

INTRODUCTION

This, the largest citrus fruit has been regarded as one of the ancestral species of the genus Citrus. Presently, the pomelo has been widely grown in warm and humid climate of Asia and the Pacific regions. The common name pomelo is derived from the Dutch pompelmoes. The current Malay names are limau abong, limau betawi, limau bali, limau besar, limau bol, limau jambua and pomelo.

There is no world production statistic exclusively for pomelo, however, according to FAO, the total production of grapefruit and pomelo was 5.05 million tonnes in 1994 which 6.2 % of the total Citrus production of the year. Thailand, China, Taiwan, Japan, Malaysia, Vietnam and Indonesia are the major commercial producers of pomelo. Pomelo ranks third (11%) of Thailand export of fruits.

In Sibu, honey pomelo is very popular. It is mainly produced by farmers at Sg. Sadit. Honey pomelo is very sweet and tasty when compared with other cultivars. Because of good eating quality, honey pomelo has now become very popular throughout Sarawak.



BOTANICAL DESCRIPTION

Pomelo or botanically identified as *Citrus grandis* L. Osbeck (*C. Maxima* Merr.) belongs to the family Rutaceae, sub-family Aurantioidae, tribe Citreae and sub-tribe citrinae.

The pomelo tree may be 5-10m tall, with a somewhat crooked trunk 10-30cm thick, and low, irregular and low branches. Some forms are distinctly dwarfed. The young branchlets and angular and often densely hairy, and there are usually spines (seed propagation) or spineless (vegetative propagation) on the branchlets, old limbs and trunk.

Technically compound but appearing simple, having one leaflet, the leaves are alternate, ovate, ovate-oblong, or elliptic, 5-20cm long, 2-12cm wide, leathery, dull-green, glossy above, dull and minutely hairy beneath; the petiole broadly winged (up to 7cm wide) to occasionally near wingless.

The flowers are fragrant, borne singly or in terminal racemes 10-30cm long, rachis and calyx hairy; the 4 to 5 petals, yellowish-white 1.5-3.5 cm long in bud, some no what hairy on the outside and dotted with yellow-green glands; stamens 20-25 (white prominent, in bundles of 4 to 5 anthers, orange; ovary 11-16 loculi.)

The fruits, sub-globose to pyriform berry, range from nearly round to oblate or pear-shaped; 10-20cm wide; the peel, clinging or more or less easily removed, may be greenish-yellow or pale yellow, minutely hairy, dotted with tiny green glands; 1.5-2cm thick, the albedo soft, white or pink; pulp vesicles vary from greenish-yellow or pale-yellow to pink or red; is divided into 11 to 18 segments, very juicy to fairly dry, the sweet and bland to sub acid or rather acid, sometimes with a faint touch of bitterness.

Pomelo is largely self-incompatible, and unlike other *Citrus* species pomelo it does not produce nucellar seedlings. Cross pollination and fertilization occur between pomelo and other species of the genus such as sweet orange or mandarin orange and the progeny will not be seedy. Because of this, pomelo exhibits a greater range of genetic variability in comparison with other species of *Citrus*. Generally, there are only a few, large, yellow-white seeds, white inside; though some fruits may be quite seedy.



CLIMATE

The pomelo is tropical or near tropical and flourishes naturally at low altitudes close to the coastal areas. In the prime growing region of Bang Bakok in Southern Thailand, the mean temperature is 28°C and mean annual rainfall is 1430 mm.

In Sarawak, quality pomelo is planted in Sg. Sadit area, Sibiu Division. General weather pattern is hot and humid with temperature ranging around 30°C and a high annual rainfall of between 2500-3500 mm being the heaviest from December through February and scant in May until September.

4 SOIL

It is obvious from its coastal habitat that pomelo revels in the rich silt and sand overlying the organically enriched clay loam of the flood plain, and that it is highly tolerant of brackish water pushed inland by high tides. On mud flats, farmers as in Sg. Sadit area dig ditches and elevated beds or mounds are established around the planted pomelo trees which are subject to flood during king tides. Thong's farm in Sg. Sadit, oil pH is of between 5.5 to 6.8. In Thailand, it is claimed that a little saltiness but quickly wash away by high tides contributes to the flavour and juiciness of the fruits.

PROPAGATION

Though the seeds of the pomelo are monoembryonic, seedlings usually differ little from their parents and therefore most soil pomelos in the Orient are grown from seed. The seeds can be stored for 80 days at 5°C and 56-58% relative humidity. Only the best varieties are vegetatively propagated by air-layering (as practice by farmers in Sg. Sadit, Sibiu). A more modernly method is by budding onto rootstocks of pomelo, or other relevant citrus. In experimental work done in United States, the 'T', or shield-budding method has been found to be the most satisfactory.





CULTURE

In South East Asia, pomelos planted are mainly by ethnic Chinese who dike the swampy lowland, dig the ditches and canals for drainage and build the raised beds or moulds. This is practiced by pioneering pomelo farmer in Sg. Sadit, Sibiu. In Sg. Sadit the honey pomelo cultivar planted is originally from Southern China. This was brought in to Sarawak in 1970s by the late father of Mr. Thong Chui Leong.

In Thailand, during the 3 to 5 years period before the raised bed are planted with pomelo, quick crops such as bananas, sugarcane and peanuts are grown on them. Water gales at

intervals along the base of the dikes, allow water to flow into the ditches in the dry season. Continual deepening and widening of ditches and adding of soil to the beds is require to counteract erosion.

In Thailand, the pomelo trees are planted close spaced 3 to 4.5m apart in order to conserve limited land mass. In Sg. Sadit, the farmer planted the pomelo at further apart which is about 7 to 8m spacing (density of 150-200 trees per hectare). This spacing contributes to the farmer to plant other crops in between pomelo trees. In Thong's farm at Sg. Sadit, sweet orange is planted as the interplant. In between every few trees are big ditches and small water ways prepared to flush out quickly the water from the flooded land after high tides.

Weeds are removed, fertilisers are applied at specific intervals. A very high input of organic based fertilisers coupled with regular compound fertilisers is a norm for Thong's pomelo farm. An intensive research is being carried out to determine the optimum fertiliser requirement for the local honey pomelo. Pruning of overgrown and diseased branches are practiced but very minimum.

FRUITING HARVESTING AND KEEPING QUALITY

Pomelos may flower 2 to 4 times a year mainly in conjunction with shoot growth flushes, and depending much on the agronomic management practiced. The tree will start to produce fruits 3-5 years after field planting but subject to proper agronomic practices. The main flowering period follows the onset of rainy season. The main crop season matures in early March through early June. Minor crop harvest is almost all year round where as the flowering and fruiting cycle is very much influenced by local weather pattern. From flowering initiation and then pollination, it takes about 7 to 8 months for the fruit to mature and be ready for harvesting.

Yellowing of the peel does not necessarily shows that the fruit is matured. The fruit is ready to be plucked (either green or yellow colored) if the peel brightens and upon ripening (the oil gland becomes more prominent and shiny). This Change starts near the tip of the fruit and progresses towards the stalk. Usually an experienced farmer will know when to do the harvesting. A matured tree can produce between 145 to 165 fruits per year with an average weight of 0.8-1.0 kg per fruit (Thong's farm yield of 2002-2003).

Fruits picked at an early stage of ripening improves somewhat during storage. The fruit can be kept for a month after harvesting without affecting the eating quality. The harvested fruits are stored in a dry ventilated shaded area. This long keeping quality is due to the thick peel. If the

fruit is kept up to 2 months, it is observed that the peel will be deeply wrinkled, but the pulp is still juicy and of appealing flavour. According to an old Chinese Atlas, the fruits of the 'Double' pomelo, is hung in the house, will remain in good condition for a year.



PESTS AND DISEASES

Among the leading insect pests of pomelo are a leaf miner, *Phyllocnistis citrella*: a flea beetle which attacks the leaves; a red ant (*Pheidologeton sp.*) that can damage roots, twigs, leaves and trunk, scale insects of various species and others.

Sooty mould, develops on the honey dew excreted by the scale insects is mainly attacking on the leaves. The pomelo is subject to most of the diseases that affect the citrus. Mistletoe (*Loranthus sp.*) is also a pest on pomelo.

For the honey pomelo cultivar in Sg. Sadit, it is quite susceptible to citrus canker *Xanthomonas axonopodis pv. Citri* (Xac) on young immature leaves and fruits. Frequent spraying with copper based chemicals is only as mean to control the disease. Currently, intensive research is being done on how to control bacterial canker on pomelo through experimenting on different type of chemicals.



FOOD USES

Though there is some labour involved, it is worth the effort to peel a good pomelo, skin the segments, and eat the juicy pulp. In other countries such as Thailand and Indonesia, the skinned segments can be broken apart and used in salads and desserts or made into preserves. The extracted juice is an excellent beverage and as flavour in carbonated drinks. The peel can be candied.



FOOD VALUE PER 100G OF EDIBLE PORTION

<i>Calories</i>	25-28
<i>Moisture</i>	84.8-94.2 g
<i>Protein</i>	0.5-0.74 g
<i>Fat</i>	0.2-0.56 g
<i>Carbohydrates</i>	6.3-12.4 g
<i>Fiber</i>	0.3-0.82 g
<i>Ash</i>	0.5-0.86 g
<i>Calcium</i>	21-30 mg
<i>Phosphorus</i>	20-27 mg
<i>Iron</i>	0.3-0.3 mg
<i>Vitamin A</i>	20-49 IU
<i>Thiamin (Vitamin B1)</i>	0.04-0.07 mg
<i>Riboflavin (Vitamin B2)</i>	0.02 mg
<i>Niacin</i>	0.3 mg
<i>Ascorbic acid (Vitamin C)</i>	30-44 mg
<i>Glucoside (Naringin)</i>	NA

* ANALYSES MADE IN THAILAND, CHINA, AND UNITED STATE.

TOXICITY

Like that of other citrus fruits, the peel of the pomelo contains skin irritants, mainly limonene and terpene, also citral, aldehydes, geraniol, cadinene and linalool, which may cause dermatitis in some individuals having excessive contact with the oil of the outer peel. Farmers or farm workers may develop chronic conditions on the fingers and hands.

OTHER USES

The flowers are highly aromatic and in Vietnam are gathered for making perfume. The wood is heavy, hard, tough, fine-grained and suitable for making tool handles.



MEDICINAL USES

In the Philippines and Southeast Asia, decoctions of the leaves, flowers and rind are given for their sedative effect in cases of epilepsy, chorea and convulsive coughing. The hot leaf decoction is applied on swellings and ulcers. The fruit juice is taken as a febrifuge. The seeds are employed against coughs, dyspepsia and lumbago. Gum that exudes from declining trees is collected and taken as a cough remedy in Brazil.



Contribution:
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Rancangan Radio Pertanian

Bahasa	Masa Siaran	FM
Bahasa Malaysia	5.30 ptg (Selasa)	88.9
China	8.20 pg (Selasa)	91.9
Bahasa Inggeris	10.00 pg (Jumaat)	91.9