlying granite. Major soils are somewhat excessively to moderately well drained, moderately deep to deep, reddish, brown or grey loamy sands, sandy loams and sandy clay loams with poor structure with very low natural fertility; and well drained, moderately deep to deep, red,	1100-1400	600-800 Monomodal	One DGP per year with duration of 3-3½ months, depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils are mainly moderately deep with low to moderate AWC (50-100 mm/m) that may present chemical barriers to root development in which case moisture reserve that can be used by crop is very low (Smax 30-50 mm). Where on

				yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility			chemical barriers exist, the moisture storing properties are moderate (Smax 100-200 mm).
PI1		6½-7	27-30 15-18	Flat plains at medium altitude developed mainly on alluvium. Major soils are imperfectly drained, shallow, dark grey or brown sands to sandy clays with hardpan within 50 cm from the surface, often calcareous and sodic in the subsoil (ESP 10-15) with moderate natural fertility; and soils of varying colour, texture, structure, consistence and drainage but with fertility status and moisture storing properties adversely affected by presence of exchangeable sodium and/or soluble salts at levels that are high enough to interfere with growth of most crops (ESP>15, pH>8.5, EC>4	900	400-600 Monomodal	For upland areas comparable to those of zone P10 above. However most of the zone DGP is influenced by flooding, water-logging, runoff losses or additions and presence of salinity.
PI2		5½ - 9	27-30 15-18	Flat seasonally inundated, lowland plains developed on young alluvium. Major soils are moderately well to imperfectly drained, shallow to deep often calcareous, black, dark grey or brown cracking clays mostly overlying paler subsoil with ephemeral structure and high natural fertility; and imperfectly drained, shallow, dark grey or brown sands to sandy clays with hardpan within 50 cm from the surface, often calcareous and sodic in subsoil (ESP 10-15), with moderate natural fertility.	900-1200	600-700 Monomodal	DGP varies with Physiography. For upland areas one DGP per year with duration of 3-3½ months depending soil moisture storing capacity and crop rooting habits. For most of the zone growing period in determined by duration of depth of flooding. Soil moisture storage is poor to moderate AWC 30-150 mm/m, Smax 75-150 mm.
R		na	na	Rocky terain	na	na	na

AGRO-ECOLOGICAL ZONES FOR SONGEA DISTRICT (RUVUMA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	**Temperature (^{0}c)**	**Soils and Topography**	**Altitude (m)**	**Rainfall total (mm/Year) / Patten**	**Length of Growing Period and Soil Moisture Properties**

E7		5-6½	27-30 15-18	Mainly well drained, flat to rolling plains, locally hilly at medium altitude (750-1300 m). 30% is strongly dissected uplands and low hills transitional to the medium altitude plateau. Major soils are well drained, moderately deep to deep dark red to red to friable clays with moderate to strong structure and evidence of clay illuviation. Natural soil fertility is low to moderate, with common problem of soil acidity.	800-1500	800-1000 Monomodal	One medium to long DGP with reliable onsets per year with duration of 5-7 months in most of the zone, varying by 1½-2 months depending on soil moisture storing capacity and crop rooting habits. Moderate moisture storing properties (good rainfall acceptance, lateral seepage water addition) poor to moderate water storing properties depending on the presence of chemical barriers (AWC 80-120 mm/m, Smax 30-70 with chemical barriers, Smax 100-300 without chemical barriers)
EI1		5-7	27-31 15-23	Complex depressions composed of dissected ridges, fault scarps and alluvial plains; low to medium altitude. Mainly covered by well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth. Natural fertility is low to very low.	500-1000	1000-1200, Monomodal	One DGP per year with duration of 5 – 6 months, varying by 1 month depending on soil moisture storage capacity and crop rooting habits. Onset dates are reliable. Moisture storing properties ranges from low to moderate (AWC 50-80 mm/m, Smax 50-150 m). The soils have goof rainfall acceptance.
H3		4½-7	22-25 10-15	Mainly strongly dissected hills and mountains at high altitude strongly susceptible to erosion and landslides. Major soils are well drained, moderately deep to deep, reddish and yellowish sandy loams and sandy clays, often with more sandy topsoils, with weak structure and low natural fertility.	1500-2300	1000-1400 Monomodal	One DGP per year with duration of 6-9 months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates, moderate AWC (120 mm/m) and favourable moisture storing properties (Smax 300-400 m).
S2		5-7	27-31 15-23	Mainly gently undulating to rolling plateaux developed on Karroo sediments. Some parts of the zone strongly dissected terrain. Dominant soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, weak structure and very low natural fertility; and proportion of moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with weak structure and very low natural fertility	200-1000	1000-1200 Monomodal	One DGP per year with duration of 5-7 months, varying by 1-2 months depending on soil moisture storing capacity and crop rooting habits. Reliable onset dates. The zone is mainly covered by moderately deep sandy and loamy soils with low to moderate AWC (50-80 mm/m) and poor to moderate moisture storing properties.
R		na	na	Rocky terain	na	na	na

AGRO-ECOLOGICAL ZONES FOR SUMBAWANGA DISTRICT (RUKWA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
RI		>8½	27-30 15-18	Mainly flat plains covered by riverine or lacustrine alluvium, strongly affected by salinity or sodicity and by variable flooding conditions, medium altitude, mostly below 1000 m. Mainly covered by salt affected soils which are soils of varying colour, texture, structure, consistence and drainage but with fertility and moisture storing characteristics adversely affected by presence of exchangeable sodium and/or soluble salts at levels that are high enough to interfere with growth of most crops (ESP>15, pH>8.5, EC>4); and well drained, moderately deep to deep, reddish and	900 - 1200	850-1300 Monomodal	One DGP per year with duration of 5-6 months around Lake Rukwa and 6-9 months in the Northwest (Karema depression). Growing period in the zone varies with rain-shadow effects in the lee of hill ranges or escarpments and variable flooding conditions. Reliable onset dates. Major soils covering the zone are characterized with moderate to high AWC (80-150 mm/m) and moderate to high moisture storing properties (Smax 150-350 mm). In 35% of the zone the ability of crops to extract moisture is negatively affected by strong salinity or alkalinity.

				yellowish sandy clay loams and sandy clays, often with more sandy topsoil, weak structure and low natural fertility; and well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with weak structure and very low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with weak structure and very low natural fertility.			
U		5-7	22-25 10-15	Complex of flat to gently undulating plains developed on various parent rocks (gneiss, schist, sandstones, acid volcanics, and granites) but mostly well drained and located at high altitude. Major soils are well drained, moderately deep to deep, reddish and yellowish sandy clay loams and sandy clays, often with more sandy topsoil, weak structure and low natural fertility; and well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, weak structure and very low natural fertility; and important proportions of moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with poor structure and very low natural fertility.	800-1800	800-1200 Monomodal	One DGP per year with duration of 5-6½ months depending on soil moisture storage capacity and crop rooting habits. In the northwest corner of the zone growing period may be 6-8½ months. Reliable onset dates. The zone is mainly covered by (moderately) deep sandy and loamy soils with low to moderate AWC (30-100 mm/m) and poor to moderate moisture storing properties (Smax 50-300 mm).
R		na	na	Rocky terain	na	na	na
L		na	na	Lake	na	na	na

AGRO-ECOLOGICAL ZOES FOR TABORA DISTRICT (TABORA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
P2		5-7	27-30 15-18	Mainly gently undulating plains, for the most part well drained, at medium altitude, developed on granites and gneisses. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are complexes of rock outcrops, surface ironstone, very stony, and very shallow (< 25 cm); and moderately well to imperfectly drained, shallow to deep frequently calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and high natural fertility.	1100-1300	550-600 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils are generally moderately deep sandy or loamy with low to moderate AWC (30-100 mm/m) and poor moisture storing properties mostly for sandy and loamy soils susceptible to surface capping (Smax 50-150mm); and favourable for other loamy soils (Smax 150-300 mm). In some units with salt affected soils effective soil depth is restricted by impervious subsoil, often high ESP.
P3		5-7	27-30 15-18	Mainly gently undulating plains, for the most part well drained, at medium altitude, developed on granites and gneisses. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep,	1100-1300	600-1000 Monomodal	One DGP per year with duration of 4-5 months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils are generally moderately deep sandy or loamy with low to moderate AWC (30-100 mm/m) and poor moisture storing properties mostly for sandy and loamy soils susceptible to surface capping (Smax 50-150mm); and

				red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are complexes of rock outcrops, surface ironstone, very stony, and very shallow (< 25 cm); and moderately well to imperfectly drained, shallow to deep frequently calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and high natural fertility.			favourable for other loamy soils (Smax 150-300 mm). In some units with salt affected soils effective soil depth is restricted by impervious subsoil, often high ESP.
P5		5-7	27-30 15-18	See P3	1100-1300	800-1000 Monomodal	One DGP per year with duration of 5-6 months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils are generally moderately deep sandy or loamy with low to moderate AWC (30-100 mm/m) and poor moisture storing properties mostly for sandy and loamy soils susceptible to surface capping (Smax 50-150mm); and favourable for other loamy soils (Smax 150-300 mm). In some units with salt affected soils effective soil depth is restricted by impervious subsoil, often high ESP.
P8		6½-7	27-30 15-18	Flat to gently undulating plains developed partly on granites, partly on old colluvium; medium altitude. Major soils are imperfectly drained, shallow, dark grey or brown sands to sandy clays with hardpan within 50 cm from the surface, often calcareous and sodic in the subsoil (ESP 10-15) with moderate natural fertility; and moderately well to imperfectly drained, shallow to deeper, usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and with high natural fertility; and well drained, moderately deep to deep, red or brown often gravely, sandy loams and sandy clay loams, with weak structure and low natural fertility.	1000-1200	600-1200 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storage capacity and crop rooting habits. Onset dates unreliable. The zone mainly covered by hardpan soils with poor moisture storing properties AWC (30-100), with important proportions of dark cracking clays of topographical depressions with moderate moisture storing properties AWC 150 mm/m; Smax 75-150 mm; and sandy and medium textured with moderate to high moisture storing properties (AWC 50 – 100 mm/m; Smax 50-300 mm).
P10		4-6	27-30 15-18	Gently undulating plains formed on 'continental deposits' overlying granite. Major soils are somewhat excessively to moderately well drained, moderately deep to deep, reddish, brown or grey loamy sands, sandy loams and sandy clay loams with poor structure with very low natural fertility; and well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor	1100-1400	600-800 Monomodal	One DGP per year with duration of 3-3½ months, depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils are mainly moderately deep with low to moderate AWC (50-100 mm/m) that may present chemical barriers to root development in which case moisture reserve that can be used by crop is very low (Smax 30-50 mm). Where on chemical barriers exist, the moisture storing properties are moderate (Smax 100-200 mm).

				structure and very low natural fertility			
PI2		5½ - 9	27-30 15-18	Flat seasonally inundated, lowland plains developed on young alluvium. Major soils are moderately well to imperfectly drained, shallow to deep often calcareous, black, dark grey or brown cracking clays mostly overlying paler subsoil with ephemeral structure and high natural fertility; and imperfectly drained, shallow, dark grey or brown sands to sandy clays with hardpan within 50 cm from the surface, often calcareous and sodic in subsoil (ESP 10-15), with moderate natural fertility.	900-1200	600-700 Monomodal	DGP varies with Physiography. For upland areas one DGP per year with duration of 3-3½ months depending soil moisture storing capacity and crop rooting habits. For most of the zone growing period in determined by duration of depth of flooding. Soil moisture storage is poor to moderate AWC 30-150 mm/m, Smax 75-150 mm.
PI3		5 - 8½	27-30 15-18	Flat, seasonally inundated lowland plains with important proportion of permanent or semi-permanent swamps. . Major soils are moderately well to imperfectly drained, shallow to deep often calcareous, black, dark grey or brown cracking clays mostly overlying paler subsoil with ephemeral structure and high natural fertility; and imperfectly to poorly drained, deep, non-calcareous, grey or brown sandy loams to sandy clays with strongly mottled and compact subsoil but with more sandy, more friable and darker toposoil. Moderate natural fertility; sodic subsoil possible.	900-1200	800-1000 Monomodal	DGP varies with Physiography. For upland areas, one DGP per year with duration of 5-6 months depending on soil moisture storage capacity and crop rooting habits. However, in most of the zone, growing period condition determined by duration and depth of flooding.
R		na	na	Rocky terain	na	na	na

AGRO-ECOLOGICAL ZONES FOR TANDAHIMBA DISTRICT (MTWARA REGION)

AEZ CODE	SUB ZONE-	pH (H_2O)	**Temperature (^{0}c)**	**Soils and Topography**	**Altitude (m)**	**Rainfall total (**	**Length of Growing Period and Soil Moisture Properties**

	AREA (Sq-Km)					mm/Year) / Patten	
C2		5-7	29-31 19-23	Nearly level to gently rolling plains and plateaux, slopes ranging from 0-10%, developed on Quaternary, Neogene, Jurrasic and Cretaceous sediment. Soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in subsoil and poor structure and with very low natural fertility; and moderately well to imperfectly drained, shallow to deep usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and moderate natural fertility.	< 500	800-1000 Monomodal	One DGP per year with duration of 3-4½ months, with variation of 3-4 weeks depending soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Soils have moderate to high AWC (80-150 mm/m) and favourable moisture storing characteristics (Smax 150-350 mm).
E5		5-7	29-31 19-23	Well drained, level to rolling plains at low altitude (200-500 m) developed on acid intermediate metamorphic rocks. Major soils are well drained, moderately deep to deep, reddish and yellowish sandy loams and sandy clays, often with more sandy topsoils. Other soils well drained, moderately deep to deep dark red to red, friable clays with moderate to strong structure and evidence of clay illuviation, with low natural fertility.	200-500	800-1000 Monomodal	One DGP per year, with duration of 5-6 months, varying by 3-5 weeks depending on soil moisture storing properties and crop rooting habits. Onset dates are reliable. Soils are well drained, moderately deep, medium to heavy textured soils with moderate AWC (70-120mm/m) and poor moisture acceptance to due to surface sealing (Smax 40-60mm). Smax in areas without surface capping and or chemical barrier ranges from 150 – 300 mm.

AGRO-ECOLOGICAL ZONES FOR TANGA DISTRICT (TANGA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
C1		5-7	29-31 19-23	Nearly level to rolling plains of slope range 0-10%, developed on Quaternary, Neogene, Jurrasic and Cretaceous sediments. Major soils are well drained, moderately deep to	< 200	1000-1200 Bimodal	2 dependable growing periods (DGP) per year. Variation of DGP length as function of soil moisture storage capcity and crop rooting habits. Duration is 3-4 months.

				deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure, and very low natural fertility; and moderately well to imperfectly drained, shallow to deep usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and moderate natural fertility.			Main DGP is March-April, while the secondary DGP is October – November. The zone has deep sandy soils with low AWC (30-80 mm/m) and moderate soil depth (1-2m). Poor to moderate moisture storing capacity (Smax 50-150mm)
O		na	na	Ocean	na	na	na

AGRO-ECOLOGICAL ZONES FOR TARIME DISTRICT (MARA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
N8		6½-7	22-30 10-18	Level to undulating or rolling plains at medium to high altitude developed on volcanic ash and sediments, often with steep hills. Major soils are well drained, deep, dark brown non-calcareous loams, silty loams and clay loams with moderate structure with high natural fertility; and moderately well to imperfectly drained, shallow to deep mostly calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with	1300-2300	800-1000 Monomodal	One DGP per year with duration of 3-3½ months, varying depending on soil moisture storage capacity and crop rooting habits. Onset dates are unreliable. Volcanic ash soils, mostly well drained clays with moderate to high AWC (70-150 mm/m) and favourable moisture storing properties (Smax 200-400 mm).

				ephemeral structure with high natural fertility.			
NI0		5-6½	22-25 15-18	Undulating to rolling plateaux and plains of medium to high altitude, developed on lavas and granites. Major soils are well drained, deep yellowish or reddish sandy clays to clays with moderate to strong structure, with very low to low natural fertility; and well drained, moderately deep or deep yellowish or reddish sandy clays to clays with weak structure and moderate natural fertility; well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with weak structure and low natural fertility.	1500-1800	1400-1600 Monomodal	One DGP per year with duration of 6½ - 9½ months depending on soil moisture storing properties and crop rooting habits. Onset dates difficult to determined due to overlap of growing periods. Covered by soil with moderate to high AWC (70-150 mm/m) and favourable moisture storing capacity (Smax 200-400 mm).
P8		6½-7	27-30 15-18	Flat to gently undulating plains developed partly on granites, partly on old colluvium; medium altitude. Major soils are imperfectly drained, shallow, dark grey or brown sands to sandy clays with hardpan within 50 cm from the surface, often calcareous and sodic in the subsoil (ESP 10-15) with moderate natural fertility; and moderately well to imperfectly drained, shallow to deeper, usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and with high natural fertility; and well drained, moderately deep to deep, red or brown often gravely, sandy loams and sandy clay loams, with weak structure and low natural fertility.	1000-1200	600-1200 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storage capacity and crop rooting habits. Onset dates unreliable. The zone mainly covered by hardpan soils with poor moisture storing properties AWC (30-100), with important proportions of dark cracking clays of topographical depressions with moderate moisture storing properties AWC 150 mm/m; Smax 75-150 mm; and sandy and medium textured with moderate to high moisture storing properties (AWC 50 – 100 mm/m; Smax 50-300 mm).
R		na	na	Rocky terrain	na	na	na
L		na	na	Lake	na	na	na

AGRO-ECOLOGICAL ZONES FOR TEMEKE DISTRICT (DAR ES SALAAM REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
C2		5-7	29-31 19-23	Nearly level to gently rolling plains and plateaux, slopes ranging from 0-10%, developed on Quaternary, Neogene, Jurrasic and Cretaceous sediment. Soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in subsoil and poor structure and with very low natural fertility; and moderately well to imperfectly drained, shallow to deep usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and moderate natural fertility.	< 500	800-1000 Monomodal	One DGP per year with duration of 3-4½ months, with variation of 3-4 weeks depending soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Soils have moderate to high AWC (80-150 mm/m) and favourable moisture storing characteristics (Smax 150-350 mm).
O		na	na	Ocean	na	na	na

AGRO-ECOLOGICAL ZONES FOR TUNDURU DISTRICT (RUVUMA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
E5		5-7	29-31 19-23	Well drained, level to rolling plains at low altitude (200-500 m) developed on acid intermediate metamorphic rocks. Major soils are well drained, moderately deep to deep, reddish and yellowish sandy loams and sandy clays, often with more sandy topsoils. Other soils well drained, moderately deep to deep dark red to red, friable clays with moderate to strong structure and evidence of clay illuviation, with low natural fertility.	200-500	800-1000 Monomodal	One DGP per year, with duration of 5-6 months, varying by 3-5 weeks depending on soil moisture storing properties and crop rooting habits. Onset dates are reliable. Soils are well drained, moderately deep, medium to heavy textured soils with moderate AWC (70-120mm/m) and poor moisture acceptance to due to surface sealing (Smax 40-60mm). Smax in areas without surface capping and or chemical barrier ranges from 150 – 300 mm.
E7		5-6½	27-30 15-18	Mainly well drained, flat to rolling plains, locally hilly at medium altitude (750-1300 m). 30% is strongly dissected uplands and low hills transitional to the medium altitude plateau. Major soils are well drained, moderately deep to deep dark red to red to friable clays with moderate to strong structure and evidence of clay illuviation. Natural soil fertility is low to moderate, with common problem of soil acidity.	800-1500	800-1000 Monomodal	One medium to long DGP with reliable onsets per year with duration of 5-7 months in most of the zone, varying by 1½-2 months depending on soil moisture storing capacity and crop rooting habits. Moderate moisture storing properties (good rainfall acceptance, lateral seepage water addition) poor to moderate water storing properties depending on the presence of chemical barriers (AWC 80-120 mm/m, Smax 30-70 with chemical barriers, Smax 100-300 without chemical barriers)
S2		5-7	27-31 15-23	Mainly gently undulating to rolling plateaux developed on Karroo sediments. Some parts of the zone strongly dissected terrain. Dominant soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, weak structure and very low natural	200-1000	1000-1200 Monomodal	One DGP per year with duration of 5-7 months, varying by 1-2 months depending on soil moisture storing capacity and crop rooting habits. Reliable onset dates. The zone is mainly covered by moderately deep sandy and loamy soils with low to moderate AWC (50-80 mm/m) and poor to moderate

				fertility; and proportion of moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with weak structure and very low natural fertility			moisture storing properties.

AGRO-ECOLOGICAL ZONES FOR UKEREWE DISTRICT (MWANZA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
P4		5-7	27-30 15-18	Mainly flat to gently undulating plains with scattered hill-footslope associations at medium altitude, developed on granites, banded ironstones and young alluvium. Soils exhibit heterogeneous pattern with important proportions of well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, moderately deep to deep, red or brown, often gravely, sandy loams and sandy clay loams with week structure and low natural fertility; and immature soils which are complexes of rock outcrops, surface ironstone, very stony, and very shallow; and moderately well to imperfectly drained, shallow to deep frequently calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and high natural fertility.	1200-1300	800-1000 Monomodal	One DGP per year with duration of 3½-5 months depending on soil moisture storage capacity and crop rooting habits. Unreliable onset dates. Soils are moderately deep to deep with low to moderate AWC (50-100 mm/m) that may present 'chemical barriers' (e.g. salts) to root development in which case moisture reserve that can be used by crops is very low (Smax 30-50 mm). Where no chemical barriers exist, the moisture storing properties are moderate (Smax 100-200 mm).
P8		6½-7	27-30 15-18	Flat to gently undulating plains developed partly on granites, partly on old colluvium; medium altitude. Major soils are imperfectly drained, shallow, dark grey or brown sands to sandy clays with hardpan within 50 cm from the surface, often calcareous and sodic in the subsoil (ESP 10-15) with moderate natural fertility; and moderately well to imperfectly drained, shallow to deeper, usually calcareous, black, dark grey or brown cracking clays often overlying paler subsoil with ephemeral structure and with high natural fertility; and well drained, moderately deep to deep, red or brown often gravely, sandy loams and sandy	1000-1200	600-1200 Monomodal	One DGP per year with duration of 3-3½ months depending on soil moisture storage capacity and crop rooting habits. Onset dates unreliable. The zone mainly covered by hardpan soils with poor moisture storing properties AWC (30-100), with important proportions of dark cracking clays of topographical depressions with moderate moisture storing properties AWC 150 mm/m; Smax 75-150 mm; and sandy and medium textured with moderate to high moisture storing properties (AWC 50 – 100 mm/m; Smax 50-300 mm).

				clay loams, with weak structure and low natural fertility.			
L		na	na	Lake	na	na	na

AGRO-ECOLOGICAL ZONES FOR ULANGA DISTRICT (MOROGORO REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	**Temperature (^{0}c)**	**Soils and Topography**	**Altitude (m)**	**Rainfall total (mm/Year) / Patten**	**Length of Growing Period and Soil Moisture Properties**

E7		5-6½	27-30 15-18	Mainly well drained, flat to rolling plains, locally hilly at medium altitude (750-1300 m). 30% is strongly dissected uplands and low hills transitional to the medium altitude plateau. Major soils are well drained, moderately deep to deep dark red to red to friable clays with moderate to strong structure and evidence of clay illuviation. Natural soil fertility is low to moderate, with common problem of soil acidity.	800-1500	800-1000 Monomodal	One medium to long DGP with reliable onsets per year with duration of 5-7 months in most of the zone, varying by 1½-2 months depending on soil moisture storing capacity and crop rooting habits. Moderate moisture storing properties (good rainfall acceptance, lateral seepage water addition) poor to moderate water storing properties depending on the presence of chemical barriers (AWC 80-120 mm/m, Smax 30-70 with chemical barriers, Smax 100-300 without chemical barriers)
E10		5½-7½	29-31 19-23	Flat alluvial plains with complex sedimentation pattern, subject to regular flood from braiding rivers. The physiographic units are mainly covered by young alluvial, well to moderately well drained, deep, brownish fine sands to sandy clay loams with high textural variability over short distances and highly stratified with more sandy than more clayey layers, with high natural fertility. About 30% of the soils covering the unit are imperfectly to poorly drained, deep, dark grey or grey brown clays, sandy clays or clay loams often mottled, with high natural fertility.	400-600	1400-1600 Monomdal	On non-flooding land, one DGP per year with duration of 5½ - 8 months, varying by 2½ months according to soil moisture storage capacity and crop rooting habits. Moisture storing properties ranges from moderate to high (more stable water table, AWC 80-150 mm/m, Smax 150-300 m). Onset dates are not reliable.
E15		4½-7	22-30 10-18	Dissected, rolling to hilly mountain slopes and plateau slope range 10-40%, in parts affected by severe water erosion and landslides. Mainly covered by well drained, deep yellowish or reddish sandy clays with moderate to strong structure, with moderate natural fertility; and well drained, moderately deep to deep, yellowish or reddish sandy clays to clays with weak structure with very low to low natural fertility.	800-1700	1000-1200 Monomodal	One DGP per year duration of 5-6½ months, varying by 1½ months according to soil moisture storage capacity and crop rooting habits. Onset dates are unreliable. The soils have moderate AWC 70-120 mm/m and favourable moisture storing properties (Smax 200-400mm). Chemical barriers to root development may occur in some soils.
H3		4½-7	22-25 10-15	Mainly strongly dissected hills and mountains at high altitude strongly susceptible to erosion and landslides. Major soils are well drained, moderately deep to deep, reddish and yellowish sandy loams and sandy clays, often with more sandy topsoils, with weak structure and low natural fertility.	1500-2300	1000-1400 Monomodal	One DGP per year with duration of 6-9 months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates, moderate AWC (120 mm/m) and favourable moisture storing properties (Smax 300-400 m).
S2		5-7	27-31 15-23	Mainly gently undulating to rolling plateaux developed on Karroo sediments. Some parts of the zone strongly dissected terrain. Dominant soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in	200-1000	1000-1200 Monomodal	One DGP per year with duration of 5-7 months, varying by 1-2 months depending on soil moisture storing capacity and crop rooting habits. Reliable onset dates. The zone is mainly covered by moderately deep sandy and loamy soils with low to moderate

				depth, weak structure and very low natural fertility; and proportion of moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with weak structure and very low natural fertility			AWC (50-80 mm/m) and poor to moderate moisture storing properties.

AGRO-ECOLOGICAL ZONES FOR URAMBO DISTRICT (TABORA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
P5		5-7	27-30 15-18	See P3	1100-1300	800-1000 Monomodal	One DGP per year with duration of 5-6 months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils are generally moderately deep sandy or loamy with low to moderate AWC (30-100 mm/m) and poor moisture storing properties mostly for sandy and loamy soils susceptible to surface capping (Smax 50-150mm); and favourable for other loamy soils (Smax 150-300 mm). In some units with salt affected soils effective soil depth is restricted by impervious subsoil, often high ESP.

P6		5-7	27-30 15-18	Mainly undulating plains and plateaux developed on sandstones, shales and quartzites medium altitude. Major soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in depth, with poor structure and very low natural fertility; and well drained, deep, reddish or brown sandy loams and sandy clay loams and sandy clays often with more sandy topsoil, weak structure and low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands with poor structure and very low natural fertility.	800-1800	850-1700 Monomodal	One DGP per year with duration of 6-8½ months depending on soil moisture storage capacity and crop rooting habits. Reliable onset dates. Soils are heterogeneous with low to moderate AWC (50-100 mm/m) and poor to moderate moisture storing properties (Smax 30-150 mm).
P13		5 - 8½	27-30 15-18	Flat, seasonally inundated lowland plains with important proportion of permanent or semi-permanent swamps. . Major soils are moderately well to imperfectly drained, shallow to deep often calcareous, black, dark grey or brown cracking clays mostly overlying paler subsoil with ephemeral structure and high natural fertility; and imperfectly to poorly drained, deep, non-calcareous, grey or brown sandy loams to sandy clays with strongly mottled and compact subsoil but with more sandy, more friable and darker toposoil. Moderate natural fertility; sodic subsoil possible.	900-1200	800-1000 Monomodal	DGP varies with Physiography. For upland areas, one DGP per year with duration of 5-6 months depending on soil moisture storage capacity and crop rooting habits. However, in most of the zone, growing period condition determined by duration and depth of flooding.
R		na	na	Rocky terrain	na	na	na

AGRO-ECOLOGICAL ZONES FOR WETE DISTRICT (KASKAZINI PEMBA REGION)

AEZ CODE	SUB ZONE-AREA (Sq-Km)	pH (H_2O)	Temperature (^{0}c)	Soils and Topography	Altitude (m)	Rainfall total (mm/Year) / Patten	Length of Growing Period and Soil Moisture Properties
C6		5-7	29-31 19-23	Nearly level to undulating and rolling plains developed on Neogene and Quaternary limestone, sandstones, marls, sands, clays. Soils are well drained, moderately deep to deep, red, yellowish red or orange sands and loamy sands with sandy loams in subsoil, weak structure and very low natural fertility; and moderately well to imperfectly drained, deep, brown, pale yellow, light grey or white mottled sands and loamy sands but with more clayey or stratified subsoils (sandy loams to sandy clays) with weak structure, somewhat higher organic matter content and very low natural fertility; and windblown sands patterned into dunes stabilized by vegetation.	<100	1600-2000 Monomodal	Long growing periods (5-10 months) depending on crop rooting habits and soil moisture storage characteristics. Onset dates are reliable. The physiographic units has low AWC (30-80 mm/m) and poor to moderate moisture storing capacity (Smax 50-150mm) but dry conditions are minimized by long rainy season.
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