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National Agricultural Research Institute

## **Galip Nut (*Canarium Indicum*)**



NARI TOKTOK  
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## THE INSTITUTE

**The National Agricultural Research Institute (NARI)** was established by an Act of National Parliament of Papua New Guinea in July 1996 as a publicly funded, statutory research organisation, to conduct applied and development oriented research on food crops, alternative food and cash crops, livestock and resource management issues. Besides applied and adaptive research, NARI is responsible for providing authoritative technical, analytical and diagnostic services and up-to-date information to the entire agriculture sector in PNG. The major targets are the smallholder semi-commercial farmers in the country.

The mission of NARI is to contribute, through applied research and technical services, to the development of the agriculture sector and realization of the national goals by identifying, adapting and transferring agricultural technologies and information, so as to:

- Enhance the productivity, efficiency and sustainability of the smallholder agriculture, and
- Improve farmer income, food security and welfare of Papua New Guineans and the Nation.

The material presented in this toktok is based on the best information available at the time of printing (May 2007)

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depulped (removal of the mesocarp) and planted soon after harvesting. Seed germination is greatly enhanced if they are pre-soaked in fresh water for at least 24 hours. Seeds germinate well when they are placed 10 mm deep in light soils (sand+peat or topsoil).

The loss of germination during even short term storage means that the seeds can be classified as recalcitrant. However, depulped seeds can be stored for periods of up to 6 months in cool, dry places.

Germinated seedlings should be transplanted into large polythene bags or pots of about 33 cm x 22 cm size when a true leaf has emerged.

When collecting seeds for propagation as planting stock, they should be collected from mature, high yielding, pest and disease free trees with desirable nut characteristics such as high yield, high Nut (kernel) to shell ratio (K:S ratio), thin shell, single seed, oil content and sweet tasting kernels, large kernels

### **Pest and Disease**

No serious pest and diseases affect galip production in the tropics. In PNG there are no records of serious pests or diseases but there may be some problems when they are grown on a large scale

At present LAES Keravat is distributing seedlings from its nursery and can supply seeds during the fruiting season from selected trees with good commercial traits.

### Nutritional Value of Kernels

Galip nuts have a high nutritional value and contain high oil, protein, vitamins and minerals content.

The *Canarium* species have a similar composition to the high value nut, macadamia. The average chemical content of galip from ENBP analysed in 2005 are shown in table 3 below.

**Table 3 Chemical Composition of the *Canarium* kernels**  
(Protein \* = Nitrogen x 5.3)

Moisture (g/100 g)	=	4.1
Fat (g/100 g)	=	73.7
Protein * (g/100 g)	=	12.2
Ash (g/100 g)	=	3.4
Carbohydrates (g/100 g)	=	6.6
Energy (kJ/100 g)	=	3046.4
Sodium (mg/kg)	=	62.3

### Cultivation

Currently, Galip nut is mainly propagated by seed only. Seeds take 4 -7 weeks to germinate, although germination can take 5-120 days (1-17 weeks) depending on age, and environmental conditions. Best germination rates are achieved when seeds are

## Galip Nut

**Scientific name:** *Canarium indium*

**Other names:** Galip Nut (Pidgin), Lawele (New Britain), Hinvei (New Ireland), Ngali (Solomon Islands) and Nangai in Vanuatu.

### Introduction

The Pacific island countries of Papua New Guinea (PNG) and the Solomon Islands (SI) are well endowed with indigenous food species with commercial potential, especially nut species (e.g. ‘Galip’ or ‘Ngali’ nut, (*Canarium indium*); ‘Karuka’ (*Pandanus julianattii*), ‘Okari nut’ (*Terminalia kaernbachii*), ‘Pau’ or ‘Cutnut’ (*Barringtonia procera* and *B. edulis*) and ‘Aila’ (*Inocarpus fagifer*); ‘Finschia nut’ (*Finschia waterhousiana* Burt).

**Figure 1. Some command indigenous nuts of PNG**



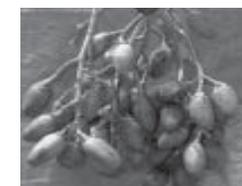
**Aila** (*Inocarpus fagifer*)



**Pau** (*Barringtonia procera*)



**Okari** (*Terminalia kaernbachii*)



**Galip** (*Canarium indicum*)

*C. indicum* has been cultivated in Melanesia for thousands of years, and have been important in the diet of people in the region and in PNG for about 6000 years.

*Canarium indium* belongs to the family Burseraceae, which has 16 genera. The genus *Canarium* contains approximately 100 species, of which 75 species are found mainly in Tropical Asia and the Pacific, including 21 species in Papua New Guinea.

Galip is a tall tree with a straight bole, which can grow up to 40m in height and 1-1.5m in diameter. It has large leaves up to 30cm long that form a dense canopy, spreading to 30m in diameter.

The Galip nuts have a 3-celled ovary but usually only one seed develops as a full-sized kernel. The bark is light to dark gray, peeling in irregular scales; mid bark being red brown with green mottling; inner bark being light red-brown, exuding clear strong smelling resins. The galip tree produces large conspicuous serrate stipules up to 60mm long and 40mm wide. These stipules are an important field characteristic for the identification of *Canarium* species.

Galip trees are dioecious but some have been found be polygamous male or female flowers sometimes occurring with hermaphrodite flowers. They are terminal or axially in panicles and have 3 yellow-green hairy sepals with 3 white hairy petals and 6 stamens. The fruits are blackish purple or dark brown when ripe with length up to 60mm and width up to 30mm.

under the tree is kept clean so that falling fruits can be easily and regularly collected. Harvesting from the tree can be difficult and some times dangerous. It requires climbing the tree with long hooked sticks and breaking off the fruiting branchlets. This method is found to be beneficial as it encourages renewed growth and flowering. Other methods of harvesting fruits from the trees include the throwing sticks and stones and by cutting branches down a very common practice in provinces like Manus and West New Britain.

### **Yields**

Records of the yields of *C. indicum* planted at Lowlands Agricultural Experiment Station, Keravat indicate that young trees produce 800 – 1200 fruits per tree per year. In the Solomon Islands, actual yields of nut-in-shell were found to vary from 80 – 320 kg per tree, with an average on a healthy tree of at least 100 kg nut-in-shell (15 kg kernel-in-testa) per year.

### **Varieties**

There are no named varieties at present in the world and in PNG there are no recommended varieties. All the bearing trees at LAES Keravat have been established from seeds. However with the work on characterization and selection of trees from wild population currently been done recommendations trees of with superior commercial traits will be made in the near future.

## Fruiting and Harvesting

### Flowering

Flowering has been reported to commence after 5-7 years after planting and may take longer in areas with high rainfall. The seasonality of flowering in *C. indicum* seems to be poorly understood, although that of fruiting is well defined. Flowering of *C. indicum* in PNG occurs in October to December, while the start of flowering in the Solomon Islands is in January to February.

Effective pollination requires that both male and female trees are grown together.

### Fruiting

The *C. indicum* fruiting season is typically spread over 3 months. The fruit takes 5-8 months to reach maturity and is indicated by the skin turning from green to dark purple in colour. Kernel filling occurs late in the maturing process and fruit harvested prematurely will not have fully developed kernels. Fruits usually fall to the ground 2 – 3 months after maturity.

### Harvesting

It has been reported that the harvesting of Galip nut is a tradition of great social importance. Rights to harvest individual trees are traded within and amongst clans. Fruits can either be picked up from the ground or harvested direct from the trees. Nut picking can last for 2 - 4 months, thus, it is recommended that the area

Figures 2: Picture showing stipules in three different *Canarium* species



*C. Indicum*

*C. ovatum*

*C. harveyi*

Galip trees are dioecious but some have been found to be polygamous male or female flowers sometimes occurring with hermaphrodite flowers. They are terminal or axially in panicles and have 3 yellow-green hairy sepals with 3 white hairy petals and 6 stamens. The fruits are blackish purple or dark brown when ripe with length up to 60mm and width up to 30mm.



Typical flower of galip



Terminal or axially panicles

### Origin and Distribution

About 100 *Canarium* species have been described. They are found from Africa in the west to Samoa in the South Pacific in the east. A number of species are

widely distributed in South-East Asia, Australia and the South Pacific, Indonesia, Philippines, Malaysia, Solomon Islands, Vanuatu, Western Samoa, Tahiti, Tonga, Cook Islands, and Fiji.

The edible species *C. indicum* has been reported in Papua New Guinea, the Solomon Islands, Vanuatu, Celebes and Moluccas only.

### **Galip species in Papua New Guinea**

Twenty-one species of *Canarium* have been identified in the New Guinea islands (Table 2) and the Bismarck Archipelago. Galip nut does not occur throughout PNG, it is only grown and used in East and West New Britain, Bougainville, New Ireland, Manus, Morobe, Madang, East & West Sepik, and Milne Bay provinces. *C. indicum* is widespread in the lowland forests these provinces.

Throughout the Pacific, the species has common names in different local languages, thus for example *C. indicum* is called Galip Nut (Pidgin), Lawele (New Britain), Hinvei (New Ireland), Ngali (Solomon Islands) and Nangai in Vanuatu.

It has been estimated that the wild galip population in PNG, SI and Vanuatu is at about 8 million hectares. The wild resource has been estimated as being 6 million ha in PNG at a density of 0.2 trees per ha. In the Solomon Islands it is 1.8 million ha with 0.5 trees per ha and in Vanuatu it has been estimated as 300,000ha of forest with one tree per hectare.

## **Environmental requirements**

### ***Altitude***

*Canarium species* are tropical plants, which typically grow in the lowlands, but can be planted up to 600m or more. In Papua New Guinea, Solomon Islands and Vanuatu, *C. indicum* and *C. harveyi* are trees of the lowland rainforest.

### ***Rainfall***

Galip nut trees are typically adapted to high rainfall areas covered with tropical rainforest, with rainfall well distributed throughout the year. The optimum rainfall for good growth and fruit production is around 2000 – 3000mm with short distinct dry periods to induce flowering and fruit set. Trees have been reported in areas with precipitation up to 6000mm/yr.

### ***Soil***

*Canarium indicum* naturally grow well on a wide range of soil types, preferably with well drained, deep, friable, sandy loam soil with good organic matter content and a pH of 4.5 - 6.5. Trees will tolerate alkalinity up to pH 7.4. However, they can be found in poorly drained sites in forest situations and growing on the beach near the sea.