# PRODUCTION OF SALAK *(Salacca zalacca)* INTEGRATED WITH OIL PALM

NORKASPI KHASIM and RAJA ZULKIFLI RAJA OMAR

750

MPOB INFORMATION SERIES • ISSN 1511-7871 • JULY 2017 MPOB TT No. 611

## INTRODUCTION

Salak (*Salacca zalacca*) is a palm native to Indonesia and Malaysia. The fruits are known as snake fruit due to the reddish-brown scaly skin, growing in clusters at the base of the palm. The palm is cultivated in the wet regions of Malaysia and commonly planted under trees as it is tolerant to limited light intensity. Therefore, this crop was studied for integration with oil palm using the double avenue oil palm planting system (*Figure 1*). The palm grows well under the oil palm environment and produces fruits comparable to mono-crop salak planting.

The fruits are sweet with a nice aroma. There is a high demand from the small and medium industry for pickle production. In Malaysia, the production of salak is inadequate and most of the fruits are imported from Indonesia or Thailand. Due to shortage of local supply, the importation of salak fruits is expected to increase, hence increasing the price of salak in the market. Salak integration with oil palm optimises land use as well as generates additional income for the oil palm growers.

## OIL PALM PLANTING

For the integration of salak in the oil palm area, the salak should be planted in the double avenue oil palm planting system. The layout and planting distance for both oil palm and salak are shown in *Figure 2*. With this system, the oil palm planting density is 136 palms per hectare. The planting rows should be in the east-west direction to maximise sunlight penetration. The selected oil palm area should not be water-logged.

## SALAK PLANTING

The 15.2 m avenue space between the two rows of oil palm should be cleared from shrubs and weeds. The soil is then ploughed twice using a disc plough and rotor tiller to a depth of 20 to 30 cm. Repeated ploughing should be conducted after 7 to 10 days to control weeds. After the lining of planting points is completed, planting hole must be dug to transplant the salak seedlings. The recommended planting system is 3 m x 3 m in a square configuration with the planting density of 280 palms $ha^{-1}$. Only two rows of salak palms should be planted in the 15.2 m avenue space (*Figure 2*).

Seven months old salak seedlings are recommended for field planting. The salak seedlings should be raised in 20 cm x 12 cm sized polybags. Only good seedlings, free from pest and disease should be planted in the field (*Figure 3*). Field planting is

*Figure 1. Salak palm planted in the double avenue oil palm planting system.*

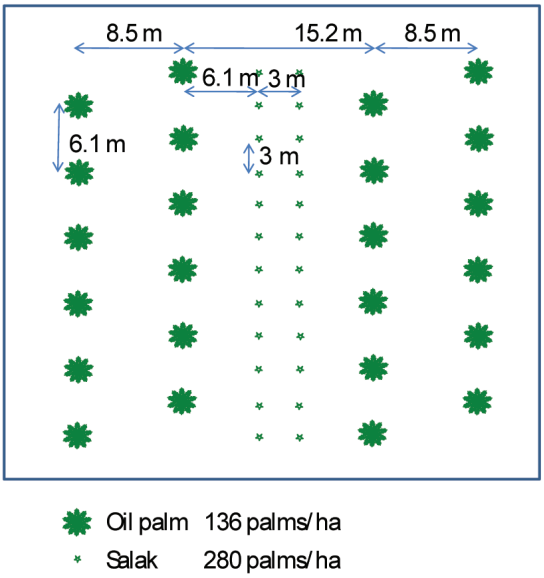


*Figure 2. Planting layout for salak integration with oil palm.*

ISSN 1511-7871
9 771511 787001

Head of Corporate Implementation and Consultancy Unit, Malaysian Palm Oil Board. 6, Persiaran Institusi, Bandar Baru Bangi, 43000 Kajang, Selangor, Malaysia.
Tel: 03-8769 4574 Fax: 03-8926 1337 E-mail: tot@mpob.gov.my Website: www.mpob.gov.my

MPOB

*Figure 3. Good salak seedlings aged 7 months raised in the nursery.*

*Figure 4. Clean circle area of salak palm.*

*Figure 5. Pruning unwanted suckers and fronds of salak palm.*

recommended after the rainy season. The male to female palms ratio should be 1:4 (56 males with 224 female salak palms). The male salak palms should be evenly dispersed among the female palms or as guard rows around them.

## FERTILISER APPLICATION

The recommended fertiliser programme for salak integration in oil palm area is shown in *Table 1*.

**TABLE 1. FERTILISER APPLICATION FOR SALAK INTEGRATION**

| Age (yr) | Fertiliser type | Application rate (g palm$^{-1}$) | Frequency |
|---|---|---|---|
| At planting | Rock Phosphate | 200 | 1 |
| 1 | Compound 15:15:15 | 75 | 6 |
| 2 | Compound 15:15:15 | 150 | 4 |
| 3 | Compound 12:12:17:2 | 250 | 4 |
| 4 onward | Compound 12:12:17:2 | 1 000 | 3 |

## WEEDING

Manual weeding is highly recommended in salak integration area. Circle weeding is carried out using hand-hoe at the circle of salak palm's canopy (*Figure 4*). Weeds in between the salak palms rows are controlled using a bush cutter at 45 to 60 days intervals, or equivalent to 6 to 8 rounds per year. Herbicides should be used to control weeds in the mature salak areas.

## PRUNING OF SALAK PALMS

Suckers are usually removed in order to maintain good growth and fruit production of the salak. This practice will also ease other maintenance work such as weeding, pest control and harvesting. Pruning activity is carried out three rounds a year using a special cutter hook (*Figure 5*). The pruned suckers and other plant parts are stacked in the oil palm frond piles.

## POLLINATION

Salak is a dioecious plant, therefore pollination is relatively crucial. Pollination of salak is normally by wind and insects. There are several insect pollinators available naturally. The recommended weevil pollinator species is *Nodocnemis* sp (*Figure 6*). Assisted hand pollination can be practiced by tapping the anthesising male spikelets onto the female inflorescences.

*Figure 6. Salak pollinating weevil,* Nodocnemis *sp (left) and hand pollination (right).*

## PEST CONTROL

Rodents such as rats, squirrels and civets are common pests for salak. These pests attack both unripe and ripe fruits. Attack on unripe bunches frequently causes the fruits to be aborted (*Figure 7*). These pests can be controlled by combination of trapping and baiting with rodenticides such as warfarin or brodifacoum.

*Figure 7. Fruits attacked by rodents (left) and trap to capture rodent pests (right).*

## HARVESTING

Salak palm starts fruiting at 2-3 years after planting. The palm produces fruits all year round (*Figure 8*). The productive life span is between 20-30 years or more. The fruits ripen between five to seven months after pollination. Normally, the peak harvest is between September to November each year. The mature bunch has fruits with shiny light brown colour with a sweet smell. Ripened bunches can be harvested by cutting or chopping the bunch with a cutter hook.

*Figure 8. Salak palm bearing fruits (left) and the appearance of salak fruits (right).*

## TECHNICAL VIABILITY

Integration of salak with oil palm in the double avenue oil palm planting system is technically viable. The salak palm grows well and tolerates to the shade of oil palm. It is also free from serious disease infestation. Rodents are the major pest for salak. Study showed that the pondoh salak variety of salak can produce fruits up to an average of 1.50 $ha^{-1}$ $yr^{-1}$. In addition, the salak integration did not significantly affect the oil palm FFB production. Based on trial carried out at the MPOB Research Station in Kluang, the FFB yield is as shown in *Table 2*.

**TABLE 2. MEANS OF FFB YIELD BETWEEN SALAK-OIL PALM INTEGRATED PLOT AND CONTROL PLOT (t $ha^{-1}$)**

| Oil palm plot | *5th year harvest (2013) | 6th year harvest (2014) | 7th year harvest (2015) | 8th year harvest (2016) |
|---|---|---|---|---|
| Double avenue & salak | 13.3 a | 24.6 a | 26.6 a | 23.9 a |
| Normal triangular (control) | 16.7 a | 25.5 a | 26.4 a | 25.3 a |

Notes: * FFB recording started in June 2013.
Mean in the same column with similar alphabet are not significantly different at p<0.05 (Duncan's Test).

## ECONOMIC VIABILITY

The cost for integrating salak in double avenue oil palm planting system is as shown in *Table 3*. Economic analysis is computed based on assumptions that the salak palm produces 8 kg fruits per palm with the selling price of RM 4.00 $kg^{-1}$ and 20 years economic life span. The calculated net present value (NPV) at 10% discount rate is RM 20 592. Internal rate of return (IRR) is 50%. Benefit cost ratio (BCR) 2.5 and payback period (PP) four years. Therefore, the integration of salak with oil palm using double avenue oil palm planting is financially feasible to be carried out by the oil palm growers.

## CONCLUSION

Salak has a great potential to be integrated with oil palm using double avenue oil palm planting system. This integration optimises the land use and generates additional income per unit area of oil palm land for oil palm growers. It will also contribute to the fruit production industry and the national economy of Malaysia.

**TABLE 3. ESTIMATED PRODUCTION COST FOR SALAK INTEGRATION WITH OIL PALM (RM ha$^{-1}$ yr$^{-1}$)**

| Input/Activities | Input cost/contract (RM) | Labour | | Total (RM) |
|---|---|---|---|---|
| | | Man-day | Cost (RM) | |
| **Establishment** | | | | |
| Seedling | 1 540 | - | - | 1 540 |
| Land preparation | 650 | - | - | 650 |
| Planting | - | 12 | 420 | 420 |
| **Total cost** | | | | **2 610** |
| **Operational** | | | | |
| Liming and fertiliser | 1 293 | 4.5 | 158 | 1 451 |
| Weed control | 30 | 3 | 105 | 135 |
| Pest and disease control | 15 | 1.5 | 53 | 68 |
| Harvesting | - | 3 | 105 | 105 |
| **Total cost** | | | | **1 759** |

For more information, kindly contact:

Head of Corporate Implementation
and Consultancy Unit, MPOB
6, Persiaran Institusi,
Bandar Baru Bangi,
43000 Kajang, Selangor, Malaysia
*Tel*: 03-8769 4574
*Fax*: 03-8926 1337
*E-mail*: tot@mpob.gov.my
www.mpob.gov.my