



CHAPTER I

INTRODUCTION

Artocarpus altilis (Park.) Fosb. belongs to tribe the Artocarpeae of the family Moraceae, order Urticales. The genus *Artocarpus* is made up of 50 species, widely distributed in Ceylon, India, and South China to the Solomon Islands, but absent from Australia and New Caledonia (Corner, 1981).

Plants in the genus *Artocarpus* J. R. & G. Forst. are trees, monoecious with thick, sticky white latex. Leaves pinnate, pinnatifid or simple. Inflorescences unisexual, pedunculate, thickly spicate to clavate or capitate, cover with the minute sessile flowers and bracteoles. Male flowers with one stamen; perianth tubular, 2-4 partite or merely perforate. Female flowers variously connate; perianth tubular, thin-walled round the ovary, often thick-walled round the style. Syncarp more or less massive, flesh, pulpy, or with pulpy pericarps, usually many-seeded. Seeds medium-sized to large; embryo straight or slightly curved; cotyledons thick fleshy, equal or unequal, not folded (Corner, 1981).

According to Smithinand (1980), the species of genus *Artocarpus* found in Thailand are as followed.

<i>Artocarpus altilis</i> (Park.) Fosb.	ขนนส้มปดอ Khanun sampalo (Central),
(<i>A. communis</i> J.R.& G. Forst,	สาเก Saake(Central for seedless variety)
<i>A. incisa</i> Linn. f.)	Bread Fruit Tree, Bread Nut Tree.
<i>A. altissimus</i> J.J. Smith	โสน Sanai (Surat Thani).
<i>A. chaplasha</i> Roxb.	หาดสำน Haat saan (Chiang rai), ทังคัน

A. dadah Miq.

Thang Khan, ม่วงกวาง Muang Kwaang (Yala), หาดรุม Haat rum, หาดลูกใหญ่ Haat luuk yai, กะเอาะ Ka oh (Peninsular), ตีอกะ Tue-ka (Malay-Yala), เอาะ Oh (Trang, Ranong).

A. gomezianus Wall. ex Trec.

ตะป้ง Ta pang, ต่าป้ง Tam-pang (Malay Peninsular), หาดหนูน Haat nun (Northern).

A. heterophyllus Lamk.

(*A. integrifolius* Linn. f.)

ขนุน Khanun (General), ขะนุ Kha-nuu (Chong-Chanthaburi), ขะเนอ Kha-noe (Khmer), ซีคีย See-khuey, ปะหน้อย Pa-noi (Karen- Mae Hong Son), นะยวายชะ Na-yuai-sa (Karen-Kanchanaburi), นาก Naa-ko (Malay-Pattani), เนน Nen (Chaobon-Nakhon Ratchasima), มะหนุน Manun (Northern, Peninsular), ล้าง Laang (Shan - Northern), หมักหมี่ Makmee (Northeastern), หมักล้าง Maak-laang (Shan - Mae Hong Son), Jack Fruit.

A. integer Merr.

จำปาดะ Champaada (General), จำปาดะ Champaadoh (Peninsular), Champadak.

A. lakoocha Roxb.

กนย Kaa-yaе, ตาแป Taa-pae, ตาแปง
Taa-paeng (Malay-Narathiwat), มะหาด
Mahaat (Pninsular), มะหาดใบใหญ่
Mahaat baiyai (Trang), หาด Haat
(General).

A. lanceifolius Roxb.

ขนนป่า Khanun paa (Peninsular), หนังกา
ปีโต Nang-kaa pee-to, หนังกาปีโต Nang-
kaa pee-pit (Malay-Peninsular), หนังกา
ปีเฒ่า Nang-kaa pee-pae (Malay-
Narathiwat).

A. nitidus Trec.

subsp. *lingnanensis* Jarrett

มะหาดข่อย Mahaat khoi (Surat Thani).

(*A. parva* Gagnep.)

A. rigidus Bl.

ขนนป่า Khanun paa (Peninsular).

A. rigidus Bl.

subsp. *asperulus* Jarrett

ขนนปาน Khanun paan (Surat Thani).

Artocarpus altilis (Park.) Fosb. is an evergreen tree with stout twigs and large pinnatifid leaves, cultivated. Twigs 10-20 mm thick; stipules 10-25 cm long. Lamina up to 60×20cm with 1-5 or more pairs of pinnate lobes; petiole 30-60 mm long, stout. Male head 12-30×1.5-3 cm, cylindric to clavate, pendent, becoming yellow; peduncle 3-6 cm long; perianth bilobed; stamen 1.5-2.5 mm long. Female head stiffly upright; stigma simple or bifid, exerted to 2 mm. Syncarps 15-30 cm wide, oblong or rounded, green to yellow, set with conical processes 15×5 mm, varying simply areolate in seedless varieties; fruiting perianth not fleshy; peduncle 4-13 cm long. Seeds 25×20×15 mm; cotyledons somewhat unequal.

This plant occurs in two forms, one with seeds and conical processes on the syncarp and the other seedless without such processes. In place of the seeds in the seedless form, the fruiting perianths develop into starchy edible tissue (Corner, 1981).

The genus *Artocarpus* is well known throughout the tropical region for its edible fruits such as Breadfruit (*Artocarpus altilis* (Park.) Fosb.), Jackfruit (*A. heterophyllus* Lamk.), Monkey Jack (*A. lakoocha* Roxb.), and Champedak (*A. integer* Merr.). The fruits of *A. nobilis* Thw. and *A. rigida* Blume are also eaten. Its wood is a valuable timber resource (Ng, 1978). The *Artocarpus* is also used for various medicinal purposes.

The Maoris of Polynesia used a solution of the crushed young leaves of *A. altilis* (Park.) Fosb. to treat common abdominal pain centered around the navel. A solution of leaf ashes, often with the juice of banana stems, is rubbed onto the skin rash. The sap is commonly applied to rashes, pains and sprains, it is also applied to a broken limb or injured muscles or joints to dry and serve as a soft cast. In China, the seeds are supposed to aid parturition and are used to treat typhoid or other fevers as well. In Indonesia, the bark of the seedless form is one of the constituents of the medicine administered post partum. The ashes of the leaves, with coconut oil and Curcuma, are applied to the skin disease which creeps like herpes. A poultice of the roasted and crushed leaves with water is applied to enlarged spleen. The heated flowers, after cooling, are rubbed on the gums to ease toothache. The fruit meat is used to treat cough, the root bark to treat diarrhoea and dysentery and the seeds as an aphrodisiac. In Philippines, a decoction of the bark is employed as a vulnerary and also to treat stomach-ache. The latex is a medicine taken to cure dysentery in New Guinea (Perry, 1980; Quisumbing, 1951; Whistler, 1985).

The Philippines ingested a solution of the bark of *A. blancoi* (Elm.) Merr. with the root of *Laportea interrupta* (L.) Chew to treat defective urinary secretion, while the sap is rubbed on parts of the body having any type of skin disease. In Indonesia,

sap from the wounded bark of *A. dadah* Miq. is employed to cleanse foul leg-wounds. A strip of *A. elasticus* Reinw. ex Bl. pounded is applied as a bandage to treat lumbago. The bark is eaten, as well as bound on the abdomen by women who wish to be spared from childbirth. The leaves mixed with rice are ingested for tuberculosis, and the latex to treat dysentery. In Malay Peninsula, the inner bark is utilized for native bandages, and to poultice ulcers. The sap of *A. heterophyllus* Lamk. is used to treat ulcers and abcess in Burma, China, and Philippines, and the bark as poultices for the same purposes in Malay Peninsula. The pulp and the seeds of the fruit are regarded as cooling, tonic, and pectoral. In Burma, the roots are used to treat diarrhea, and in a compound extract to treat fever. In Indonesia, the wood is a sedative to treat convulsions. The boiled leaves are given to both animals and women to activate the secretion of milk; the sap is antisyphilitic and vermifuge. In Malay Peninsula and Philippines, ashes of the leaves, with or without oil, are applied to treat ulcers and wounds. The milky juice is used in glandular swelling, and in snake bite. The ripe fruit is demulcent, nutritive, and laxative. The unripe fruit is astringent, if eaten in large quantities, it produces diarrhoea. Dried, ground roots of *A. horridus* Jarrett (*A. communis* Forst. var. *pungens* J. J. Sm. ex Heyne) are utilized to stop dysentery. The milky sap of *A. kemando* Miq. has a flavour suggessting coconut milk and is used by the natives (West part of Indonesia) as a sauce, but it coagulates when heated. If taken in too great quantities, it causes violent persistent colic. The ripe fruit is edible. In Burma, the juice and the seeds of *A. lakoocha* Roxb. are purgative, the bark is astringent. In Indo-China, the root is tonic and deobstruent, the leaves are used in treating dropsy. The boiled bark of *A. ovatus* Blco. (*A. cumingiana* Trec.) is used to treat stomachache. The latex of *A. rigidus* Bl. is applied to wounds of domestic animals. A decoction of the bark and fresh leaves of *A. rubroveniosus* Warb. is administered for fevers (Perry, 1980).

Earlier phytochemical studies of *A. altilis* (Park.) Fosb. were reported α - and β -amyrin as the triterpenoid compounds isolated and characterized from its latex (Ultee, 1949). Subsequently, several flavonoids have been reported from this plant. It

is notable that most of the previous studies were conducted on plant materials collected from different countries, for example Taiwan and Indonesia, but not from Thailand. On the survey of Thai medicinal plants for anticancer activity, Ruangrunsi *et al.* (1989-1990) found that ethanol extract of the wood of this species exhibited cytotoxic activity against KB-cell (Human nasopharynx carcinoma) at a dose of 10 $\mu\text{g/ml}$ and P 388 lymphocytic leukemia at 3.4 $\mu\text{g/ml}$. These prompted the author to investigate the chemical compounds of this plant for more information in the field of chemotaxonomy and phytochemistry.