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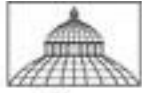
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## NOTES ON ECONOMIC PLANTS

**The utilization of edible *Canna* plants in southeastern Asia and southern China.**— The family Cannaceae consists of only a single genus, *Canna*. Although this genus is endemic to tropical America, several taxa have been introduced into the Old World tropics and subtropics, where, in some areas, they have become differentiated into local varieties.

Although canna rhizomes have long been used for food and as a source of commercial starch, the edible canna has not as yet received much attention from scientists. Consequently, much remains to be done from the horticultural standpoint, including the assessment of the agronomic characteristics of the older and newer varieties of canna all the way up to their genetic improvement (1). Canna starch, as seen by the naked eye, is a white powder with a peculiar satiny or glistening appearance due to the large size of its constituent granules (2). *Canna* starch is easily digested, soluble in water, and constitutes an excellent food material for invalids and infants (3).

In order to collect edible cannas and to better observe their use, the author undertook expeditions to Malaysia, Thailand, and Vietnam in August and September of 1996 and to southern China in October of 1997. Only one species of edible canna was recognized by the author during the course of his expeditions, *C. discolor* Lindl., a species that had been previously misidentified as *C. edulis* Ker-Gawl. (4). Unlike the latter species, however, *C. discolor* Lindl. has thickened and very enlarged arm-like rhizomes, leaves with purplish-red margins, reddish staminodes that are erect and about 7.0–7.5 cm long, and recurved labellum (4). Two infraspecific taxa of *C. discolor* are known (5).

The results of the expeditions are as follows:

**Malaysia:** The use of *Canna* plants on Penang Island was examined. Edible *Canna* plants were found scattered in backyard gardens in Tengah village, north of Teluk Kumbar and in Masjid village, in the southeastern part of the island. The local name for this domesticated is Ubi Larut." The natives eat the boiled rhizomes flavored with sauce. Also, the scraped rhizomes of this species are used medicinally by the Malay-

sians for the relief of fever. According to the local people, *Canna* was introduced to Singapore, but is no longer found there. During his visit to Singapore, the author found only one place where edible cannas were grown. However, they were probably being grown as ornamentals in this location and not for food or medicinal purposes.

**Thailand:** According to local residents, edible *Canna* was at one time abundantly grown near Bangkok city. However, today the center of cultivation appears to have shifted to the western part of the country. At Sai Yok, which is located at 99° E and 14° 30' N (or approximately 40 km northwest of Kanchanaburi), the boiled rhizomes are valued by the people for their starch content. Vendors sell small bundles of rhizomes at roadside stalls. The price for one bundle in 1996 was 10 Bahts (= 0.2 U.S.\$).

**Vietnam:** As previously reported by the present author (4), edible cannas are sold commercially only in Vietnam. Noodles made from canna starch sell for 3000–3500 Don (1 U.S.\$ = 11 000 Don) per bunch in the main markets (Fig. 1). The stalls sometimes sell hot canna noodles (Fig. 2) that are used for the making of soup, often with chicken. Additional information on canna was brought out in a survey that was undertaken in Song Trau (ca. 107° 40' E and 11° 10' N) and in Cay Gao village in Dong Nai Province. In this part of Vietnam, the regional name for this plant is "Cu Giong." According to Ms. Huyen Thong Nhat, one of the people I interviewed in Song Trau village, a wholesale agent from the main marketplace (located about 10 km south of Song Trau) buys up the canna harvest every December. The last known offer of this middleman was 1500 Don per kg. As fertile soil is required to successfully cultivate edible canna in this part of the country, villagers often spend a considerable portion of their income on expensive fertilizer. In order to cut costs, some growers use pig excretions as an organic fertilizer. Aside from the Song Trau area, edible canna is also widely cultivated at Cay Gao. In addition to the cultivation of banana, papaya, cassava, maize, etc., about 70% of the Cay Gao people grow edible canna. In Thoi



**Fig. 1.** A display of dried noodles made from canna starch in the marketplace at Ho Chi Minh City in southern Vietnam.



**Fig. 2.** A bowl of fresh canna noodles as displayed in a small market stall in Vietnam.

**Fig. 3.** A crop of canna destined for the production of "Ping Fa Lou," an alcoholic beverage manufactured in the Province of Guangxi, China.

Long village (ca. 105° 45' E and 10° 15' N in O Mon prefecture), the inflorescences of *C. discolor* are sold in January and February as household decorations for the New Year.

China: Field surveys were carried out in the provinces of Yunnan and Guangxi. In a village located at the foot of Mt. Ping Mang Gui Gang Shan in Guangxi province (Fig. 3), the residents brew an alcoholic beverage called "Ping Fa Lou" from the rhizome starch of *C. discolor*. After boiling for 40 minutes, the rhizomes are chopped into small pieces. The mash is prepared with locally available yeast, and fermentation is completed in 15 days. The rhizomes for this process are dug up each year between November and December. The villagers boil the leftover canna leaves, stems, and any remaining small pieces of the rhizomes to make a feed for their livestock (often swine). With respect to Yunnan Province, the most commonly grown canna differs from the variety cultivated in the Guangxi area by having yellow flowers spotted with red.

Recent social and economic changes are making societies less dependent on the surrounding environment, causing rapid and irreversible losses of minor crops that may have potential for development into food and other plant resources in the future. Currently, world advances in food production fail to keep in step with our ever-increasing world-wide populations (6). Growing edible canna makes good sense from the standpoint of soil conservation since the large leaves of this plant develop very rapidly and tend to completely cover the ground surface (7). Moreover, following the harvesting of the rhizomes, the leaves and stems of this crop can be fed to livestock. All in all, it appears that edible canna has the potential for becoming a new starch crop suitable for growth in the tropics and subtropics. However, more information on the various varieties and strains of edible canna will eventually be needed in order to ensure the success of future breeding programs.

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***Cleyera japonica* Thunb. var. *wallichiana* (DC.) Sealy (Theaceae): A tea-beverage plant of the Himalayas.**—During an ethnobotanical and plant-environment field study in the Arun River Basin of Makalu-Barun National Park (MBNP) and Buffer Zone, Nepal (Fig. 1), a plant used as a tea-beverage by the local people (and especially by the highland Sherpas) was collected. Until recently, no information was available about this plant outside of the study region. Few systematic studies on the collection of this important species have been undertaken. Information on habitat and uses was gathered through local enquiries, and a preliminary chemical analysis was performed.

The collection of raw material and preparation of the tea-like beverage, *chhasing*, was documented during a field visit to MBNP from 1–18 December 1999. The study area is located in the

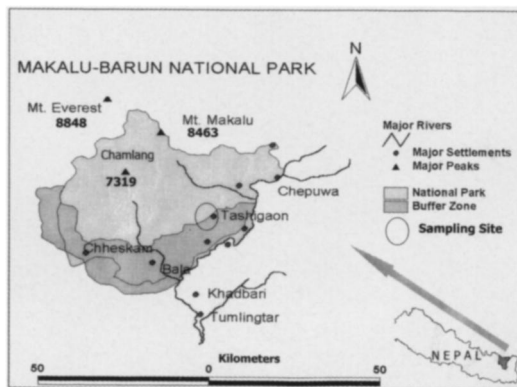


Fig. 1. The collection area in the Makalu-Barun National Park.

sector of Seduwa, between 27°17' N to 27°35' N, and 87°13' E to 87°16' E. The plant was identified, and the voucher specimens are deposited in the herbarium of the Central Department of Botany, Tribhuvan University (TUCH), Nepal.

*Cleyera japonica* Thunb. var. *wallichiana* (DC.) Sealy (Theaceae) is an evergreen shrub, often climbing upright on *Rhus javanica* L. (Anacardiaceae) and *Castanopsis hystrix* Miq. (Fagaceae) in Eastern Nepal. The following features are characteristic of this species:

Leaves petiolate, oblong-obovate or oblong-lanceolate, 8–12 cm long and 3–5 cm wide, more or less acuminate, with an acute base. Flowers stalked, white, rarely yellowish-white, 1.5–2 cm in diameter when in bloom, usually in small fascicles, often 5-flowered, with minute bracts. Sepals 5, small. Petals 5, 1–1.25 cm (about three times the length of the sepals), yellowish. Stamens many; anthers pilose; style subulate and persistent. Ovary 2–3 celled, ovules many; stigma slender; style often elongate and shortly 2–3 bifid. Fruit baccate (berry like, pulpy).

This shrub is distributed in the Himalayas of Nepal, S.E. Tibet, Assam, N. Burma, and W. China. In Nepal, it is distributed in the west, central, and east regions between 1400 and 2100 m (1). We observed that it prefers sandy-loam soil and moist habitat conditions under the shade of trees. Locally, the plant is called *chhasing* in the Sherpa language and *bhotechiya* in Nepali in the Makalu-Barun region. It is also called *kalo bakalpate* in Nepali (2).

The people of the Arun River basin use the following procedure in the preparation of *chhasing*: First, fresh leaves (Fig. 2) are collected in