

# **Root crops**

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## ABSTRACT

This guide describes the staple root crops of Indonesia, including native taro and yam species as well as more recently introduced plants such as tannia (cocoyam), sweet potato, cassava, and the Irish potato. A final section lists a further dozen minor species used for their edible, starchy roots.

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## KEY WORDS

taro; tannia; cocoyam; yam; cassava; sweet potato; potato

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Before I came to Sulawesi, I didn't even know the difference between a yam and a sweet potato, let alone how the six most common yam species of Indonesia differ from one another. Here are *brief* descriptions of the most common root crops you are likely to encounter in Indonesia. (These are the bland, starchy 'staple' crops, not the aromatic gingers, galangals, etc.) For further information on these plants, see especially the individual articles in Flach and Rumawas (1996).

## Aroids

An aroid is any plant of the Araceae family.<sup>1</sup> This family comprises over 3700 species, most of which are endemic to tropical America. A number of aroids are considered ornamentals: if you've heard of caladiums, philodendrons and aloccasias, then you've heard of aroids. Here I consider the edible species.

### **Colocasia esculenta (L.) Schott**

common taro; *talas*, *keladi*

Taro is an Old World crop, thought to have been cultivated in Asia even before rice. It is easily recognized by its large 'elephant ear' (some would say 'arrowhead') leaves. Young leaves and petioles can be eaten, but it is best known for its edible corm (Indonesian: *umbi*). Whilst cultivated varieties are variable, botanists distinguish two main types, a dasheen variety with a long central corm and few cormels (side-corms), and an eddoe variety<sup>2</sup> with well-developed cormels. As with tannia (below), all parts of the plant can also be used as animal feed.

### **Xanthosoma spp.**

tannia, cocoyam; *talas*, *keladi*

Tannia, or cocoyam,<sup>3</sup> is a New World crop which was spread to Southeast Asia in the nineteenth and early twentieth centuries. Leaves and corms are similar in appearance to those of common taro. However, in tannia the leaf stem (petiole) attaches at the margin (between the two upper lobes) whereas in taro the stem attaches on the underside of the leaf. Another important difference is that, unlike taro, tannia *cannot* grow in flooded fields

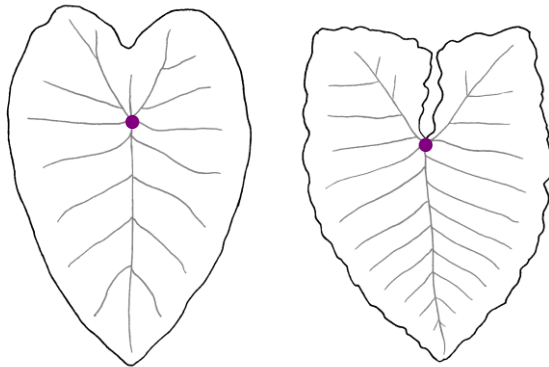
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<sup>1</sup> All aroids are characterized by an inflorescence consisting of a spadix surrounded by a solitary spathe.

<sup>2</sup> Formerly classified as a separate species, *Colocasia antiquorum* Schott.

<sup>3</sup> Some prefer to use cocoyam as a cover term for both tannia (*Xanthosoma* spp) and taro (*Colocasia esculenta*).

(e.g. on the margins of rice paddies). The two species of edible *Xanthosoma* which have been introduced into Asia are *X. nigrum* (Vell.) Mansfield<sup>4</sup> (blue tannia, blue taro, *talas belitung*) and *X. sagittifolium* (L.) Schott (new cocoyam).



Leaves of taro (*Colocasia esculenta*), left, and tannia (*Xanthosoma sagittifolium*), right. Dot (●) indicates point of petiole attachment.

Because of their morphological similarity, taro and tannia may be lexically undifferentiated (as is the case in colloquial Indonesian).<sup>5</sup> Alternatively, owing to its more recent introduction, the name for tannia may be a modification of the name for taro, compare Papua New Guinea where taro is *talo* (or *talo tru*), and tannia is *talo singapo*.

### ***Alocasia macrorrhizos* (L.) G. Don**

giant taro, elephant ear taro; *birah*

Elephant ear taro is another large-leaved aroid, with erect, bluntly triangular leaves. The sap contains needle-like crystals of calcium oxalate, and is well-known for being irritating (itch-inducing) to the skin. Corms are stem-like, mostly growing above ground, with only the bottom six inches or so rooted in soil. They can be harvested 18 to 24 months after planting, when they may be three or four feet long and six to eight inches in diameter (Aliaki et al. 1990:37). The flesh, which may be purplish, yellow or white depending on the cultivar, is edible after being boiled. The plant has been grown as a subsistence crop or for animal feed from Malaysia to the Pacific. It is now also popular as an ornamental. Some older sources discuss this plant under its synonyms *Alocasia macrorrhiza* or *Alocasia indica*.

### ***Cyrtosperma merkusii* (Hassk.) Schott**

giant swamp taro; *keladi pari*, *gele-gele*

Giant swamp taro is a true giant among plants, with saggitate leaves that can grow up to three meters long, atop spined petioles (but unarmed in some cultivated varieties). Unlike common taro, which is usually harvested a year or so after being planted, giant swamp taro corms maintain their edibility and are often dug only three to six years after planting.

<sup>4</sup> Commonly referred to under the synonym *Xanthosoma violaceum* Schott.

<sup>5</sup> Of the two Indonesian terms, *talas* refers specifically to taro (and by extension, tannia), whilst *keladi* is a general term including many aroids (cf Wilkinson 1959:s.v.).

Whilst common in Malaysia and the Philippines, giant swamp taro is rare in Sumatra and Java and is said not to occur in Sulawesi, the Moluccas or mainland New Guinea.

## Yams

In this section I give relatively short shrift to yams, and refer the reader instead to the online brochure [A Practical Guide to Identifying Yams](#) (Wilson 1988). Not only does this brochure give brief vignettes for each *Dioscorea* species, it also has a simple, easy-to-follow key for identifying species in the field.

### ***Dioscorea alata* L.**

greater yam; *ubi*

This is the principle species which is identified by the Indonesian word *ubi*; other yam species below are always identified by *ubi* plus modifier. Greater yam vines can be identified in the field in that they are without spines, they twine to the right, and stems are often conspicuously four-winged. Leaves are opposite (except near the base) and are five-nerved.

### ***Dioscorea esculenta* (Lour.) Burkill**

lesser yam; *kembili*, *gembili*, *ubi kembili*

Stems of lesser yams are prickly (especially near the base) and twine to the left. Leaves are alternate and broadly heart-shaped, with 9-13 nerves.

### ***Dioscorea hispida* Dennst.**

bitter yam; *gadung*, *ubi gadung*, *ubi arak*

Bitter yam is the chief famine food of tropical Asia, and tubers may not be harvested otherwise, since they contain poisons (diosgenin and dioscorine, which attack the central nervous system). Preparation includes slicing and soaking in running water or washing in several changes of salt water. Stems twine to the left, and are easily identified by their large, three-parted leaves.

### ***Dioscorea nummularia* Lam.**

hard yam, *ubi takup*

The designation 'hard' is in reference to the flesh of the tubers, which can be (relatively) hard and dry even after cooking. In Kulisusu there is a folktale about how bitter yam and hard yam were rejected as being king of the food crops. As a result, bitter yam's heart became bitter, while hard yam shattered and buried himself deep between the rocks. In some varieties, tubers are spindle-shaped, a few centimeters round and up to a meter long. Stems twine to the right but unlike with greater yams are never winged, and are often thorny at the base.

**Dioscorea bulbifera L.**

aerial yam, potato yam, *ubi atas*, *ubi cina*

The aerial yam is said to be the most prolific and widespread of all yam species. It is best known for its distinctive aerial tubers (properly speaking, ‘bubils’) which grow along its stem (it can also have underground tubers). Some varieties, particularly wild ones, can be poisonous unless properly prepared.

**Dioscorea pentaphylla L.**

sand yam, fibrous yam, ginger yam, five-fingered yam; *ubi pasir*, *ubi jahe*

The name ‘five-fingered yam’ comes from the shape of the leaves, which are 3-5 palmately compound (the leaf ‘fingers’ are completely separated, not webbed). Whilst sand yam tubers are never toxic, they can be nauseating in some wild varieties. Most varieties have small aerial tubers.

**Some New World crops**

Taro and yams—for centuries these were the principle root crops known in Southeast Asia. The arrival of Europeans, and the New World crops they brought with them, led to a greater variety of choices. Besides tannia, already discussed above, the following three crops were all introduced to Indonesia after 1500.

**Ipomoea batatas (L.) Lamk.**

sweet potato; *ubi jalar*

Having grown up in the U.S., to me a prototypical sweet potato has brown skin and orange flesh, but sweet potatoes are actually variable in color (skin: white, yellow, brown, red, purple; flesh: white, yellow, orange, purple). The plants are recognizable from leaf shape (variable, but generally lobed, as opposed to the heart-shaped leaves of most yams), and habit of the vines (which, as the Indonesian name suggests, like to spread across the ground). The Kulisusu (Southeast Sulawesi) word for sweet potato, *kasitela*, comes from Castilla, a province of Spain (in the East Indies, Spaniards were also known as Castellans).

**Manihot esculenta Crantz**

cassava, manioc; *ubi kayu*, *kasbi*, *singkong*

Cassava is a New World crop which was first introduced into Indonesia in 1810. However, it began to be cultivated widely only at the beginning of the 20th century, owing both to promotional efforts by the Dutch government and to failures in rice and corn crops. Cassava is grown from stem cuttings, and is easily recognized from its woody, unbranched stems, usually with leaf scars, and its leaves which have five to seven slender lobes. Both leaves and tubers are edible. All parts of the plant, however, contain cyanogenic glucosides, but the exact amount is variable and depends on variety of cassava, local soil conditions, and climate. This is also reflected in local preparation methods, which

may involve grating and/or drying tubers to reduce glucoside content. In the Mori area of Central Sulawesi, people recognize two varieties of sweet cassava (low glucoside content), based on whether the tuber has yellow or white flesh, and a third variety of bitter cassava (high glucoside content), of which only the leaves are eaten. Owing to cassava's great variability, there is no accepted classification below the species level.

### ***Solanum tuberosum* L.**

Irish potato, white potato; *kentang*, *ubi kentang*

Unlike yams and sweet potatoes, Irish potatoes do not grow vines, but are plants somewhat resembling tomato plants (= *Lycopersicon esculentum* Miller). Once harvested, the tubers have a relatively long dormancy period (2–6 months). Generally the cooler the climate where the potato is grown, the longer the dormancy and hence the better the storability. In highland Central Sulawesi, potatoes were introduced by missionaries in the early twentieth century. The Napu word for potato, *silanu*, must be one of the few borrowings which has come into a Sulawesi language directly from the Latin!

## **Less common roots used for their starch**

I only have 'head' or 'book' knowledge for most of the following species. I mention them here by way of bringing them to your awareness.

### ***Alocasia* spp. (Schott) G. Don**

(*alocasia*, *daun keladi*) Alocasias are aroids, with large, heart- or arrow-shaped leaves similar in appearance to taro. However, alocasia corms contain oxalic acid crystals, and must be boiled for a prolonged period before becoming edible.

### ***Amorphophallus paeoniifolius* (Dennstedt) Nicolson**

(elephant foot yam, telinga potato; *suweg*) As with taro, also an aroid; tubers can reach 30 cm wide and 20 cm long, and weigh up to 25 kg. At least three other *Amorphophallus* species are grown for their edible tubers, but are of even less importance in Indonesia.

### ***Canna indica* L. (syn. *Canna edulis* Ker Gawl. *inter alia*)**

(*canna*, edible canna, Queensland arrowroot, Indian shot; *ganyong*, *laos jambek*, *laos mekah*) Perhaps better known for its showy red flower, canna also has a starchy, edible root; the name 'Indian shot' comes from its hard, round, black seeds (like large BB's), in some locales used as beads. A New World plant.

### ***Curcuma xanthorrhiza* Roxburgh**

(white turmeric; *temu lawak*) Deep yellow, pungent, bitter root with a complicated starch extraction process; cultivated in Java, wild in other parts of Indonesia. Other well-known plants of this genus are *Curcuma longa* L. turmeric *kunyit* and *Curcuma angustifolia* Roxb. East Indian arrowroot, native to central and southern India.

**Dioscorea orbiculata Hook.f.**

(– ; *ubi garam*) A minor yam species known in Indonesia from Sumatra.

**Dioscorea polyclades Hook.f.**

(– ; *kedut*) A minor yam species known in Indonesia from Sumatra and Java.

**Dioscorea pyrifolia Kunth.**

(marsh benzoin climber; ? *ubi babi*) In India the tubers are eaten, in Indonesia the stems are used for cordage and wickerwork; known from Sumatra, West Java, and Kalimantan.

**Dioscorea rotundata Poiret**

(white Guinea yam; – ) Recently introduced to Southeast Asia from Africa; discussed in the above-mentioned *Practical Guide to Identifying Yams*.

**Dioscorea trifida L.**

(cush-cush yam; – ) Recently introduced to Southeast Asia from tropical America; discussed in the above-mentioned *Practical Guide to Identifying Yams*.

**Maranta arundinacea L.**

(arrowroot, bamboo tuber; *garut, ubi garut, ubi bemban*) Indigenous to tropical America; tubers are long, pointed and enclosed in bracts.

**Pachyrhizus erosus (L.) Urb.**

(jicama, Mexican turnip, Mexican yam bean; *besusu, bengkuang*) Indigenous to Mexico. Tubers have a crisp white flesh, sometimes used in *rujak* (fruit in spicy sauce).

**Plectranthus rotundifolius (Poiret) Sprengel**

(Madagascar potato, Hausa potato ; *kentang jawa, kentang bulu, kentang bogor*) Tubers can be used as Irish potatoes. Easily propagated and disease resistant, it has the potential of becoming more widely cultivated; currently Sumatra, Java and the Moluccas.

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