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Research Article

## Development of *salak bali* as an organic fruit

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### Abstract

*Salak* (*Salacca zalacca*) is a species of palm tree (family Arecaceae) native to Indonesia and Malaysia. The fruit grow in clusters at the base of the palm, and are also known as snake fruit due to the reddish-brown scaly skin. *Salak Bali* (*Salacca edulis*) has long been favoured because this variety is moist and crunchy. It has a relatively high economic value, eaten as fresh fruit as well as utilized as an industrial raw material for the food industry. There are around 18 varieties of *Salak* being developed at the commercial level in Indonesia.

Bali is an important tourist destination in Indonesia and tourists are often introduced to *Salak* for the first time. This has led to an increasing demand for *Salak* as an organic fruit. In Bali, *Salak* has been produced traditionally since the 1500's. Cultivation is in accordance with standard practices, little changed over time. According to a phenophysiology study in 2007 validating farmer practices in cultivating *Salak Bali*, it was found that farmers are still maintain traditional cultivation practices and thus the fruit can qualify as an organic product. Traditional irrigation practices are still generally used, relying on rain availability, although some growers are now using more modern irrigation technology. Fertilization is conducted by using manure and put mulch from refuse onto the soil, while plant protection is conducted by mechanical techniques. However, the Indonesian National Standards (SNI) have still to grant *Salak Bali* full organic certification. Through Indonesia's Go Organic Program 2010, the Agriculture

Department proposed to provide financial support and technical assistance for *Salak* farmers in Bali to produce *Salak Bali* in accordance with recommended SNI practices for Organic Food. Once this recognition is forthcoming, it is expected that *Salak Bali* will enjoy a wider market and can be expected to become one of Indonesia's excellent product of certified organic fruit.

This paper details the steps involved in cultivating *Salak Bali* to assist the fruit in attaining full organic status.

**Keywords:** *Salacca edulis*, certification, Indonesia

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## Introduction

Indonesian tropical fruit have an unfulfilled opportunity to contribute to the global food market. *Salak Bali* (*Salacca edulis*, or sometimes classified by taxonomists as *Salacca zalacca* var. *amboinensis*) [1], offers good potential for export, particularly if it is classified as organic. Currently, there is a noticeable change of consumer pattern to organic product is through higher organic horticultural product demand, including demand for fruit. Due to its popularity locally, investors are now establishing large estates to grow *Salak Bali*. Much research was undertaken around the turn of the century aimed at improving *Salak Bali* using modern technology [2, 3, 4, 5]. However, such wealthy investors see traditional growing methods as a hindrance to improving production. However, because these traditional practices lend themselves towards organic agriculture, they may be preserved if certification is forthcoming and markets are established.



**Figure 1.** *Salak Bali*.

Orchard management is traditionally done by simple methods. Fertilization, plant protection and irrigation have not been intensified as yet. For example, the method to enhance soil fertility is conducted by using manure and putting refuse into the soil, without the application of any inorganic fertilizer. Harwood [6], revealed that there are three concepts to develop sustainable agriculture, i.e. (i) agricultural production has to be increased but efficient in exploiting of resources, (ii) biological process has to be controlled by agricultural system itself, (iii) nutrient cycles in agricultural system has to be improved and more closed.



**Figure 2. An Example of Commercial Application of *Salak* in the Food Industry.**

Currently the market potential for organic agricultural products in Indonesia is considerably very small, limited only to the middle to high class communities and to tourists. There are some other constraints to develop organic products, e.g. (a) there is no fair price incentive to organic agricultural product producer, (b) need a high investment for initial development due to sanitary selection of land, and (c) there is no market assurance, therefore the farmer is uninterested to develop organic product.

### **Cultivation Techniques on Bali**

*Salak Bali* naturally flowers throughout the year, at least 4 times regularly. The peak harvest is in December to February, the first intermediate season is in March to May, “gadu” harvest season is in June to August and the second intermediate harvest season is in September to November. Peak season and “gadu” are regarded as on-season periods, whereas first intermediate and second intermediate harvest season are off-season periods. The *Salak* palm is intolerant to full sunshine. About 50 – 70% of full sunshine is required, therefore the plant needs to be sheltered by shady plant. *Salak Bali* orchards generally use coconut, durian, *Leucaena glauca* and *Eythrina* sp. for shading plants. It is thus suitable in some circumstances for intercropping with other agricultural produce. *Salak Bali* is cultivated under an average rainfall of about 200 – 400 mm/month.

According to a phenophysiology study on *Salak Bali*, it has been found that the flowering ability of the palm is similar during the entire season, but during the second intermediate

season flower drop occurred at a much higher rate, about 88.96% [7]. The study also found the high rate of flower drop during the off-season is caused by inadequate irrigation input. Low irrigation input influenced the nutrient absorption ability of N, P, and K, shown by the low evidence of N, P, and K on plant tissue during the off-season period.

The following outlines the standard procedures used for the cultivation of *Salak Bali* [8].

### ***Seedling preparation***

Aimed to produce best quality and highly homogeneous fruit and to ensure the seedling is free of pathogens. Seedlings sourced from seed that were obtained from guaranteed mother plant. Seedlings that were used were aged 6 – 8 months and bore 4 – 5 leaves.

### ***Trimming of shoot and midrib***

It is done by removing the shoot that grew on the plant and undesired midrib, such as unproductive, wilt, dead and damaged by pathogen. It is aimed to maintain amount of plant, to stimulate the blooming, orchard sanitation, to manage air circulation and to optimized sunshine intensity. Old and unutilized leaf, damaged leaf and exceeded leaf has to be trimmed. Too many numbers of shoots have to be removed, especially close to fruit set. By trimming, salak orchard will not be too leafy and air circulation was preserved. Trimming was also helping good distribution of nutrition, not only for vegetative portion, but also for generative portion. Trimming is done twice a month, but close to blossoming or fruiting, it could be done once a month. Leave only one or two plants in one cluster. If in one cluster consist of several plants, productivity was upset. Leaf trimming was done until base of midrib, not only cut partially due to leaf was undesirable and unusable by plant. After harvest, trimming was also important to preserve plant growth optimally.

### ***Weeding***

Removed and cleaned the weed or undesired plant that grew in the orchard. First weed control was done when plant aged 2 months after transplanting and 3 times a month for a further 2 months. After that, weeding was done every 6 months, in early and by the end of rainy season. During weeding, soil was also loosened. It was aimed to cover and to make dense the stem and root of *Salak* plant in the soil.

### ***Fertilizing***

It was done by putting organic fertilizer into the soil, such as cow dung. The objective was to maintain nutrient condition in the soil, provide balanced nutrients for plant growth and development, improve fruit quality and enhance plant productivity. Fertilizing of *Salak Bali* is by using manure and putting refuse into the soil.

### ***Irrigation***

Aimed to provide water in root area according to accurate time, technique and amount of water, therefore nutrient absorption could be run well. *Salak Bali* utilized rainwater dominantly.

### ***Plant Protection***

Aimed to decrease intensity and expansion of pests and disease under control limit. Pest and disease control to avoid economical loss specifically yield loss and quality reduction. Significant insects and diseases concerned to *Salak Bali* were caterpillar (larvae) of *Lepidiota stigma* that destroy the root and *Lepidiota stigma* itself attacks the shoot of the plant, *Silphidae* and *Pseudococcus* sp. Whereas disease types are leaf spot disease (*Pestalotia* sp.), flower spot disease (*Fusarium* sp. and *Marasmius* sp.), fruit rot disease (*Certocystis paradoxa*, *Fusarium* sp. and *Aspergillus* sp.) and plant malformation. Pest control was done by mechanical technique. Larvae attractant such as *Colocasia esculenta* and cassava was utilized to control larvae, whereas imago attractant lamp was used to control imago.

### ***Fruit thinning***

It reduced the amount of on each bunch, intended to produce optimum quantity and quality fruit in line with target. Normally, farmers ignore fruit thinning, leaving whole fruit on bunches without fruit thinning. The consequence of this is that abundant small fruit was formed in a bunch. Fruit thinning was done 2 – 3 month after full bloom. It will get 12 – 14 fruit per kg by maintaining about 20 fruit per bunch.

### ***Harvest***

It is intended to obtain fruit with a specified quality standard. *Salak Bali* was harvested when hairs on the skin surface disappear and skin colour changed blackish brown, maximum fruit size and fruit position on bunch was loose, seed colour was black or blackish brown, with a good taste and fine aroma.



**Figure 3. Freshly Harvested *Salak Bali* in Traditional Basket.**

### ***Postharvest and processing***

Postharvest treatments including cleaning, sorting, grading, labeling and packing according to size and specified quality standard. During peak season, fruit was processed as “salak cracker”, “dodol”, “salak wine” and sweetened to overcome copious yield.

### **Conclusion**

Agronomical activities mentioned above support excellent *Salak Bali* fruit as an organic product. Current evidence of activities to support organic farming of *Salak Bali* are using fertilizer without chemicals, irrigation generally depending on rain availability and mechanical pest and disease controls. This consistency has caught the attention of provincial and central government through the Agriculture Ministry who propose to give financial support and technical assistance for *Salak Bali* farmers as a pilot project development of *Salak Bali* as a certified organic fruit, through Go Organic 2010.

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