AGRONOMIC INFORMATION ON TROPICAL CROPS FOR FERTILIZER RATE PER CROP STAND

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S/N	LIST OF CROP GROUPS	CROP GROUP	CROP NAME	SCIENTIFIC NAME	CROP SPACING	FERTILIZER RATE (KG/HA)
1	CEREAL ROOT AND TUBER CROPS SUGAR CROPS GRAIN LEGUMES FRUIT CROPS NUT CROPS OIL CROPS BEVERAGE AND STIMULANT CROPS FIBRE CROPS RUBBER CROPS VEGETABLES PESTICIDE CROPS DRUG CROPS	CEREAL	Finger millet	*Eleusine coracama*	10 - 30cm on rows 30 cm apart	(45–56 kg/ha) Nitrogen after planting, and another (45–56 kg/ha) after three or four weeks.
			Maize	*Zea mays* L.	75 x 25 cm	200 kg 15:15:15
			Pearl millet	*Pennisetum glaucum*	120 x 90 cm (Intercropped); 90 x 30 cm (Sole)	100 kg/ha compound fertilizers applied during seed bed preparation.
			Rice	*Oryza sativa* L.	25 x 25 cm or 30 x 30 cm (Upland); 30 x 15 cm or 23 x 23 cm (Swamp and irrigated)	336 kg/ha sulphate of ammonia
			Sorghum	*Sorghum bicolor* (L.) Moench	45 – 75 cm between rows, 15 – 25 cm within rows	As for maize (200 kg 15:15:15)
			Teff	*Eragrostis tef* (Zuc.) Trotter	Seeds are broadcast at a rate of 25 – 30 kg/ha and covered lightly with soil	25 – 40 kg/ha N; 30 – 40 kg P_2O_5 all applied at planting
			Wheat	*Triticum aestivum* *Triticum durum*	Manual broadcast use seed rate of 150 – 200 kg/ha; Mechanized drilling	150kg/ha N

	ESSENTIAL OIL CROPS TANNIN CROPS					in rows 20 – 25 cm apart and at depth of 2 – 5 cm using 80 – 120 kg/ha seed rate.	
2	FORAGE CROPS AGROFORESTRY	ROOT AND TUBER CROPS	YAM	White yam	*Dioscorea rotundata*	1 m^2	Equal parts of sulphate of ammonia, single superphosphate and sulphate of potash applied at 200 kg/ha or 10:10:20 compound fertilizer. Applied at 6 to 12 weeks after planting.
				Water yam	*Dioscorea alata*		
				Yellow yam	*Dioscorea cayensis*		
				Trifoliate yam	*Dioscorea dumetorum*		
				Aerial yam	*Dioscorea bulbifera*		
				Chinese yam	*Dioscorea esculenta*		
			Cassava		*Manihot esculenta* Crantz	0.75 – 1.50 m^2	
			Potato		*Solanum tuberosum* L.	25 – 35 mm within row spaced 70 cm apart (for small seed potatoes); 35 – 60 mm spaced 70 cm (for medium to large tubers); 0.3 0.5 m^2 per stand. Seed rate is 1.25 – 2 t/ha using small whole tubers.	NPK ratio of 1:1:2 is recommended. Excess N can delay maturing, impair quality of tubers and adversely affect storage. 20 – 30 t/ha organic manure recommended.

			Sweet potato	*Ipomoea batatas* (L.) Lam	3 cuttings planted on $1m^2$ mounds; 0.5 m^2per stand	50 kg N, 150 kg P_2O_5 and 200 kg K_2O /ha
			Cocoyam : Tannia and Taro	*Colocasia spp*. *Xanthosoma sagittifolium* (L.) Schott	80 x 50 cm; 60 x 40 cm; 100 x 100 cm. OR 1 – 2 m^2. Propagation by using small tubers or the apical portions of large tubers harvested at maturity.	65 kg N, 50 kg P_2O_5 and 100 kg K_2O/ha
3		SUGAR CROPS	Sugar cane	*Saccharum officinarum* L.	Cuttings are planted end to end and in parallel at the bottom of each furrow and covered with 5 – 10 cm of soil	Split fertilizer application; the first application is a basal dressing at planting at 80 – 100 units of N, 50 – 60 units of P_2O_5 and 80 – 120 units of k_2O. About two months after planting, apply further 40 – 50 units of N. 100 and 200 kg N/ha, 46 to 92 kg P_2O_5/ha, 120 – 160 kg/ha K_2O

4		GRAIN LEGUMES	(a) Bambara groundnut	*Vigna subterranean* (L.) Verd	15 – 30 cm apart on ridges 0.5 – 1 m apart	100 kg/ha N which can be obtained by symbiotic fixation
			(b)Common bean	*Phaseolus vulgaris* L.	Interrow spacing is 30 – 45 cm and row spacing is 10 – 30 cm	Compound fertilizer with NPK ratio of 1:2:1; N rate is 25 - 100 kg/ha; P rate is 45 – 100 kg/ha
			(c) Cowpea	*Vigna unguiculata* (L.) Walpers	30 x 60 cm	112 kg/ha 15:15:15
			(d) Hyacinth bean	*Lablab purpureus* (L.) Sweet	90 cm in all directions	112 kg/ha 15:15:15
			(e) Lima bean	*Phaseolus lunatus* L.		
			(f) kersting's groundnut	*Macrotyloma geocarpum* (Harms)	Row spacing is 15 cm; interrowspacing is 30 – 40 cm	
			(f) Pigeon pea	*Cajanus cajan* (L.) Millspaugh	0.3 x 0.3 m to 1.0 x 1.5 m	FMY at 1 – 10 t/ha
			(g) Yam bean	*Sphenostylis stenocarpa*	90 cm in all directions	
5		FRUIT CROPS	(a) Avogado	*Persea americana* Mill	Planting distances for grafted trees are 6 x 8 m, 8 x 10 m, 8 x 8 m and 10 x 12 m	
			(b) Banana	*Musa* L.	2 x 2 m; 3 x 3 m; 6 x 6 m.	Phosphate and potash should be applied at planting.
			(c) Cape gooseberry	*Physalis peruviana* L.	Transplantation done at 0.8 – 1 m in every direction	

			(d) Carambola		*Averrhoa carambola* L.	Transplantation done at 7 – 8 m in every direction	
			(e) Citrus	Sweet orange	*Citrus sinensis*	Transplantation done at 6 – 9 m apart in every direction	150 – 20 kg/ha Ammonium Sulphate, 500 – 600 kg/ha Calcium superphosphate and 500 kg/ha Potassium sulphate
				Lemon	*Citrus limonia*	Transplantation done at 6 – 9 m apart in every direction	150 – 20 kg/ha Ammonium Sulphate, 500 – 600 kg/ha Calcium superphosphate and 500 kg/ha Potassium sulphate
				Lime	*Citrus aurantifolia*	Transplantation done at 6 – 9 m apart in every direction	150 – 20 kg/ha Ammonium Sulphate, 500 – 600 kg/ha Calcium superphosphate and 500 kg/ha Potassium sulphate
				Grapefruit	*Citrus paradise*	Transplantation done at 6 – 9 m apart in every direction	150 – 20 kg/ha Ammonium Sulphate, 500 – 600 kg/ha Calcium superphosphate and 500 kg/ha Potassium sulphate
				Mandarin	*Citrus reticulata*	Transplantation done at 6 – 9 m	150 – 20 kg/ha Ammonium Sulphate,

						apart in every direction	500 – 600 kg/ha Calcium superphosphate and 500 kg/ha Potassium sulphate
				Tangelo	*C. reticulate x C. paradisi*	Transplantation done at 6 – 9 m apart in every direction	150 – 20 kg/ha Ammonium Sulphate, 500 – 600 kg/ha Calcium superphosphate and 500 kg/ha Potassium sulphate
				Sour orange	Citrus aurantium		
			(f) Ensete		Ensete ventricosum (Welw.)	Final transplantation is at 3 x 3 m	
			(g) Guava		Psidium guajava	Transplanted at 6 – 8 m spacing	
			(h) Mango		Mangifera indica L.	9 – 12 m apart	
			(i) Mangosteen		Garcinia mangostana L.	7 – 10 m apart	
			(j) Mulberry		Morus spp		It is self-fertile
			(k) Papaya		Carica papaya L.	2.5 – 3.5 m	
			(l) Passion fruit		Passiflora edulis Sims	4 – 5 m between rows and 3 – 4 m in the row	
			(m) Pineapple		Ananas comosus (L.) Merr.	1.5 m between rows and 1 m within row	
6		NUT CROPS	(a) Cashew		Anacardium occidentale L.	9 x 9 m to 15 x 15 m	

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			(b) Macadamia	Macadamia integrifolia maid; M. tetraphylla L. Johnson	10 x 10 m; 10 x 5 m; 7.5 x 7.5 m	NPK ratio of 17:17:17
7		OIL CROPS	(a) Castor	Ricinus communis L.	2 x 1 m for tree-like varieties; 1 x 0.25 m for the short internode varieties	
			(b) Coconut	Cocos nucifera L.	Triangular planting at 9 m (143 palms/ha)	
			(c) Groundnut	Arachis hypogaea L.	30 x 30 cm; 25 cm within row on ridges 1 m apart	
			(d) Niger seed	Guizotia abyssinica (L.f.) Cass.	Seed is broadcast at a rate of 10 – 15 kg/ha. However broadcasting seeds evenly is difficult and leads to uneven stands.	
			(e) Oil palm	Elaeis guineensis Jacq.	Triangular planting at 9 m (143 palms/ha)	
			(f) Sesame	Sesamum indicum L.		
			(g) Shea	Butyrospermum paradoxum (Gaertn.f.) Hepper		
			(h) Soya bean	Glycine max (L.) Merrill	10 cm within row on ridges 90 cm apart	
			(h) Sunflower	Helianthus annuus L.	0.5 sqm	
8		BEVERAGE AND	Cacao	Theobroma cacao L.	1.5 x1.5 m; 1.5 x 3 m; 2.5 x 2.5 m	112.5 kg N, 87 – 112 kg P, 56 – 87 kg K, 25 – 56 kg Mg per hectare

		STIMULANT CROPS	Coffee	Coffea spp; C. Arabica, C. canephora	3.1 x 3.1	In soils with a low exchange capacity, a compound fertilizer with an NPKMg composition of 12:6:20:4 is recommended at a rate of 300 kg/ha at planting, 600 kg in the first year and 1,000 kg from the second year upward.
			Tea	Camellia sinensis (L) O. Kuntze	120 x 60 – 90 cm	100 – 500 kg/ha split in two to four applications (for young plants); 600 – 1,000 kg/ha in two applications (for adult tea plants).
			Tobacco	Nicotiana tabacum L.	105 x 75 cm	225 kg/ha NPK
9		FIBRE CROPS	Cotton	Gossypium hirsutum L.	92 x 46 cm	50 units of N, 20 units of P,30 units of K and 3 units of S. Boron deficiency is prevented by applying 10 – 20 kg/ha of borax.
			Kenaf	*Hibiscus cannabinus* L.	3.5 – 5 cm within the row and rows are 15 – 18 cm apart	
			Sisal	*Agave sisalana* Perrine	Sisal is multiplied through suckers or	

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						bulbis. Transplantation is done at 0.75 m within row which are 1 m apart	
			Urena	*Urena lobata* L.		5 cm apart in all directions	
10		RUBBER CROPS	Hevea	Hevea brasiliensis Muell. Arg		300 – 350 plant population per hectare	
11		VEGETABLES	Leafy vegetables	Amaranth	Amaranthus spp	Seedlings transplanted at 10 x 10 cm (high density) or 20 x 20 cm (lower density)	
				Celosia	*Celosia argentea* L.	Transplanted at a spacing of 15 x 15 cm	
				Kale	Brassica oleracea L.	Transplanted at a spacing of 30 x 40 cm	
				Malabar spinach	*Basella alba* L.	Propagated by 25 cm cutting or by seed. Direct seeding is at 20 x 25 cm.	Incorporating manure at a rate of 20 – 30 t/ha during soil preparation.
				Roselle	*Hibiscus sabdariffa* L.	25 x 25 – 40 cm	Incorporating manure at 10 – 20 t/ha during soil preparation.
				Vegetable jute	*Corchorus olitorius* L.	0.4 – 0.5 x 0.3 – 0.4 m	Incorporating manure at a rate of 20 – 30

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							t/ha during soil preparation.
				White cabbage	*Brassica oleracea* L.	40 – 60 x 30 – 60 cm	Incorporating manure at a rate of 20 – 30 t/ha during soil preparation.
			Fruit vegetables	African eggplant	*Solanum aethiopicum* L.	Seedlings transplanted after 30 to 40 days at 0.4 – 0.6 x 0.3 m	
				Courgette	*Cucurbita pepo* L.	Sown in situ at 0.75 – 1 m in all directions	
				Cucumber	Cucumis sativus L.	Sown in situ at spacing at 1 – 2 m on hills 0.4 – 0.5 m apart	
				Eggplant	*Solanum melongena* L.	Seedlings transplanted 30 – 50 days after at 0.5 x 1.2 m	
				Hot pepper	*Capsicum frutescens* L.	Seedlings transplanted 45 to 60 days after planting at 0.5 – 0.7 x 0.4 – 0.6	
				Okra	Abelmoschus esculentus L.	Sown in situ at 30 – 60 cm x 60 – 120 cm	
				Pumpkin	Cucurbita maxima Duch.	Sown in situ at 2 – 3 m x 1 m	
				Sweet pepper	*Capsicum annuum* L.	Seedlings transplanted 30 to	

						45 days after planting at 0.4 – 0.5 m x 1 m	
				Tomato	*Lycopersicon esculentum* Mill.	1 x 0.4 m	
				Watermelon	Citrullus vulgaris L.	Sown in situ at 50 cm x 2.5 – 3 m	
			Root & bulb vegetables	Carrot	Daucus carota L.		
				Onion	Allium cepa L.	The three growing methods are: direct drilling, sowing in the nursery followed by transplanting and planting bulblets. Seedlings are transplanted at 20 x 10 cm. Bulblets are planted at 10 x 25 cm	
12		Pesticide crops	Derris	Derris elliptica		Propagated by splits and by cuttings; 1 x 1 m	
			Neem	Azadirachta indica		Propagated by seeds in the nursery and transplanted at 2.5 x 2.5 m apart	
			Pyrethrum	Chrysanthemum cinerariaefolium		Propagated by seed or vegetatively. Seeds sown in nursery in rows 20 cm apart; planting spacing in	

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					the field is 0.6 x 0.3 – 0.4 m	
13		Drug crops	Cinchona	*Cinchona ledgeriana* Moens	Propagated by seed or vegetatively. Seeds sown in nursery at 10 x 20 cm apart; transplanted after 8 to 10 months at planting spacing of1 x 1 m or 1.5 x 1.5 m	
			Madagascar periwinkle	*Catharanthus roseus* L.	Propagated by seeds; planting distances for nursery transplant are 50 -60 x 20 – 25 cm	Manure at 15 t/ha
			Neorautanenia	*Neurautanenia mitis* (A. Rich) Verdc.		
			Rauwolfia	*Rauwolfia vomitoria* Afzel		
			Tetradenia	*Tetradenia riparia* (Hochst) Codd.		
			Thornapple	*Datura stramonium* L.	Propagated by seed at spacing of 90 x 30 – 45 cm	
14		Essential Oil crops	Lemongrass	*Cymbopogon citratus*	Propagated by pruned rooted divisions at 1 x 0.45 m	
			Pelargonium	*Pelargonium spp*	Propagated from herbaceous cuttings at 15 – 40 x 50 – 80 cm	
			Vetiver	*Vetiveria zizanioides* L.	Propagated by tillers	

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15		Tannin Crops	Black wattle	*Acacia mearnsii* De Wild.	Direct seeded at 3 x 2 m		
16		Forage crops	Forage grasses	Andropogon gayanus Kunth			
				Brachiaria brizantha			
				Brachiaria decumbens Stapf			
				Brachiaria mutica (Forsk.) Stapf			
				Brachiaria ruziziensis			
				Cenchrus ciliaris L.			
				Chloris guyana Kunth			
				Panicum maximum Jacq.			
				Peninisetum purpureum Schumach			
				Setaria sphacelata			
				Tripsacum laxum Scrib and merr.			
			Forage legumes	Centrosema pubescens			
				Desmodium intortum Mill.			
				Macroptilium atropurpureum			
				Pueraria phaseloides (Roxb.) Benth.			
				Stylosanthes guianensis			
				Stylosanthes hamata			
17		Agroforestry	Multipurpose trees and shrubs	Calliandra calothyrsus			
				Gliricidia sepium			
				Leucaena leucocephala			
				Sesbania sesban			

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