

Studies on root and tuber crops grown in association with coconut. 1. Survey on root and tuber crops found under coconut and the morphological characterization of edible aroids

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ABSTRACT

A survey of root and tuber crops found in some coconut growing areas revealed that Aroids and Dioscoreas are among the popular intercrops grown under coconut. It was also found that there is some degree of confusion regarding their identity and some species of Aroids or Dioscoreas are known by a number of different local names.

Based on morphological characters, venation and leaf epidermal characters, Sevel ala, Thummas ala, Desi ala, Dehi ala have been determined as cultivars of *Colocasia esculenta* (Schott). Kiri ala as *Xanthosoma sagittifolium* (Schott) and Dampata-kiri ala with purple pigmentation as *X. violaceum*. Kolakana ala or Andi habarala with peltate leaves has epidermal features suggesting that it is a species of *Alocasia*. Ath kohila, Angili kohila, and Sinhala kohila are cultivars of *Lasia spinosa* (L) Thw. Rathu kohila identified as *Crytosperma johnstonii* is the first botanical record of this species for Sri Lanka.

INTRODUCTION

Although root and tuber crops are widely cultivated as intercrops under coconut, studies on their distribution, morphological features and cultural practices have been neglected. This may be due to the lack of appreciation of their nutritional value and also their ability to grow well under shade. While there is some information available which indicates that aroids are nutritionally as rich as the popular root crops, potato and sweet potato, no quantitative data is available on their performance in partial light regimes such as that found beneath the canopy of tree crops.

In many South East Asian and African countries root and tuber crops, mainly aroids, are an important source of food. In Sri Lanka yams of aroids are utilized generally as a subsidiary food. The foliage of certain species such as Kohila (*Lasia* sp), Andi-habarala (*Alocasia* sp.) and Kidaran (*Amorphophallus* sp).

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is also consumed as a leafy vegetable. Apart from their consumption as a main or subsidiary food item, there appears to be a demand for specified uses (Plucknett, 1970). For instance, edible aroids can be used as an alternative source of carbohydrate for children and adults who are allergic to cereal products. Conrsey and Haynes (1970) compared *Coloasia* with potato and sweet potato and concluded that *Coloasia* was not nutritionally inferior to potato and sweet potato.

The first part of this paper deals with the findings of a preliminary survey of root and tuber crops grown under coconut in some parts of the island. The second part discusses in detail the morphological features of edible aroids, and the construction of a key for their identification in the field.

Survey on root and tuber crops

A preliminary survey was conducted in 1975 in a few coconut growing districts to study the various root and tuber crops grown under coconut. Information collected in relation to edible species is summarised in Table 1.

Within the group of Root and Tuber crops, the Aroids and Dioscoreas are also popular among coconut growing farmers in addition to manioc and sweet potato. In regard to manioc and sweet potato, a considerable amount of technical information on the promising varieties, fertilizer requirements etc. is available, whereas for Aroids and Dioscoreas such information is lacking.

Aroids were grown under very wide range of environmental conditions, both edaphic and climatic. Husks are buried in coconut lands to increase the water holding capacity of the soil. Trenches are cut and filled with alternate layers of husk and soil. It was observed that most farmers grow *Xanthosoma* (Kiri ala) on these husk-filled trenches. With very little additional effort and inputs 2-3 kg of yams are harvested in 9-12 months, from each plant.

In the drier coconut growing areas, example Chilaw, *Xanthosomas* are grown under heavy shade as in 10-15 year old plantations and in underplanted areas. It is interesting to note that although intercropping is generally not recommended in such situations, the *Xanthosomas* performed quite well under these conditions.

Dioscoreas were generally grown on stakes or trellises. It was a common practice to plant betel (*Piper betle*) after harvesting the Dioscorea so that its vines could be trained on the same supports.

Classification of aroids

In the past, root and tuber crops research in Sri Lanka has been directed towards adapting temperate root crops, especially sweet potato and potato, to our conditions. The edible aroids like *Xanthosoma*, *Coloasia* and *Amorphophallus* appear to have been neglected. Selection and testing of promising cultivars would no doubt constitute an important aspect of a programme designed to develop the production of aroids. To this end, a key for their identification in the field, would be indispensable.

Table 1 Summary of the data collected on edible root and tuber crops

Family of group	Sinhala name of crop	Location		Edible part	Season of cultivation	Duration
		District	Village			
<i>Xanthosoma</i>	Kiri-ala (green) Kiri-ala (purple)	Kegalle, Galle, Kandy, Chilaw, Kurunegala	Common among coconut gro- wing farmers	Cormels	Oct-Nov.	9-12 months
	Kandala (green)	Kegalle, Chilaw	Beligalle	Mother yam and cormels	- do -	12-15 months
	Kandala (purple) Kaha-ala	Kegalle Kegalle	Beligalle Godawella	- do - Cormels	- do - - do -	- do - 9-12 months
	<i>Colocasia</i>	Sevel-ala Thummas-ala (green) or Dehi-ala Thummas-ala (purple)	Galle, Kandy Kurunegala	Common among coconut gro- wing farmers	Cormels	Rainy season
<i>Alocasia</i>	Andi habarala or Kola kana habarala	Galle, Kegalle, Kandy	Godawella, Beligalle	Leaves	Oct-Nov.	Leaves are harvested from time of establish- ment.
	Polon habarala	Kegalle	Beligalle	Leaves	- do -	Leaves are harvested from 6 months.
<i>Cyrtosperma</i>	Rath kohila	Kandy	Ranawana	Rhizome and leaves		Leaves are harvested from 8-9 months
<i>Lasia</i>	Angili kohila or Relou Kohila	Chilaw	Kirimetiya	Leaves		- do -
	Sinhala kohila or Ath kohila	Chilaw	Lunuwila	- do -		- do -
<i>Anorphophallus</i>	Kidaran	Galle, Chilaw	Baddegama Talgahapotta	Leaves and corm	Oct-Nov.	Survives upto 3-4 years.
<i>Dioscoreas</i>	Raja-ala and other species	Chilaw, Colombo, Kandy	Nawasigaha- watte, Ingiriya	Yams	April-May	9-10 months
	Kiri khondol	Chilaw, Colombo	Talgahapotta	- do -	March-April	- do -
	Angili-ala	Chilaw, Kandy	Nawasigahawatte Raawana	- do -	April-May March-April	- do -
	Hingurala	Chilaw	Nawasigahawatte	- do -	April-May	- do -
	Rajawalli	Chilaw	Talgahapotta	- do -	April-May	- do -
	Wel-ala	Kegalle	Beligalle	Aerial tubers	April-May	Tubers are harvested from 7 months onwards
	Kukul-ala	Kegalle	Beligalle	Yams	April-May	9-10 months
	Katu-kukul-ala	Chilaw	Tabbowa	- do -	April-May	- do -
	Katu ala	Kegalle	Beligalle	- do -	April-May	- do -
	Java-ala	Kegalle	Godawella	- do -	April-May	- do -
	Jamburala	Kegalle	Godawella	- do -	April-May	- do -
	Jaffna purple	Colombo	Ingiriya	- do -	March-April	- do -
	Kiri wel-ala	Kegalle	Mawanella	- do -	March-April	- do -
	Ratna walli	Kegalle	Ambepussa	- do -	March-April	- do -
	Kahata angala	Chilaw	Tabbowa	- do -	April-May	- do -
Rathu khondol	Colombo	Ingiriya	- do -	March-April	- do -	
Rata-ala	Colombo	Ingiriya	- do -	March-April	- do -	
<i>Colony</i>	Rata Innala	Colombo	Walpita	Tubers	with rains	
	Sinhala Knnala	Kandy, Kegalle		- do -	with rains	
<i>Tamio varieties</i>	-	All districts	Common among cultivators	- do -	with rains	9-10 months
<i>Sweet potato varieties</i>	-	Wet and Inter mediate zones		- do -	with rains	3-9 months
<i>Turmeric and Ginger</i>	-	Popular in the wet and inter- mediate zones.	Common among cultivators		with rains April-May	

Cocoyam, eddoe, dasheen, taro, elephant yam are some of the common names given to edible aroids. In Sri Lanka, aroids are popularly known as Habarala. Various members of the botanical family Araceae produce underground tubers and aerial leaves that can be used by man as food. The family belongs to the Monocotyledons and also includes such familiar ornamental plants such as Anthurium, Arum lily and the Caladiums. From the economic point of view species of *Colocasia* and *Xanthosoma* are by far the most important, but several other genera also provide food. In Sri Lanka all these edible genera, except *Cyrtosperma*, are widely cultivated. *Lasia spinosa* though not a root or tuber crop is widely cultivated in Sri Lanka and therefore has been included in this study.

Botany of the Aroids

Aroids are mainly herbaceous plants, often with an enlarged root stock which acts as a storage organ and is the part of the plant usually consumed. In some, such as *Alocasia*, this root stock develops above ground into a permanent "trunk" while some non-edible species such as the ornamental *Philodendron* and *Syngonium* have climbing stems. The leaves are generally large, a metre or more in length; they may be simple or compound and have veins often bunched or netted, in a manner resembling the leaves of dicotyledonous plants. The inflorescence is very typical consisting of a spike of small flowers forming the spadix, which is sheathed from the base and partially surrounded by a leaf like bract, termed a spathe which is sometimes coloured. The spadix contains separate male and female flowers. They have either a much reduced perianth or none at all. The female flowers produce berries. However, many of the cultivated aroids have been propagated vegetatively for so long that they have lost the ability to produce sexually. Morphologically the primary corm of the plant represents the main stem and the secondary corms or cormels, the lateral branches. They are often referred to, incorrectly as rhizomes and tubers, respectively. But in *Lasia* the thick stem can be regarded as a rhizome. The relative size of the corm and cormels vary greatly between species and variety. As a food the cormels are usually of better quality.

Representatives of genera which are of economic importance, have been classified by Engler as follows:

- | | |
|---------------------|-----------------------------------------|
| 1. Pothoideae | — Pothos* and Anthurium* |
| 2. Monsteroideae | — Rhipidophora* and Monstera* |
| 3. Calloideae | — Zantedeschia* (= Calla) |
| 4. Lasiodeae | — Amorphophallus** Lasia** |
| 5. Philodendroideae | — Philodendron* |
| 6. Colocasiodeae | — Colocasia**, Alocasia**, Xanthosoma** |
| 7. Aroideae | — Arum* |
| 8. Pistioideae | — Pistia (Aquatic weed.) |

* Ornamental

** Edible

*Morphological Description of Aroids**Colocasia*

The genus includes about seven species with large or small peltate leaves, native of Indo-Malaysia and the Pacific. *Colocasia esculenta* is widely grown throughout the tropics for its edible corms and leaves. Some forms are grown for their ornamental foliage. Several ala (*Colocasia esculenta*), Thummas ala (*Colocasia antiquorum*) are widely grown in Sri Lanka for their edible corm and leaves.

The taxonomy of *Colocasia* cultivars with edible tubers is not clear. Some authorities, as discussed by Barrace (1957), recognize two species, namely *C. esculenta* in which the sterile appendage of the spadix is much shorter than the male portion and where the spadix projects beyond the tips of the spathe and *C. antiquorum* (Schott) in which the sterile appendage is longer than the male portion and where the spadix is contained within the spathe. Others consider that there is only one species *C. esculenta* with two botanical varieties var. *esculenta* (syn var. *typica* A. F. Hill) and variety *antiquorum* (Schott). Haudricourt (1941) retains the name *C. antiquorum* for the species and distinguishes a number of botanical varieties based on vegetative character.

The edible clones of *Colocasia*, of which a large number are being propagated vegetatively, exhibit considerable variation. Until they are collected and studied, preferably from living material, it seems prudent to recognize only one polymorphic species, namely *C. esculenta*. Dasheens and eddoes appear to be distinct agronomically. Also there are differences in the form of their corms and in the flowering cultivars, in the length of the sterile appendage of the spadix. It appears valid to consider these as two botanic varieties var. *esculenta* and var. *antiquorum*. It is proposed that the common name dasheen be confined to var. *esculenta* and eddoe to variety *antiquorum*. In Sri Lanka, sevel ala and thummas ala are representative of var. *esculenta* and var. *antiquorum*, respectively. The following is a morphological description of these two varieties.

Sevel ala - *Colocasia esculenta* var. *esculenta*

Herb 1-2 m tall with underground starchy corm producing at its apex a whorl of large leaves with long erect petioles. Leaves peltate, 25 to 35 cm in length, oblong, ovate, glabrous with basal lobes rounded. Petiole stout upto 1 m or more in length, clasping at base. Leaves are yellowish green in colour. Marginal vein of the leaf is not prominent, Colour of the leaf axil is light green. Petiole usually winged. Wings are colourless. Watery exudates present in the stem and leaves.

Corms usually cylindrical, and produce few cormels. Corms are creamy white in colour, with short roots on it. The colour of the inner part of the corm is yellow. The cut surface of the corm, exudes a mucilaginous substance and hence its local name sevel ala (sevela = slimy).

Inflorescence on stout peduncle shorter than petiole. Spathe is about 15 cm long rolled inwards; spadix cylindrical with female flowers at the base, above which is a section of aborted flowers compressed by the neck of the spathe, followed by a longer protruding male section tipped by a short sterile appendage. Many cultivars do not flower.

Thummas ala - *Colocasia esculenta* var. *antiquorum* (Purple) - Figure 1.

Herb 60 to 75 cm in height with a short stem and at its apex a whorl of small leaves with long erect petioles. Leaves are peltate, erect with a purple coloured petiole. Basal lobes rounded, petiole about 50 cm or more in length, clasping at base. The colour of the petiole is purplish white usually cylindrical with broad based wings. The colour of the lower part of petiole is white. The length of the leaf is 15-20 cm and the width is 10-15 cm. Leaf margin is purple. The marginal vein is absent or not prominent.

Root system is superficial and has feeding roots upto about 20 cm deep. It has an underground small starchy corm which is rounded in shape. The colour of the corm is creamy white, and it produces cormels. The new plants arise from the cormels. The corm, when cut, does not exude mucilaginous substance, but the cut surface discolours rapidly. Corms are ready for harvest 3 months after planting, which accounts for the local name Thummas ala (Thummas = three months). It is very popular in the wet and intermediate zones of Sri Lanka.

Thummas ala or Dehi ala - *Colocasia* sp. (Green)

A small herb 30-40 cm in height, with a short stem at the apex of which are borne small green leaves. Leaves are peltate, erect with a green coloured petiole. Basal lobes of the leaves rounded, petiole about 30 cm in length, clasping at the base. The colour of the stem is light green, petiole usually cylindrical with broad based light green wings. The marginal vein is not prominent.

Root system is superficial and sparse. It has very small underground starchy corm which produces cormels. New plants arise from the cormels. There is hardly any colour change when the corms are cut and exposed to air. The corm resembles a lime fruit (*Citrus aurantifolia*) in appearance (Dehi = lime). Both the corms and cormels are edible. Tender leaves are also edible. The raphide content of the cormel is lower than that of the corm.

Xanthosoma

The genus includes the crops particularly known as tannia, kiriala (Sri Lanka) or in Africa as cocoyam.

Most of the edible representatives of the genus are generally referred to by agriculturists simply as *Xanthosoma sagittifolium* (L) Schott. However other species have been identified. Among them: *Xanthosoma violaceum* Schott with violet coloured leaves and corms of little value as food; *X. brasiliense* Engl. which has only a much reduced underground stem and is cultivated solely for its edible leaves; and *X. atrovirens* Koch et Boache (Kaha ala - Sri Lanka) which has yellow corms and is much favoured especially in Puerto Rico. Haudricourt (1941) who studied many cultivated forms has described a number of species based mainly on vegetative characteristics. A statistical analysis of the vegetative characteristics of a sufficient number of cultivated forms of *Xanthosoma* might well indicate that these various sub species and varieties correspond to distinct groups of cultivars. A few cultivars have been described in detail in this paper.

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Kiri ala - *Xanthosoma sagittifolium* (Green) - Figure 2.

A robust herb approximately 2 m in height with a short stem at the apex of which are borne large stalked leaves. Leaves are sagittate, erect with stout petiole 1 m or more in length, attached at the base of sinus. Lamina ovoid or oval 50-75 cm long with triangular basal lobes and deep sinus. Leaves are green in colour, and the colour of the leaf axil is light green. Petiole usually winged and cylindrical. The colour of the stem is light green. Wings are prominent with a white narrow margin. The marginal vein of the leaf is very prominent. Latex is present in the leaves and stem.

A corm is produced at the base of the plant which bears upto 10 or more cormels or lateral tubers which are 15 to 25 cm long and flask shaped (broader apical end). It has a vigorous root system with feeding roots about 20 to 25 cm in length, short roots arise from the corm and cormels. Stolens are present and the new plants arise from the stolon. Corms are reddish brown in colour and when the corm is cut the white flesh turns brown colour within few minutes. A milky latex is produced from cut leaves and stems (Kiri - milk).

Inflorescences borne below leaves: spathe usually pale green in colour, about 20 cm long with overlapping base expanded and open above. Cylindrical spadix about 15 cm long with shorter female section enclosed in the base of spathe, male portion above and three or four times the length of the female section, and no terminal sterile appendage. Male flower with disc-like yellow stigma. Some cultivars flower but very rarely produce seed.

Kiri ala - *Xanthosoma violaceum* (Purple)

A robust herb upto 1 m height with a short stem at the apex of which are borne small stalked leaves. Leaves are sagittate, erect with short petiole attached at the base of the sinus. Lamina oval, 30 to 35 cm long with triangular basal lobes. Leaves are light green in colour and the colour of the leaf axil is purple. Lower epidermis of the leaf is purplish white in colour. Petioles are usually cylindrical and have wings. The colour of the petiole and the stem is purple. Wings are prominent and dark purple. Marginal vein of the leaf is very prominent. Milky latex is present in the leaves and stems.

A small corm is produced at the base of the plant which bears a few lateral flask shaped cormels, 5 to 10 cm long. Corms are purplish brown in colour. When the corm is cut it turns purple in colour in a few minutes.

Kandala - *Xanthosoma sp.* (Green)

A robust herb about 2.5 m in height with a stem about 25 cm long and 15 to 20 cm in diameter. On the apex of this are borne greenish blue stalked leaves. Leaves are sagittate with the petiole attached at the base of the sinus. Lamina 75 to 85 cm long with triangular basal lobes. Leaves are green with a distinct marginal vein. Petioles are greenish blue and have wings. Milky latex is present in the leaves and stems.

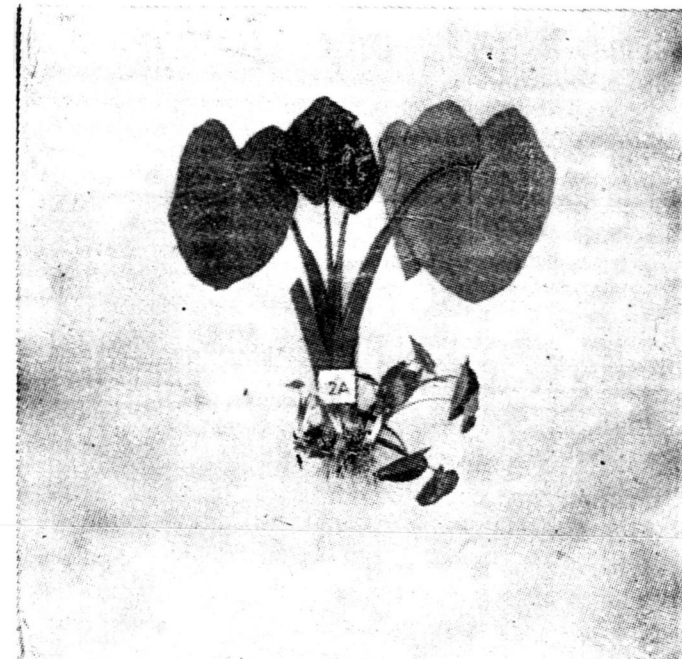


Fig. 1 — *Colccasia esculenta* Var *antiquorum* — Thummas ala.

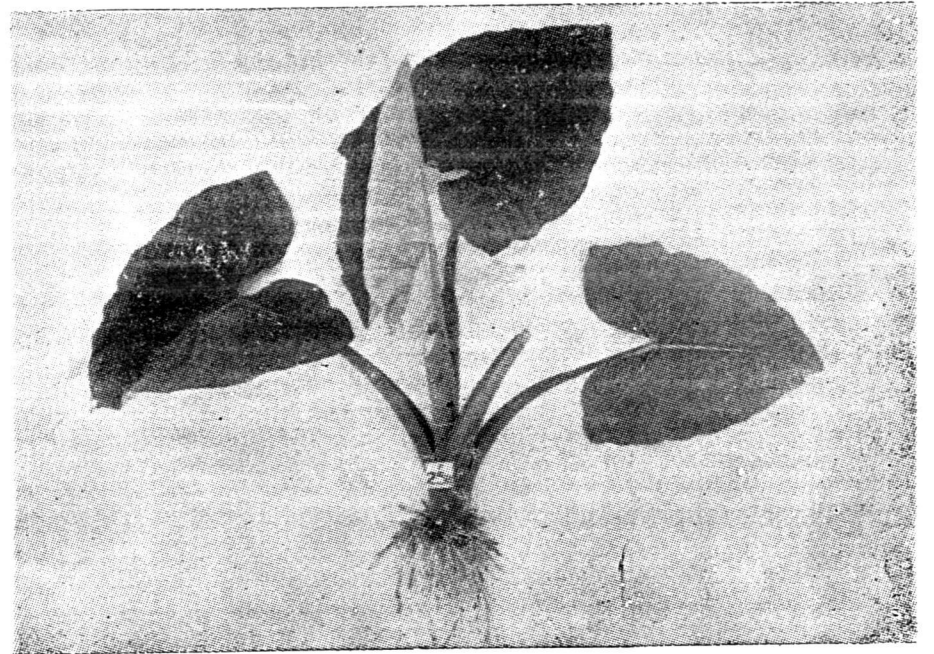


Fig. 2 — *Xanthosoma sagittifolium* — Kiriiala.

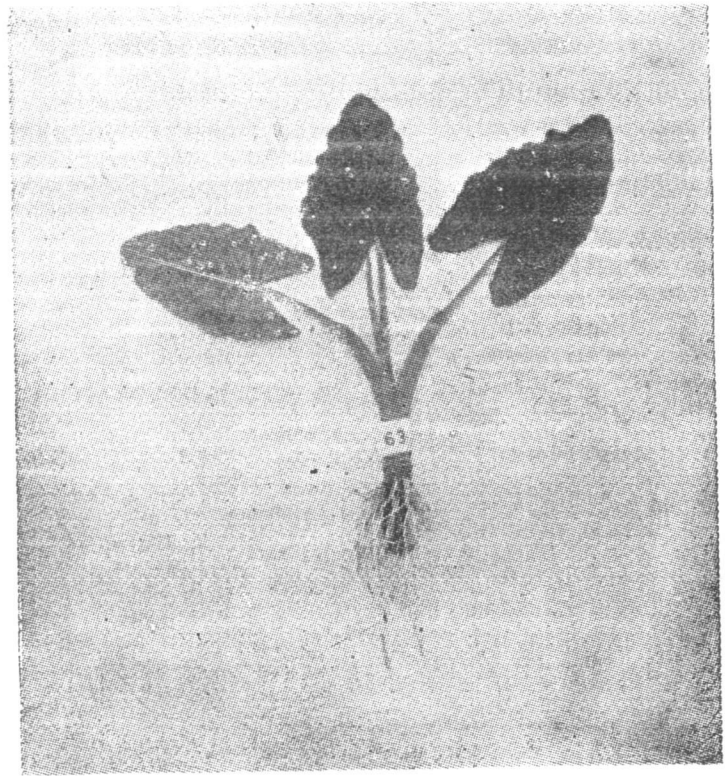


Fig. 3 — *Alocasia indica* — Polon habarala.

The mother corm which is usually seen above the ground level is edible. Small globular cormels are seen attached to the base of the main stem. As the mother corm or main stem is referred to as Kanda in Sinhala, the variety is known as *Kanda-ala*.

Kaha ala - *Xanthosoma* sp.

A small herb reaching about 1 m in height. On the short stem arise the stalked leaves. The leaves are green and deeply hastate with its basal lobes overlapping each other. The petiole is winged. Lamina has a prominent marginal vein.

Few corms are produced at the base of the plant. The corms are yellow in colour and when cut changes from yellow to dark yellow (Yellow = kaha).

Alocasia

It is probably a native of Sri Lanka but it has been cultivated from ancient times throughout South East Asia (Plucknett, *et al.*, 1971) whence it was carried into the Pacific to many islands including Tahiti. *Alocasia macrorrhiza* (L.) Schott, *A. indica* (Roxb), *A. cuculata* (Schott) and *A. fornicata* are used for food in parts of Asia.

A. macrorrhiza grows wild in Sri Lanka. As this is used as food in other parts of Asia it appears feasible to select suitable varieties and popularise its cultivation in Sri Lanka. However, the stem has an acrid taste and causes irritation of the mucous membranes due to the high content of calcium oxalate crystals. This problem could be overcome if the stem is sliced, washed, boiled and the water discarded during its preparation as food.

Wal habarala (*A. macrorrhiza*), Polon habarala (*A. indica*), Nai habarala (*A. cuculata*) are the most common *Alocasia*s found in Sri Lanka. A descriptive morphology of *A. indica* and *Alocasia* sp. Andi habarala or Kolakana ala is given below.

Polon habarala - *Alocasia indica* - Figure 3

An erect herb 1 to 2 m tall with a short stem at the apex of which are borne stalked leaves. Leaves are sagittate, arrow shaped, with rather shallow and rounded lobes. The leaves point upwards forming a straight line with the main axis of the winged petiole. Leaves are light green in colour, veins are very thick and prominent. Marginal vein of the leaf is not prominent. Lamina oval 40 to 50 cm long with angular lobes, and the margin is undulating.

A characteristic feature is the grey dots or blotches on the upper part of light green petiole, resembling the markings on a viper (Polonga)

The root system is shallow and the feeding roots are about 20 to 30 cm in length.

A stout, short stem is produced above soil level on which leaf scars, buds and adventitious roots are visible.

This variety is scarce, found in the Kegalle district. The fleshy leaves are edible.

Andi habarala or Kolakana ala - *Alocasia* sp. - Figure 4

Herb 0.75 to 1 m tall with small underground starchy corm producing at its apex a whorl of small leaves with small erect petioles. Leaves peltate 20 to 25 cm long with rounded basal lobes. Petiole stout up to 0.75 m in length clasping at the base of the leaf. Leaves are light green in colour. Marginal vein of the leaf is absent.

Corms are round in shape, but generally no corms are produced. Leaves are the edible portion of the plant.

As the leaves are peltate according to the key prepared by Purseglove, *Andi habarala* would be regarded as a species of *Colocasia*. On the other hand, the pattern of venation and epidermal peel characters suggests that it is a species of *Alocasia*. (Ibrahim and Balasubramaniam, 1977).

Lasia

Van Bauren (1971) claimed that there were two distinct varieties of *Lasia spinosa* in Sri Lanka. One has entire hastate or sagittate leaves (*Ath kohila* or *Sinhala kohila*) while the other has a dissected lamina (*Relou kohila* or *Angili kohila*). Trimen (1900) was of the view that there was only one species with variable leaf form. Field observations made during the course of this study revealed that there are two varieties. One has only hastate leaves (*Sinhala kohila*) and the other has heterophyllous leaves, hastate and dissected leaves, arising on the same rhizome.

Angili-kohila or Relou-kohila - *Lasia spinosa* - Figure 5

A stout prickly herb 50 to 60 cm in height, with thick creeping greenish rhizomes found in marshy places, along streams and in fresh water swamps in the tropics. The whole plant is covered with spines and the stem being creeping and ascending interlace so as to form a thick impenetrable mass or clump. Petioles stout, with spines and carry either hastate leaves or those with a dissected lamina. Leaves are hastate, erect with dark green petioles. In the hastate leaves the leaf lamina is triangular, 30 cm long with triangular lobes. The other type of leaf is very much divided and has spines. Marginal vein of the leaf is not prominent.

Rhizome is green, thick and spiny. New plants arise from the rhizome. The raphide content of the rhizome is slightly higher than *Colocasia* and *Xanthosoma*. Freshly cut rhizomes turn brownish on exposure to air. Fibrous strands are easily drawn out from the cut end of rhizomes and these represent the spiral thickening of the vessel elements.

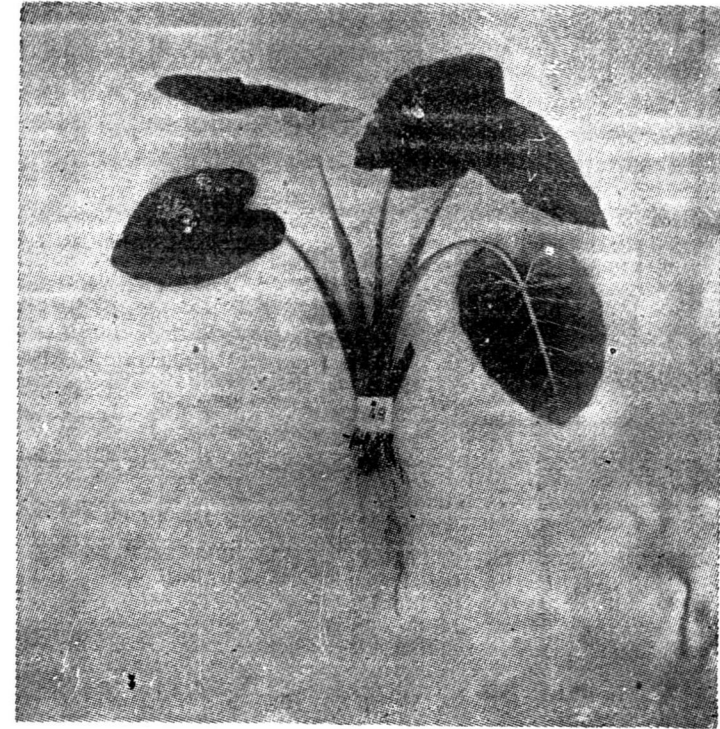


Fig. 4 — *Alocasia* Sp. — Kolakana ala. or Andi habarala.



Fig. 5 — Lasia spinosa — Angili Kohila.

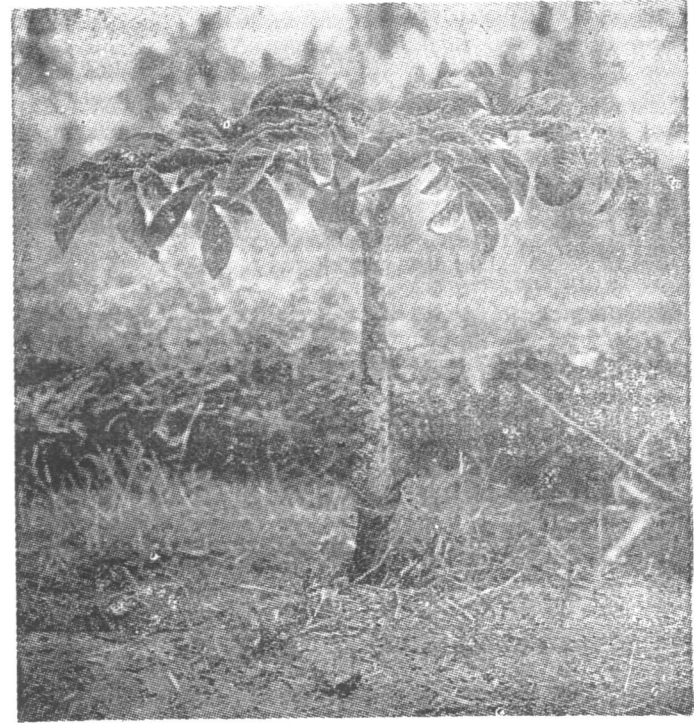


Fig. 6 — *Amorphophallus companulatus* — Kidoran.

Ath-kohila or Sinhala kohila - *Lasia spinosa*

A stout prickly herb, with relatively slender creeping greenish rhizome found in marshy places. The whole plant is covered with spines. Produces only one type of leaf, the hastate leaves. The other vegetative characters are similar to that of Angili-kohila.

Rath-kohila - *Cyrtosperma johnstonii*

During our field surveys this species was collected from Kitulgala, Beligala and Muthugala. This species is not mentioned in Trimen's Flora (1900) or Alston's supplement (1931) or Macmillan (1956). This appears to be the first record of this edible aroid in Sri Lanka. It is popular in Malaysia and Indonesia.

A stout prickly herb, 60 to 75 cm in height. Leaves hastate with deeply triangular basal lobes on purplish pink petioles. The upper surface of the leaf lamina is green and the lower surface is purplish pink.

Unlike *Lasia spinosa*, the prickles or spines are arranged more or less in arcs or rings on the petiole and at the nodes on the rhizome.

Kidaran (*Amorphophallus campanulatus*) - Figure 6

This is a stout herbaceous plant about 1 m in height. It bears a large solitary compound leaf on a long petiole. Leaves are light green in colour and have white mottling. Leaves are compoundly pinnate. Leaf margin is undulating. Veins are netted and all lateral veins are joined by a marginal vein. The petiole is dark green with characteristic grey blotches.

A corm is produced at the base of the plant which bears upto 5-6 cormels. The corm is hemispherical and 20 to 25 cm in diameter. The external colour of the corm is dark brown and has a warty surface. Freshly cut corms are orange-yellow in colour. Short roots and cormels are present on the corm. Feeder roots are about 50 to 60 cm in length. New plants arise from cormels. Evil smelling inflorescence with a spathe of 20 to 25 cm long, with female flowers at the base and male flowers above and an exerted sterile spongy wrinkled purple appendage, 7 to 10 cm long.

DISCUSSION

It is evident from publications on Aroids (Plucknett, 1970; Purseglove, 1970; Van Bauren, 1917) as well as the discussions with the cultivators during the survey that the same species is known by a number of different common names. Table 2 gives the local common names and the generic names of the aroids grown in the areas surveyed. Generally the common names are descriptive and refer to a characteristic feature of the plant.

Ath-kohila or Sinhala kohila - *Lasia spinosa*

A stout prickly herb, with relatively slender creeping greenish rhizome found in marshy places. The whole plant is covered with spines. Produces only one type of leaf, the hastate leaves. The other vegetative characters are similar to that of Angili-kohila.

Rath-kohila - *Cyrtosperma johnstonii*

During our field surveys this species was collected from Kitulgala, Beligala and Muthugala. This species is not mentioned in Trimen's Flora (1900) or Alston's supplement (1931) or Macmillan (1956). This appears to be the first record of this edible aroid in Sri Lanka. It is popular in Malaysia and Indonesia.

A stout prickly herb, 60 to 75 cm in height, Leaves hastate with deeply triangular basal lobes on purplish pink petioles. The upper surface of the leaf lamina is green and the lower surface is purplish pink.

Unlike *Lasia spinosa*, the prickles or spines are arranged more or less in arcs or rings on the petiole and at the nodes on the rhizome.

Kidaran (*Amorphophallus campanulatus*) - Figure 6

This is a stout herbaceous plant about 1 m in height. It bears a large solitary compound leaf on a long petiole. Leaves are light green in colour and have white mottling. Leaves are compoundly pinnate. Leaf margin is undulating. Veins are netted and all lateral veins are joined by a marginal vein. The petiole is dark green with characteristic grey blotches.

A corm is produced at the base of the plant which bears upto 5-6 cormels. The corm is hemispherical and 20 to 25 cm in diameter. The external colour of the corm is dark brown and has a warty surface. Freshly cut corms are orange-yellow in colour. Short roots and cormels are present on the corm. Feeder roots are about 50 to 60 cm in length. New plants arise from cormels. Evil smelling inflorescence with a spathe of 20 to 25 cm long, with female flowers at the base and male flowers above and an exerted sterile spongy wrinkled purple appendage, 7 to 10 cm long.

DISCUSSION

It is evident from publications on Aroids (Plucknett, 1970; Purseglove, 1970; Van Bauren, 1917) as well as the discussions with the cultivators during the survey that the same species is known by a number of different common names. Table 2 gives the local common names and the generic names of the aroids grown in the areas surveyed. Generally the common names are descriptive and refer to a characteristic feature of the plant.

Table 2 Local common names and the botanical names of the aroids

Local Name	Botanical Name
1. Wal habarala	— <i>Alocasia macrorrhiza</i>
2. Ath kohila Relou kohila	— <i>Lasia spinosa</i>
3. Rath kohila	— <i>Cyrtosperma johnstonii</i>
4. Wal kohila	— <i>Syngonium</i> sp.
5. Kiri ala (Green) (Milky latex)	— <i>Xanthosoma sagittifolium</i>
6. Kiri ala (Purple)	— <i>Xanthosoma violaceum</i>
7. Sevel ala	— <i>Colocasia esculenta</i> var. <i>typica</i>
8. Thummas ala (Green)- Desi or Dehi ala Thummas ala (Purple)	} — <i>Colocasia esculenta</i> var. <i>antiquorum</i>
9. Wel ala (not edible)	
10. Andi Habarala, Kola kana ala	— <i>Alocasia</i> sp.
11. Polon Habarala	— <i>Alocasia indica</i>
12. Kidaran	— <i>Amorphophallus campanulatus</i>

In an attempt to overcome the confusion brought about by the use of numerous names, the local varieties were described compared with those recorded outside Sri Lanka, and classified in accordance with the nomenclature used by Plucknett, Purseglove and others working on aroids of Hawaii and Trinidad. Sevel ala and Thummas ala probably belong to *Colocasia esculenta* and the former very likely represent variety *esculenta* or *Typica* and the latter variety *antiquorum*. The corm of sevel ala are more or less cylindrical while those of Thummas ala are globular. The inflorescence of sevel ala had the sterile appendage characteristic of *C. esculenta* var. *esculenta*.

The peltate leaves of Andi habarala suggest that this specimen belongs to the genus *Colocasia*, but the lower epidermis of the leaves lack the papillae characteristic of *C. esculenta*. In fact the leaf epidermis of Andi habarala show features similar to those seen in epidermal peels of *Alocasia macrorrhiza* (Ibrahim and Balasubramaniam, 1977). Further anatomical examination of the vegetative parts and examination of the spadix along with a study of the leaf flavanoids may be necessary to establish the generic identity of Andi habarala.

Lasias are grown in marshy areas and the field survey supports Van Bauren, contention of two distinct cultivars. The cultivar with only hastate leaves is *Lasia spinosa* var. *Ath.-kohila*, the other with dimorphic leaves is *Lasia spinosa* var. *Angili-kohila*. There was no evidence to support Trimen's contention that both forms of leaves may be seen in one clump and that they represent the juvenile and adult forms of leaves of one species.

Studies on roots and tuber crops

Table 3. A field key for the identification of some aroids

A—————	Spines present	
B—————	Pinnately lobed leaves,	
C—————	Pinnately lobed leaves and hastate leaves present on the same rhizome, Spines present on rhizome, lamina, mid ribs and veins.	<i>Lasia spinosa</i> var. <i>Angili-kohila</i> or <i>Relou-kohila</i>
BB—————	Usually entire hastate leaves	
C—————	(Comparatively less spiny) Slender root stock, leaves green.	<i>Lasia spinosa</i> var. <i>Sinhala-kohila</i> or <i>Ath-kohila</i>
CC—————	Under surface of leaves purplish pink, spines more or less arranged in rings or arcs and curved upwards.	<i>Cyrtosperma johnstonii</i> <i>Rath-kohila</i>
AA—————	Spines absent	
B—————	Pinnately lobed leaves	
C—————	Distinct hemispherical corm present, crown of leaves carried on a blotched petiole.	<i>Amorphophallus campanulatus</i> <i>Kidaran</i>
BB—————	Entire leaves	
C—————	Sagittate leaf with prominent marginal vein. Milky latex present. Leaf lamina triangular. Veins and mid ribs on upper surface of lamina has shallow depression	<i>Xanthosoma</i>
D—————	Leaf lamina green with deep sinus. Powdery appearance on leaf surface and petiole. Petiole winged with its margin white	<i>Xanthosoma sagittifolium</i>

- DD----- Leaves dark green. Wings and petiole purple. Under surface of mid-rib and veins darkened with purple colour. Corms purplish brown in colour. *Xanthosoma violaceum*
Dampata-kiri-ala
- DDD----- Leaves light green with overlapping basal lobes. Dark glaucous petiole. *Xanthosoma sp. var.*
Kaha-ala
- DDDD----- Leaf lamina dark green. Petiole bluish tinged, with its margin purple. Base of the stem (mother corm) is usually seen above ground level. *Xanthosoma sp. var.*
Kandala
- CC----- Sagittate leaves without prominent marginal vein. Exudates watery. Leaf margin undulating. Mid rib and veins on the upper surface of lamina is slightly elevated or raised. Leaf axis and petiole in a straight line.
- D----- Lamina dark green. light green winged petiole, Plants reaching over 3 metres height. Base of the stem (mother corm) seen above ground level. *Alocasia macrorrhiza*
Wal-habarala
- DD----- Lamina dark green, Petiole green with purplish grey specks on its surface. Plants usually less than 2 metres in height. *Alocasia indica*
Polon-habarala
- CCC----- Peltate leaves without prominent marginal vein.
- D----- Usually mid ribs and veins not raised, but flush with upper surface of lamina. Leaf margin not undulating *Colocasia*
- E----- Usually cormels present

- F----- Relatively small leaves. Light green leaves, petiole green. Corms small and dome shaped. *Cocolasia esculenta var. antiqorum-Thummas-ala*
(green)
- FF----- Small leaves green in colour. Petiole purplish black, Small globular corms. *Colocasia esculenta var. antiqorum-Thummas-ala*
(purple)
- FFF----- Relatively large green leaves. Basal lobes hastate. Corms cylindrical and large. Usually base of the plant is pinkish. Corms are usually high in mucilagenous substances. *Colocasia esculenta var. esculenta - Sevel-ala*
- EE----- Usually corms absent.
- F----- Light green leaves with undulating margin. On the upper surface of lamina the mid rib and veins are slightly raised. Cormels absent, slender red colour stolens present. Leaves edible. *Alocasia sp.*
Kola-kana-habarala.

Rath-kohila (*Cyrtosperma johnstonii*) reported here is the first record of its existence in Sri Lanka.

Amorphophallus campanulatus (Kidaran) has been traditionally grown in the red soil areas of the Northern province as an intercrop with onions and banana. High yielding varieties with low oxalate content and good keeping qualities have been selected by local farmers but very little agronomic evaluation of these have been carried out. Both leaves and underground tubers are edible. The form grown in Jaffna has a smooth mottled petiole and it is very different from the wild species found in the South West of Sri Lanka. The latter has a dark green petiole with arc like papillae and the tubers are not edible. The botanical identity of the wild form *Wal kidaran* in Sinhala has not been satisfactorily determined and probably is another species.

Taking into account the more distinct morphological variations discussed above, a key was prepared to facilitate the identification of the edible Aroids in the field (Table 3).

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