Tropical Fruit Trees

Mango *(Mangifera indica L.)*

French: Manguier; Spanish: Mango; Italian: Mango; German: Mango

Crop data

Perennial.
Planting at onset of rainy season.
Fruits 2 to 4 years after planting.
Fruits harvested 15 to 20 weeks after flowering.

Plant density: 123 plants/ha.
Preferably grown on well drained, deep, loamy soils, pH 5-6.

Well suited to regions with distinct wet and dry seasons, with at least 4-5 months dry period.

Plant analysis data

Plant analysis data (optimum supply) - Macronutrients							
Plant part	**Stage of growth**	**Source**	**% of dry matter**				
			N	**P**	**K**	**Mg**	**Ca**
4-7 month old leaves from midshoot of flush	n.a	Young & Koo, 1969	1.0-1.5	0.08-0.175	0.3-0.8	0.15-0.4	2.0-3.5
5th leaf from base of current flush	after harvest	Tengku Ab. Malek et. Al., 1989	1.0-1.5	0.08-0.18	0.3-0.8	0.15-0.4	2.0-3.5

To produce fruits of good quality and free from internal tissue breakdown ('softnose' disorders), the N/Ca and K/Ca ratios should be less than 0.5 and 0.2 respectively.

Fertilizer recommendations

10 kg organic manure and 50 g rock phosphate per plant should be put into 30 cm3 planting holes.

Plant age (years)	Rate per tree (kg per application)	Applications per year
1	0.15	4
2	0.25	4
3-5	1.0	2
6-8	1.5	2
> 8	2.0	2
In years 1 and 2, 15:15:15 or 14:13:9:2.5 (N:P2O5:K2O:MgO) fertilizers are used and from year 3 onwards either 12:12:17:2 or 12:6:22:2. Organic manures at 10-15 kg/plant/year are also generally given in split applications.		

Papaya *(Carica papaya L.)*

French: Papayer; Spanish: Papayero; Italian: Papajo; German: Papaya

Crop data

Perennial.
Planting generally at onset of rainy season.
Flowers 4-5 months after sowing.
Fruit matures about 5 months after flowering.

Plant density: 1 100 to 2 000 plants/ha.
Prefers a deep, friable and well drained soil, pH 6.0 - 6.5.

The crop is adapted to tropical and subtropical climates and is generally irrigated.

Plant analysis data

Plant analysis data (17th petiole) - Macro- and micronutrients					
Stage of growth	**Source**	**% of dry matter**			**ppm**
		N	**P**	**K**	**B**
Fruiting	Awada & Long, 1971	1.45*	-	3.61*	-
Fruiting	Awada, Suehisa & Kanehiro, 1975	-	0.18*	-	-
Fruiting	Chan & Raveendranathan, 1984	-	-	-	20-30*
* Critical value yield					

Fertilizer recommendations (Malaysia)

Soil pH should be raised to pH 6.0 - 6.5 by incorporating lime in upper 25 cm.

In planting hole: 200 g soluble phosphate/plant.

Vegetative phase:
1st month - 0 g/plant (15:15:15 fertilizer)
2nd month - 50 g/plant (15:15:15 fertilizer)
3rd month - 100 g/plant (15:15:15 fertilizer)

Fruiting phase:

From 5th month onwards at 2-month intervals, 350 g 12:12:17:2 fertilizer per tree.

To overcome boron deficiency (exemplified by "bumpy" fruits) apply evenly 5 g borax per plant or weekly sprays of 0.25 % borax solution (3-4 sprays).

Durian *(Durio zibethinus Murr.)*

French: Durion; Spanish: Durion; Italian: Durie; German: Durian

Crop data

Perennial.
Planting at onset of rainy season.
Fruits 5 to 6 years after planting.
Flowering to harvesting of fruit 110-120 days.

Plant density: 87 plants/ha.

Preferably grown in undulating areas on well-drained loamy soils.
Irrigation strongly recommended.

Nutrient removal in fruit production

Nutrient removal - Macronutrients						
Yield kg/ha	**Source**	**kg/ha**				
		N	**P2O5**	**K2O**	**MgO**	**CaO**
6720	Ng & Thamboo, 1987	16.1	6.6	33.5	5.4	2.8

Fertilizer recommendations

10 kg organic manure and 250 g rock phosphate per plant should be put into 60 cm3 planting holes.

Recommended fertilizer schedule (Malaysia)		
Plant age (years)	**Rate per tree (kg/application)**	**Applicatons per year**
1	0.15	4
2	0.3	4
3	1.0	3
4	2.0	3
5	2.5	3
6	4.0	2
7	5.0	2
8	5.0	2
> 8	6.0	2
In years 1 to 5 15:15:15 or 14:13:9:2.5 fertilizers are used, and from year 6 onwards 12:12:17:2 or 12:6:22:2.		

Passion fruit or Granadilla *(Passiflora spp)*

French: Passiflore comestible, granadille; Spanish: Granadilla, maracuya; Italian: Granadiglia; German: Passionsfrucht, Maracuja

Crop data

Woody perennial vines.
Planting at onset of rainy season.
Requires 8-12 months to produce commercial crops.
Flowering to fruit harvest: 60-90 days.

Plant density: 500- 1 500 vines/ha.
Grows well on deep (> 60 cm), fertile, well-drained loamy soils, pH 5.5-6.5.

Crop is adapted to tropical and subtropical climates with high rainfall (> 1 200 mm/year)

Nutrient uptake

Amounts of nutrients taken up by roots, stem and fruit of golden passion fruit vines after 370 days (1 500 vines/ha):

Nutrient uptake (1 500 vines/ha) - Macronutrients			
Plant part	**Stage of growth**	**Source**	**kg/ha**

			N	P2O5	K2O	MgO	S
Roots, stems and fruit	370 days	Menzel et al, 198	205	41	221	27	25

Nutrient uptake (1 500 vines /ha) - Micronutrients							
Plant part	**Stage of growth**	**Source**	**g/ha**				
			Fe	**Mn**	**Zn**	**Cu**	**B**
Roots, stems and fruit	370 days	Menzel et al, 1989	779	2 180	316	198	295

Plant analysis data

Plant analysis data (optimum supply) - Macronutrients							
Stage of growth	**Source**	**% of dry matter***					
		N	**P**	**K**	**Mg**	**Ca**	**S**
Before new growth or flush	Menzel et al, 1989	4.75-5.25	0.25-0.35	2.0-2.5	0.25-0.35	0.5-1.5	0.2-0.4
* Last fully expanded leaf from strong vines							

Plant analysis data (optimum supply) - Micronutrients						
Stage of growth	**Source**	**ppm dry matter***				
		Fe	**Mn**	**Zn**	**Cu**	**B**
Before new growth or flush	Menzel et al, 1989	100-200	50-200	45-80	5-20	25-100
* Last fully expanded leaf from strong vines						

Fertilizer recommendations

Soil pH should be raised to pH 5.5 or more by liming.

Recommended fertilizer schedule (Malaysia)		
Plant age (years)	**Rate per vine (g/application)**	**Applications per year**
1	300	3
2	450	2
3	450	2
> 3	450	2
15:15:15 fertilizer is used.		

Litchi *(Litchi chinensis Sonn.)*

French: Litchi; Spanish: Litchi; Italian: Litchi; German: Litchi

Crop data

Planted when wheather is neither too wet nor too dry.
Fruits 3 to 5 years after planting.
Harvested 5 to 6 months after flowering.

Plant density: 100 plants/ha
Grows well in a deep, well-drained loamy soil rich in organic matter, pH 5.5 to 6.0.

Crop thrives well under moist subtropical climate. Frost in winter and dry heat in summer are limiting factors for its successful cultivation. Can be grown without irrigation if rainfall is more than 1250 mm and is well distributed throughout the year.

Fertilizer recommendations (India)

25 kg farm yard manure, 2 kg bone meal and 0.3 kg muriate of potash per plant should be put into 1 m3 planting holes.

Recommended fertilizer schedule (India)				
Plant age (years)	**kg/plant/year**			
	FYM	**CAN**	**SSP**	**MOP**
1- 3	10-20	0.3-1.0	0.2 -0.6	0.05-0.15
4- 6	25-40	1.0-2.0	0.75-1.25	0.2 -0.3
7-10	40-50	2.0-3.0	1.5 -2.0	0.3 -0.5
> 10	60	3.5	2.25	0.6

The farm yard manure, superphosphate and muriate of potash are all applied in autumn while the calcium ammonium nitrate is given in two equal applications, i.e. in mid-February and after fruit harvest.

Rambutan *(Nephelium lappaceum L.)*

French: Litchi chevelu; Spanish: Rambutan; German: Rambutan

Crop data

Perennial.
Planting at beginning of rainy season.
Fruits about 3 years after planting.
Fruits mature about 15-18 weeks after flowering.

Plant density: 118 plants/ha.
Grows well on well drained, loamy soils, pH 5.0 to 6.0.
Generally not irrigated.

Nutrient removal in fruit production

Nutrient removal - Macronutrients						
Yield per ha	**Source**	**kg/ha**				
		N	**P2O5**	**K2O**	**MgO**	**CaO**
6720 kg fruits + 620 kg twigs	Ng & Thamboo, 1967	15.0	4.7	14.0	4.4	8.3

Fertilizer recommendations

10 kg organic manure and 250 g rock phosphate per plant should be put into 45 cm3 planting holes.

Recommended fertilizer schedule (Malaysia)		
Plant age (years)	**Rate per tree (kg/application)**	**Applications per year**
1	0.3	3

2	0.5	3
3	1.0	3
4	1.5	2
5	2.0	2
6	2.5	2
7-10	3.5	2
11-14	4.5	2
> 14	5.0	2
In years 1 to 3 15:15:15 or 14:13:9:2.5 fertilizers are used, and from year 4 onwards 12:12:17:2 or 12:6:22:2.		

Starfruit or Carambola *(Averrhoe carambola L.)*

French: Carambole; Spanish: Carambole; German: Sternfrucht

Crop data

Perennial.
Planting at beginning of rainy season.
Fruits 2 years after planting.
Fruits mature 60-70 days after flowering.

Plant density: 278 plants/ha.
Prefers well-drained, light to medium textured soils, pH 5.0 - 6.5.
Irrigation recommended.

Fertilizer recommendations

Soil pH should be raised to 5.0 - 6.5 by liming. 10 kg organic manure and 200 g rock phosphate per plant should be put into 60 cm3 planting holes.

Recommended fertilizer schedule (Malaysia)				
Plant age (years)	**Mineral fertilizer***		**Organic manure**	
	kg/tree at each application	**Applications per year**	**kg/tree at each application**	**Applications pêr year**
1	0.3	6	10	1
2	1.0	4	10	1
3	2.0	4	10	1
4	2.5	4	15	1
5	3.5	4	15	1
6	4.0	4	20	1
> 6	5.0	4	20	1
* In year 1, 15:15:15 fertilizer is used, and from year 2 onwards 12:12:17:2.				

Guava *(Psidium guajava L.)*

French: Goyavier; Spanish: Guyaba; Italian: Guaiava; German: Guave

Crop data

Perennial.

Planted at onset of rainy season.
Fruits within a year from planting.
Fruits harvested about 3 months after flowering.

Plant density: 1 000 plants/ha.
Generally adapted to wide ranges of soil types and pH but does well on deep and fertile loamy soil.
Performs well with irrigation.

Guava can be successfully grown in tropical and subtropical climates with good rainfall (2 000 - 3 000 mm/year).

Fertilizer recommendations

Soil pH should be raised to 5.0 - 6.5 by liming. 10 kg organic manure and 200 g rock phosphate per plant should be put into 60 cm3 planting holes.

Recommended fertilizer schedule (Malaysia)				
Plant age (years)	**Mineral fertilizer***		**Organic manure**	
	kg/tree at each application	**Applications per year**	**kg/tree at each application**	**Applications per year**
1	0.25	12	5	2
2	0.5	12	5	1
3	0.5	12	5	1
> 3	0.5	12	5	1
* In year 1, 15:15:15 fertilizer is used and from year 2 onwards 12:12:17:2.				

Sapota or Sapodilla [Ciku] *(Achras zapota L.)*

French: Sapotille; Spanish: Zapota, Sapotillo; Italian: Sapota; German: Sapotille

Crop data

Perennial.
Planting generally at beginning of rainy season.
Fruits 2-3 years after planting.
Fruits harvested 10-12 months after flowering.

Plant density: 123 plants/ha.
Prefers a well drained light to medium textured soil.
Generally not irrigated.

Adapted to warm, moist weather and grows in both dry and humid areas.

Fertilizer recommendations

5 kg organic manure and 200 g rock phosphate per plant should be put into 60 cm3 planting holes.

Recommended fertilizer schedule (Malaysia)				
Plant age (years)	**Mineral fertilizer***		**Organic manure**	
	kg/tree at each application	**Applications per year**	**kg/tree at each application**	**Applications per year**
1	0.15	6	4	2

2	0.3	6	8	2
3	0.75	4	8	2
4	1.5	4	-	-
5	2.5	4	-	-
6	3.0	4	-	-
> 6	3.5	4	-	-
*. In the first 2 years, 15:15:15 fertilizer is used and from year 3 onwards 12:12:17:2.				

Further reading

BOSE, T.K.: Fruits of India: tropical and subtropical. Naya Prokash, Calcutta, India (1985)

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