Agnote

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Rambutan
2. Growing and Marketing

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CULTURAL PRACTICES

Planting densities

The most common planting distance for rambutan is 8-10 m within rows and 10 m between rows. A square or triangular planting system is used, giving densities of 100-150 trees/ha. Few orchards have wider tree spacings of 12 m x 10 m giving a density of 80 trees/ha. In the Northern Territory (NT), because of considerable fruit losses from ravages by rainbow lorikeets, it is recommended that rambutan be established under some form of overhead permanent netting structure, in which case densities of 200-300 trees/ha, i.e. planting distances of 4-6 m by 8 m are desirable. Under such a regime annual topping and hedging of trees is necessary besides the usual pruning inside the canopy and skirting.

Windbreak

A windbreak established 8-10 m from the crop row along the windward side is necessary for all areas in the NT because of strong, dry and cold south easterly winds from May to August and the threat of strong cyclonic winds during November to March. Please refer to Agnote G24 (810) ‘Selecting Plants for Spray Drift Buffers and Windbreaks in the Top End of the NT’. Windbreaks should be established before growing the rambutan trees.

Pruning

Fruiting terminals and other strong leaders should usually be pruned back 0.3-0.5 m after harvesting. Weak growths and shoots inside the canopy should also be cut away and branches drooping to the ground should be skirted. In the Northern Territory, where it has become necessary to establish rambutan trees under some form of overhead netting, topping and side hedging should be done every two to three years.

Mulching

Mulching is good for young trees. Fallen leaves, waste paper, hay, poultry and other livestock manure are often used. Poultry and other livestock manure should not be applied to fresh plantings. Mulching helps soil moisture and increases organic matter, humidity and carbon dioxide in the tree microenvironment, while it reduces weed growth and soil erosion, alters soil pH and insulates surface roots of trees.

IRRIGATION

The water requirements of rambutan are not well understood. The native environment of the plant (wet tropics) is different from the environment in which the crop is grown in the NT (wet/dry tropics) where evaporation exceeds rainfall for eight months of the year. Rambutan is sensitive to drought.

Irrigation monitoring in the NT suggests that water requirements are generally less than evaporation. The data collected suggests that the period of lowest water use occurs after the end of the wet season to early flowering (May-July). The length of this period depends on the duration of cool weather prior to flowering. The need for water increases as the fruit develops, reaching a peak during mid fruit development (September). Crop factors have been developed from this data (Table 1) which can be used to calculate approximate water requirements for trees in the Northern Territory.

Growers should note that the evaporation based system of water needs is a valid means of assessing water use to design irrigation systems for new orchards and for starting irrigation levels in existing orchards. Day to day irrigation requirements should be gauged using one of the many soil moisture monitoring instruments available, such as tensiometers, neutron moisture probes or capacitance probes.

On sandy clay loams in the NT 80% of the root system is in the top 15 cm of the soil surface and within the drip line of the tree. This suggests that irrigation should be frequent (daily) and that during periods of high water requirements (fruit filling) it should be twice daily, particularly on sandy soils. Trees are adversely affected if not watered for more than three days in the dry season and leaf loss may occur within 10 days.

Flowering in rambutan appears to respond positively to short periods of soil moisture deficit. The lower crop factor (Table 1) for the period "end of wet to flowering" is for those who wish to promote early more synchronised flowering. Light irrigation every second or third day should be applied to maintain leaf turgor. Soil tensions at 20 cm in the range 60-80 kPa are required to reduce leaf flushing and induce flowering. Growers should seek advice from horticulture officers before scheduling irrigation.

Table 1. Suggested crop factors developed from irrigation monitoring work in the NT

Period	Crop factor*	mm per day #	litres/tree/day	litres/tree/week
End Wet to flowering	0.6 -0.8	4.2-5.6	100-134	700-940
Flowering to early fruit fill	1.0	7.0	168	1,176
Early fruit fill to harvest	1.2	8.4	200	1,400
Harvest to end of Wet	1.0	7.0	168	1,176

* Crop factor refers to the rate of transpiration in a particular crop
# Based on tree size (radius 2.5 m); canopy cover 25 sq.m; evaporation at 7.0 mm/day

CROP NUTRIENT REQUIREMENT AND FERTILISATION

Nitrogen (N), potassium (K) and phosphorus (P) are the most limiting macroelements depending on the stage of the crop, weather conditions and individual orchard cultural practices. N and K are limiting in rambutan leaves in January (after harvest) and in September to November during fruit development. P is also limiting during flowering and early fruit set.

Among the micronutrients, manganese (Mn) occurs in high amounts in rambutan, above 100 mg/kg throughout the year. Zinc (Zn), iron (Fe) and boron (B) tend to fluctuate more erratically although they appear to be low around March and November. Generally, chlorine (Cl) levels are higher during the Dry from July and peak around September. Rambutan leaves are sensitive to Cl levels above 0.12 percent.

For the first two non-bearing years an N:P:K (10:4.5:8) fertiliser applied six times per year is recommended at the rate of 1 kg/tree the first year and 1.5 kg/tree the second year.

A suggested fertiliser program for bearing trees is four applications in late January, late March, June and late August/September. Generally, in the NT, an N:P:K: magnesium (Mg) mix in the ratio of 12:5.4:14:1 is used. Rates should be around 2 kg for year 3, increasing 0.5-1 kg per year of age depending on productivity but higher rates should be applied during January and additional K at 250-500 g/tree can be applied during January and June. Chloride sources of K fertilisers should be avoided. Rates should be increased in accordance with the increasing age of the tree until around 10 years after first bearing. The rate of N fertiliser should be increased for the August/September application. Calcium (Ca) and Mg fertilisers as dolomite should be applied at 250-500 g/tree in adequate amounts during January in alternate years. Micronutrient sprays of Zn, Fe, Mn, copper (Cu), and B should be applied as a separate spray, to coincide with peak vegetative flushing in January, March and May.

PESTS

Winged vertebrate pests pose a severe constraint to the cultivation of rambutans in northern Australia. In the NT, rainbow lorikeets can cause catastrophic losses in yield ravaging young, maturing and ripe fruit. Flying foxes also damage ripe fruit.

Numerous caterpillars, especially the castor oil looper (A*chaea janata*) and other flower caterpillars can damage young foliage and inflorescences. Beetles, such as the swarming leaf beetles (*Rhyparida* spp.), red shouldered leaf beetle (*Monolepta australis*), swarming weevil (*Myllocerus nr Darwini*) and plant-hoppers (also known as flatids) (*Flatidae: Colgaroides* spp., *Siphanta* sp.), feed on the foliage and later on inflorescences. Red-banded thrips (*Selenothrips rubrocinctus*), or false spider mites may cause russeting damage to the fruit. The fruit spotting bug (*Amblypelta lutescens lutescens*) damages fruit by inflicting dark blemishes on it. Flatids, mealy-bugs and scales also infest inflorescences and fruit. They disfigure the fruit and promote its deterioration. They are cultured and spread by ants, which feed on the honeydew secreted. The secreted honeydew promotes the proliferation of sooty mould fungi on the foliage and fruit. One way to control mealy-bugs and scales is by using ant-guards and by keeping the trees well skirted with no branches touching the ground. However, ant-guards are only effective for one to two months under Darwin conditions and their use must be closely monitored as the bark around the tree trunk is extremely sensitive.

The DBIRD Entomology Section recommends an integrated pest management (IPM) approach to the control of insect pests in rambutan. Information on the identification, monitoring and management of rambutan insect pests is available on the NT Pest-info website, http://pestinfo.nt.gov.au/ and from the QDPI&F publication, Rambutan: Identification and Monitoring of Major Insects and Mites.

For information on IPM techniques and strategies in rambutan contact DBIRD Entomology on 8999 2260 or DBIRD Horticulture Information Service on 8999 2357.

DISEASES

Diseases are less of a problem than winged vertebrate or insect pests. Stem canker is common on the trunk, branches and twigs especially when the canopy is thick and full. Pruning to facilitate more light penetration can reduce its incidence, as can a spray program of a Cu fungicide containing no Cl. A fungus, *Lasiodiplodia theobromae*, has been reported to cause dieback of branches and trunk lesions and another fungus, *Thyronectria psuedotrichia*, has also been implicated in dieback. Algal leaf spots characterised by felty, orange-brown spots are caused by *Cephaleuros virescens* and can be controlled by non-Cl Cu sprays. Fruit rots of rambutan are caused by *Colletotrichum gloeosporioides* and *Phomopsis* sp. Stem end rots of fruit are caused by *Phomopsis* sp. and *Dothiorella* spp.

HARVESTING AND POST HARVEST HANDLING

Rambutan is non-climacteric and has to be harvested when ripe. The fruit is usually harvested two to three weeks after colour change or when the total soluble solids (brix) level of 18-20 degrees is reached. Harvest should be done in the early morning. Depending on market or labour requirement, whole panicle or individual fruits are selectively picked and placed into crates in the shade. Rambutan loses its attractive appearance very rapidly after a few days under ambient conditions. It turns brown and eventually black because of water loss from its spinterns and skin and from mechanical damage to the fruit. Immediately after harvesting the fruit should be rapidly transported to the packing shed, sprayed with cool water to dissipate field heat, and placed in a high humidity cool room at 8-10^{o}C. Many orchards in Queensland have developed a post-harvest handling system which includes de-stalkers, dip tanks, sorting table, size grader and an area for assembling cartons and packing.

Depending on market requirement, fruit is packed in single, double or multi-layers in cartons with polythene liner wraps, bulk packs or punnets and kept refrigerated at 8-10^{o}C. Wraps are necessary to decrease desiccation of fruit so as to increase shelf life to several weeks. The fruit is transported to interstate markets by refrigerated trucks or by air.

Fruit sent interstate must comply with Interstate Certification Assurance (ICA) procedures which are conducted in the NT, to prevent the spread of fruit flies to other States. Red fruit requires ICA 13 to all States except Queensland and New South Wales. Yellow fruit requires ICA 01 to all States except Queensland and New South Wales. Further information can be obtained from the NT Quarantine Service (NTQS) in Darwin, or by visiting their web site at www.ntqs.nt.gov.au

MARKETS AND PROSPECTS

The rambutan industry is small compared with the banana, papaya and mango industries. The fruit is sold fresh although in Southeast Asia it is also canned.

The major domestic markets are in Sydney, Melbourne, Perth, Brisbane and, to a smaller extent, Darwin. Rambutan is sold in single layer trays, punnet packs, bulk packs or bunched panicles. Bunched panicles are only in demand around the Chinese New Year which falls either in January or February. Production in the NT is from December to February and in Queensland from February to June. Currently domestic prices are much the same as export prices. The main consumer groups are Asian communities although acceptance among European communities is growing as rambutan is a very attractive, palatable and nutritious fruit.

Presently rambutan commands a lucrative market in Japan and smaller markets in Europe which are expected to grow. Small quantities of rambutans have been exported from Australia since 1987.

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