HORTICULTURE NOTE: NO.20

AIBIKA

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ABSTRACT

Aibika (Abelmoschus manihot) is an important leafy vegetable common in the lowlands of Papua New Guinea (PNG). Its botany, cultivation and management under lowland conditions is discussed.

Common Name: Aibika, Bele, Pele
Botanical Name: *Abelmoschus manihot*

WHAT THE PLANT LOOKS LIKE

The aibika plant is a shrub that grows from 2 to 6 metres tall. The stems are soft, entire or hollow and may be smooth or have small soft hairs. Stem color varies with varieties but is usually brown, light or dark green and many have purple or red spots.

Leaf shape vary from pinnate to cordate (heart shape) and mature leaf lobing ranges from none to deeply lobed. Leaves of many varieties have a shiny leaf appearance.

The flowers are usually big, like that of *Hibiscus* with sulfur yellow petals and a purple base. The fruits are of conical shape and when dry they tend to shatter small hairy seeds about 3 mm in diameter.

WHERE IT GROWS

Aibika is thought to be a native of China and was introduced into the Pacific a long time ago. More varieties can be found in Papua New Guinea (PNG) than elsewhere. PNG is, therefore, considered to be an important centre of diversity for this crop.

In PNG the crop is more common in the lowlands than in the highlands, but it can be grown at higher altitudes (<2000 masl) as well.

SOILS AND FERTILIZERS

Aibika can grow in a wide range of soils but sandy loam and clay loam soils are best. The soils should have sufficient organic matter with a pH between 5 and 7. Usually sufficient amounts of the major elements are needed but limiting effects of trace elements are yet to be established. Both organic and inorganic fertilizers can be used. In fertile or volcanic ash soils, fertilizer response may be delayed.

The following fertilizer rates should generally give satisfactory production:

Before Planting:

(a) 400 g per plant (large tinned fish tin) of chicken manure (droppings) applied into the soil. This is equivalent to an application of 4 tons of manure per hectare; or

(b) 50g per plant of NPK (12:12:17) applied into the soil. At this rate 500Kg per hectare of fertilizer will be applied.

After Planting:

(a) A topdressing with 400g Chicken Manure per plant at two to three weeks after planting; or

(b) 25g Urea (46%N) applied as top dressing around the base of the plant at two to three weeks after planting. This amounts to 115 kgN/ha.

Repeat application every two months if crop continues to produce marketable leaves.

VARIETIES

Twelve promising varieties have been selected from Laloki (See Table 1), five from Bubia and six from Keravat. Variety numbers are: L6, L9, L11, L16, L19, L24, L30, L35, L39, L41, L45, and L82; BAM4, BAM5, BAM9, BAM11 and BAM17; and K22, K38, K50, K51, K69 and K80.

Sufficient planting materials are maintained to meet requests for distribution to farmers.

HOW IT IS GROWN

Aibika is grown from mature stem cuttings. Planting can be either on flat ground, raised beds or ridges. Fresh cuttings are planted using a digging stick by making a hole and placing a single cutting vertically or slightly at an angle into the ground.

Under normal circumstances, rooting of cuttings may not be necessary before planting.

PLANT SPACING

A spacing of 1 metre between plants and 1 metre between rows is sufficient. This spacing gives a total of 10,000 plants/ha.

IRRIGATION

In areas where there is a distinct dry season supplementary water is required for off-season production. This is done by using different types of irrigation systems - spray, flood and trickle or drip irrigation. Spray irrigation is the most common system used in PNG because it can be used in a wide range of soils, and is easy to install and operate. Irrigation systems for smallscale farmers are discussed in detail in *Harvest volume 10 (2)*.

At Laloki Research Station, two hours of spray irrigation is usually administered before and after planting, and at weekly intervals during the growing season until the crop ceases to produce edible or marketable tips. With standard size sprinklers a two hour irrigation should give about 50 mm of water.

WEEDING

Usually four hand weedings are required at 2, 4, 6, and 8 weeks after planting before the first harvest. Once the canopy forms, weeding need only be done when necessary. However, mulch can be applied soon after planting to suppress weed establishment and retain soil moisture.

PESTS AND DISEASES

Major Pests

Several insects feed on aibika, attacking leaves, tips and stems of the plant. The degree of damage ranges from light to severe depending on factors such as variety, site, seasonal conditions, area of planting and the type of insect present. Aibika leaf roller (*Sylepta derogata*) is a serious pest all year round. During the dry season the aibika jassids (*Amrasca sp.*) and the red spider mite, (*Tetranichus sp.*) are able to cause serious damage also. Other occasional pests are: the aibika flea beetle (*Nisotra sp.*) which causes "shot-hole" damage on leaves, aibika tip borer (*Earias vitella*), aibika semi-looper (*Anomis flava*) and the tip wilt bug (*Amblypelta lutescens papuensis*) which feed on the soft stem and leaf stalk.

Chemical Control

Chemical control is often not necessary as natural enemies keep check on the aibika pest population and reduce levels of damage. However, where severe outbreaks occur control can be achieved by using the insecticides specified in Table 2 and others listed by Thistleton (1987). A waiting period is required before harvesting.

Collar Rot

Aibika suffers from a serious disease commonly

Table 1: **Characteristics of promising Aibika Varieties from Laloki**

VARIETY	LEAF SHAPE	LEAF MARGIN	LEAF VEIN COLOUR	PETIOLE LENGTH	STEM COLOUR	TIME TO HARVEST (Months)	% CRUDE PROTEIN (Wet wt.)	YIELD (t/ha)	INSECT DAMAGE	DISEASE (Collar & Root Rot)
LA30	Pinnatisect	Entire	Red	Intermediate	Red	3	3.23	9.82	Mild	Tolerant
LA45	Hastate	Entire	Red/Green	Long	Red	3	3.52	9.61	Moderate	Susceptible
LA39	Pinnatisect	Sinuate	Green	Long	Green	3	3.30	8.88	Mild	Tolerant
LA41	Deltoid	Entire	Green	Short	Purple Spots	3	3.05	8.44	Moderate	Tolerant
LA82	Pedate-digitate	Entire	Purple	Long	Purple	3	3.18	8.11	Mild	Tolerant
LA11	Hastate	Entire	Red	Intermediate	Red	3	3.77	8.05	Mild	Susceptible
LA6	Palmate	Crenate	Green	Intermediate	Purple Spots	3	4.05	8.00	Heavy	Tolerant
LA35	Palmate	Entire	Red	Long	Purple	3	3.63	7.55	Moderate	Susceptible
LA16	Pinnatisect	Entire	Green	Long	Red	3	3.70	7.42	Mild	Tolerant
LA24	Linear	Entire	Red	Short	Red	3	2.83	6.45	Mild	Tolerant
LA9	Pedate-digitate	Sinuate	Green	Intermediate	Green	3	3.81	5.50	Mild	Tolerant
LA19	Pinnatisect	Entire	Green	Intermediate	Purple Spots	3	3.40	5.39	Mild	Tolerant

Table 2: **Description and chemical Control of Common Pests of Aibika**

COMMON NAME OF INSECT	DESCRIPTION OF INSECT	SYMPTOM OR DAMAGE CAUSED	CHEMICAL CONTROL	WAITING PERIOD
1. Leaf Roller	Green larvae	Rolling of Leaves	13g Acephate (Orthene 75WP) to 10 litres of water or 13g Carbaryl (Septene 80) to 10 litres of water	3 days 3 days
2. Jassids	Small Leaf Hoppers	Decoloring of Leaves	13g Acephate (Orthene 75WP) to 10 litres of water or 13g Carbaryl (Septene 80) to 10 litres of water	3 days 3 days
3. Red Spider Mite *	Small Red Spiders	Decoloring of Leaves	30g Sulfur Spray to to 10 litres of water	14 days
4. Flea Beetle *	Small Beetles	Small holes (shot holes)	13g Acephate (Orthene 75WP) to 10 litres of water or 13g Carbaryl (Septene 80) to 10 litres of water	3 days 3 days
5. Tip Borer *	Burrowing Larvae	Bores through stem and tips	Dimethoate (Rogor) Use 5 mls to 10 litres of water	7 days
6. Semi-Looper Caterpillar *	Caterpillar	Feed on Leaves	13g Acephate (Orthene 75WP) to 10 litres of water or 13g Carbaryl (Septene 80) to 10 litres of water	3 days 3 days
7. Tip-Wilt Bug *	Brownish Sap Sucking Bug	Stunting of Tips	13g Acephate (Orthene 75WP) to 10 litres of water or 13g Carbaryl (Septene 80) to 10 litres of water	3 days 3 days

* Occasional Pests *

known as collar rot. The disease is caused by a fungus, *Phytophthora nicotiana var nicotiana*. Initial symptoms of collar rot are yellowing of mature leaves, wilting of growing tips and young leaves followed by defoliation (leaves dropping off). Rotting starts from the collar region immediately above the ground and progresses into the root system. Affected plants eventually die. The following are some methods of control according to Muthappa (1985) (Plant Pathology Note No. 27).

Cultural Control:

(a) Avoid growing aibika on the same piece of land previously infected with collar rot.

(b) Be careful not to damage the stems close to the ground during weeding because the fungus can easily infect the plant through the wound.

Chemical Control:

(a) Use 5 grams of Ridomil 5G granules (1 teaspoonfull), apply by removing the soil around the base to a depth of about 3 cm, sprinkle the granules, then cover the fungicide with soil. This should be done soon after early symptoms of the disease are observed.

(b) Cuttings can be treated with two types of copper fungicides; - Bordeaux paste (copper sulphate and hydrated lime) and Cuprox (copper oxychloride).

To make Bordeaux paste mix:

1 kg copper sulphate
2 kg hydrated lime, and 15 litres of water

Dissolve the copper sulphate and hydrated lime in an equal quantity of water (from 15 litres), then pour in the remaining quantity of water and stir well.

To make Cuprox paste mix:

1 kg cuprox and 5 litres of water
Add water to cuprox and stir well.

Dip lower half of the cuttings in one of the fungicidal paste, allow to dry overnight or keep in shade before planting. One litre of Bordeaux paste or Cuprox paste can be used to treat 100 cuttings of aibika.

Aibika Viruses

Aibika mosaic virus is common in aibika but reports show that it does not reduce yield of the crop. Mottling symptoms appear on young leaves but do not affect yield.

Recent work by Dr. A. Brunt of the Horticulture Research International, UK showed that all the Fijian aibika plants were infected with *Hibiscus chlorotic ringspot virus* and some also with other viruses (per. comm.). Observations on seedlings grown from seeds of the Fijian varieties were all virus free. It is doubtful, therefore, if any of the aibika viruses are seedborne. The effect of these viruses are yet to be determined but it is likely that virus-infection may reduce aibika yield.

TIME TO HARVEST

Aibika takes up to $3^{1/2}$ months from planting to the first harvest. Subsequent harvests than follow as long as the crop can produce edible or marketable leaves/tips. On well managed plots some varieties have produced marketable leaves for up to six months after the first harvest.

HARVESTING AND MARKETING

Harvesting is done either by breaking the tips (about 5 cm from the growing tip) or by plucking mature leaves including the petioles. The first three harvests should be done using the plucking method as this allows the growing tip to gain height before breaking it off to regenerate primary shoots.

At harvest, leaves or tips should be tied into marketable size bundles. Listed below are some useful suggestions for harvesting and handling aibika for the market:

(1) Harvest early in the morning to avoid direct exposure to sunlight and subsequent wilting.

(2) Construct a temporary shed or shelter to sort and bundle aibika.

(3) Use empty stock feed bags or an open plastic bag fitted into a bilum to carry aibika.

(4) On an open back utility ensure that the floor is covered with banana leaves, load the aibika and then

cover with the same material.

(5) An empty bottle or plastic container is handy to sprinkle water on leaves and tips to keep them looking fresh at the market.

(6) If you have planted large areas of aibika, do not harvest it all at once unless you have access to wholesale or retail outlets.

An estimated 7 tons of aibika is needed every week to supply the consumers in the National Capital District. Up to date information on supply of aibika in major centers can be obtained from Fresh Produce Development Company, P O Box 1290, Mt. Hagen. Tel: 52 2442.

STORAGE

Under standard refrigeration units, aibika can be stored for up to one week. In a household fridge aibika should be stored in plastic bags in the vegetable compartment, usually the lower part of the fridge. If tips are washed make sure to drain off excess water before storage as water tends to promote necrosis in tender tips and bruised leaves.

Good storage in cool rooms can be achieved by packing aibika tips in open boxes. Tips packed in bags go bad very quickly.

YIELDS

Aibika yields are variable but most recommended varieties under good management should produce 8 - 10 tons of marketable tips per hectare. On an average, tips could be harvested four times before the next planting. At a retail price of K1.50/kg, this should give a gross return of K1.20 - K1.50 per square meter.

HOW IT IS USED

Aibika is a protective food rich in vitamins and minerals. Crude protein content on a wet weight basis for the recommended varieties from Laloki range between 2.83 (L24) and 4.05 (L6) percent. Tips and leaves are used in many Pacific Island dishes including *Mumu* or *Umu* (Tonga) and *Aigir*. Tips are also cooked with other vegetables in coconut cream.

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