Agnote

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Carambola
2. Growing and Marketing

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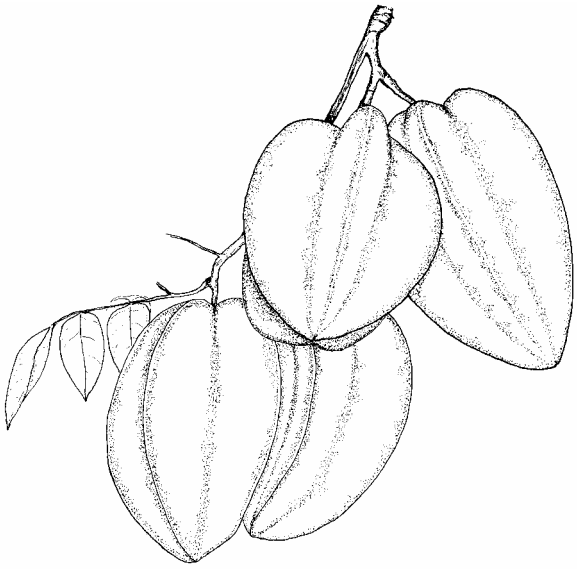
CULTURAL PRACTICES

Planting densities

In the Northern Territory, it is advisable to plant carambola under some form of netting because of depredation by birds, and to reduce losses from fruit piercing moth damage if the mesh size is less than 10 mm. Under such a regime, trees have to be planted at higher densities and periodic pruning, hedging and topping have to be carried out to keep trees to a manageable height. Planting distances are 4-6 m within the row by 6 m inter-row, giving densities of 280-420 trees per hectare. Also carambola is grown in a T-trellis system with plants at a close spacing of 1-2 m within rows.



Windbreaks

As for most tropical fruit trees in north Australia, permanent windbreaks are very important because of the strong winds. Strong wind causes premature fruit abortion, mechanical bruising of fruits and limb breakage. Experience in Darwin indicates that a good windbreak is needed even if trees are grown under overhead netting.

Pruning

Current recommendation is to shape trees when young to 4-6 sturdy, wide angled branches with a vertical leader. Low hanging, criss-cross branches are removed periodically to open up the canopy and facilitate sunlight penetration and pollination activities. Trees planted at higher densities, for instance under netting or in a trellis system, need to be hedged and topped at least once a year.

PEST AND DISEASE

In the Northern Territory, birds, fruit fly and the fruit piercing moths are the most important pests. Birds especially the sulphur crested cockatoo can destroy a whole crop. The fruit fly, *Batrocera aquilonis* and fruit piercing moths, *Orthreis* spp. can cause 90% damage. Other minor pests include the fruit spotting bug *Amblypelta lutescens* , *Monolepta* beetles, the green vegetable bug *Nezara viridula*, lepidopterous flower grubs, mealy bugs, and scales (*Coccus* spp).

For tropical fruit trees in general, the Entomology Section recommends the use of the following chemicals for the pests listed. Growers are advised to contact Entomology Section for more detailed information and other pest problems.

fruit fly	dimethioate
caterpillars	trichlorophon
flower caterpillars	*Bacillus thuringensis*
red banded thrips	dimethioate, endosulfan
swarming beetles	endosulfan
ants	chlorpyrofos
mealy bugs	malathion, petoleum oil
borers	carbaryl dust, malathion
broad mites	sulphur, dicolfol
two spotted mites	fenbutin oxide (Torque®)
	clofentazine (Apollo®)

These chemicals are sold under several brand names and are available from rural suppliers. Follow the directions on the container when using them.

Except for post harvest fruit rot fungi such as *Ceratocystis, Colletotrichum, Dothioriella,* and *Phomopsis* species field diseases are of less significance in all the growing areas. Field diseases observed on carambola around Darwin include *Cercospora* leaf spot, *Cephaleuros virescens* leaf spot, *Cladosporium* sp. on flowers and an unidentified white root rot.

IRRIGATION

Carambola has a high water demand especially during the dry months and during the fruiting period and is extremely susceptible to short periods of water stress. Rates recommended should be at least 0.8 of pan evaporation which is equivalent to 30-75 mm per week. An irrigation system should be able to provide 200 L/week during maximum demand periods. Mulching can help to conserve moisture around the trees.

FERTILISATION

No fertilisation or crop nutrient requirement studies have been carried out on carambola. Fertilisers can be applied manually by basal dressing or through the irrigation system - fertigation. For fertigation more soluble fertilisers are used and trees are fertigated every 2-3 weeks resulting in 17-26 applications per year. One fertigation option used at Coastal Plains Research Station, Darwin is shown in Table 1.

If fertilisers are to be used as a basal dressing, they can be manually broadcast 12 times a year for the first two years and 4 -6 times a year after year 3. Trace elements of iron, zinc, boron and copper can be applied as foliar sprays 6 times a year. One manual application schedule used is shown in Table 2. Additionally, periodic applications of organic manure viz., chicken manure, bagasse, straw can be beneficial.

HARVEST AND POSTHARVEST HANDLING

Carambola has to be harvested when mature. One rule of thumb is to harvest fruit when there is some tinge of yellow, i.e., covering less than 25% of the fruit surface or in the case of some varieties, when the fruit is pale whitish green. To avoid fruit bruising and to extend postharvest shelf life, fruit should be carefully harvested with hand or picking pole with an attached bag and carefully cleaned, washed, graded and packed. Pack size depends on market requirements but fruit can be wrapped in paraffin paper or netted socks and placed in a carton lined with foam. Carambola can be stored up to 5 weeks with or without packaging and retain acceptable flavour. Mature green fruits can be stored at 10°C up to 5 weeks and still ripen in storage to the ripe yellow colour with acceptable flavour; and fruit destined for processing can be stored at 5°C up to 10 weeks without appreciable loss in flavour.

MARKETS AND PROSPECTS

Carambola is sold mainly in localised markets and in the main domestic markets of Brisbane, Sydney and Melbourne. Prices vary widely between markets and between production periods in the growing areas. Generally prices are higher in the months of October and November.

A small volume of carambola is exported. In 1992/93, 2.487 tons were exported to Bahrain, France, Hong Kong, Indonesia, Kampuchea, Lebanon, Philippines and Singapore from markets in Queensland, NSW and Victoria.

The demand for carambola is still growing in Singapore and Hong Kong, whilst new markets are being developed in Europe, especially Germany, the Netherlands, France, Belgium and the United Kingdom and the Middle East countries. Malaysia is the leading producer and exporter of carambola. Although carambola is produced year round with 4-6 peaks, the major peaks in Malaysia are January to March and June to August. Thus, there could be a vacuum in carambola supply in October-November.

Table 1. Fertiliser rates for fertigation of carambola

Fertiliser g/tree/year	**Year 1**	**Year 2**	**Year 3**	**Year 4 and more**
Urea (N=46%)	48	150	28	111
Calcium nitrate (N=16%, Ca=19%)	*	*	742	742
Potassium nitrate (N=13%, K=38%)	474	786	1262	1420
Magnesium sulphate (Mg=16%)	*	*	450	450
Monoammonium sulphate (N=12%, P=22%)	816	1089	544	544
Iron chelate (Fe=13%)	138	138	138	138
Zinc sulphate heptahydrate (Zn=23%)	78	78	78	78
Solubor (B=22%)	54	54	54	54

* Calcium and Magnesium supplied manually as dolomite(Ca=14%, Mg=7%)

Table 2. Fertiliser rates for basal application of carambola

Fertiliser g/tree	Year 1	Year 2	Year 3	Year 4 and
N:P:K 12:6:12	-	-	2000	2000
N:P:K 12:12:12	500	600	-	-
Ammonium sulphate (N=18%)	-	111	666	1000
Potassium chloride (K=60%)	-	666	400	500
Dolomite (Ca=145, Mg=7%)	342	1000	1028	1028

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