

INTEGRATION OF BANANA (*Berangan* variety) WITH OIL PALM PLANTED IN DOUBLE AVENUE PLANTING SYSTEM

by: SUBOH ISMAIL and ROSLAN ARSHAD

JUNE 2004

231

MPOB TT No. 224

MPOB INFORMATION SERIES

ISSN 1511-7871

Maximum land use of oil palm area through crop integration can generate additional income to farmers especially during the immature phase of oil palm. One of the crops which has been identified suitable to be integrated with oil palm is *pisang berangan*. It is very popular among Malaysians and highly demanded for local consumption. It is a non-seasonal fruit and is available at the market throughout the year. The crop can be grown on a wide range of soils. However, for high yield and good return, banana planting needs deep soil profile with good drainage and on flat to gentle slope topography. Planting of banana is not suitable on sandy soils and flood pruned areas.

Under the conventional triangular oil palm planting system, the banana can be integrated for a period of 1.5-2.0 years after planting of the oil palm and harvested in two cycles. Beyond that period, it is not suitable to carry out the integration because the fronds of the palms start to encroach the surrounding palms; thus, limiting the light penetration through the leaves canopy. Under this condition, the banana plants will etiolate and their growth affected thus producing small and unmarketable fruits.

The planting of banana under the oil palm can be extended with the adoption of double avenue planting system for oil palm. In this planting system, the area between the two double avenues will be widened and the light



Figure 1. A bunch of pisang berangan ready to be harvested.

penetration can be increased and the growth of banana could be enhanced.

METHODOLOGY

Oil palm is planted in triangular system at a distance of 6.1 m x 9.1 m x 15.2 m with planting density of 136 palms ha⁻¹. As shown in Figure 2,

ISSN 1511-7871



9 771511 787001

Malaysian Palm Oil Board, Ministry of Plantation Industries and Commodities, Malaysia
P. O. Box 10620, 50720 Kuala Lumpur, Malaysia. Tel: 03-89259155, 89259775, Website: <http://mpob.gov.my> Telefax: 03-89259446



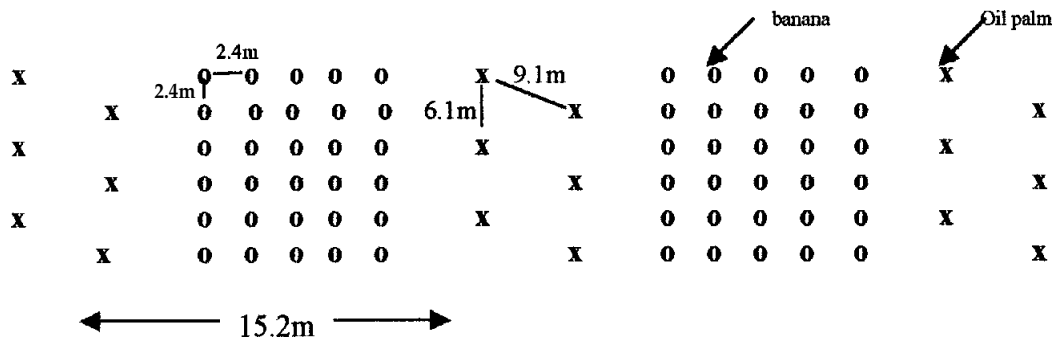


Figure 2. Arrangement of banana plants in double avenue planting system of oil palm.

the planting distance between the palms in a row is 6.1 m, between rows is 9.1 m and between two double avenues is 15.2 m.

The banana plant is planted either after the completion of oil palm lining or planting. The area for banana planting has to be cleared from shrubs and weeds. The land is ploughed three rounds to a depth of 20 to 30 cm, *i.e.* two rounds of disc ploughing and one round of rotovation. The period between ploughing rounds is seven to 10 days. On coastal alluvial soils or areas prone to flooding, field drains have to be constructed between the second and third row of banana plant in each area between two oil palm double avenues. The planting distance and the planting density of the banana will depend on the planting technique of the oil palm, *i.e.* zero burning or clean clearing techniques.

Zero Burning Technique of Oil Palm Planting

The banana plants can be planted in five rows in the area between the two double oil palm avenues at a distance of 2.4 m between plants and 2.4 m between the rows as shown in Figure 2. The planting density is at 880 plants ha⁻¹.

Clean Land Clearing Technique of Oil Palm Planting

In addition to the five rows between the two double avenues of oil palm, another two rows of banana are planted in between the palm rows in the avenue of oil palm area. Planting density is increased to 1060 plants ha⁻¹.

For banana planting, it is recommended to use tissue culture planting materials because of its low mortality rate and uniform growth of the plant. The planting hole is 0.45 m x 0.45 m x 0.45 m, some 200 g of rock phosphate fertilizer is applied during planting. For early growth vigour and high survival rate, planting has to be carried out at the onset of the rainy season.

The fertilizer programme for banana planting is as Table 1.

Dried leaves are pruned and spread over the ground between planting rows. In general, only one sucker is kept from each point with five to six months age difference (compared to the main plant). The unwanted suckers are removed by cutting them at the ground level. Circle weeding up to the radius of about 0.9 m is carried out

TABLE 1. THE FERTILIZER PROGRAMME FOR BANANA PLANTING

Age of banana plant	Types of fertilizer (N : P ₂ O ₅ : K ₂ O)	Rate (g plant ⁻¹)
1 month after planting	Comp. 15:15:15	60
3 months after planting	Comp. 15:15:15	120
6 months after planting	Comp. 12:12:17:2 + TE	240
1 week after 1 st harvest	Comp. 12:12:17:2 + TE	300
6 weeks after 1 st harvest	Comp. 12:12:17:2 + TE	300
3 months after 1 st harvest	Comp. 12:12:17:2 + TE	300



Figure 3. 3.5-month-old banana plants integrated with oil palm.



Figure 4. Six-month-old banana plants grow vigorously in oil palm area.

manually at monthly interval. Chemical weeding at two to three months interval is carried out when the banana plant exceeds four months old.

Two to three weeks old banana bunches are wrapped up with special plastic bags following the removal of the florescence buds. The banana can be harvested nine to 12 months after planting. The second harvest can be done at five to six months after the first harvest. After the second round of harvest, all the remaining suckers are cleared for the second cycle of planting. The methodology of the second cycle planting is similar to the first planting. The new plants will be planted in between the previous planting points and in the same planting rows. However, two planting rows adjacent to the oil palm rows (and in the avenues area for the clean clearing planting technique) have to be removed to minimize light and space competition with the oil palm. Only three rows will be left and the planting density reduced to 530 plants ha⁻¹.

BENEFITS

- In line with the government's policy, banana integration will increase the national food production without opening up of new area.
- Sale of banana generates additional income; thus, maximizing the income from a piece of land.
- Planting of banana increases crop canopy that can reduce light penetration to the ground.

Under this situation, the growth of weeds especially the light demanding species will be suppressed. Weeding carried out on the banana area will reduce weeding cost of the oil palm.

- The banana biomass, such as pruned leaves and stem during harvesting, are spread and left to decompose in the field. The decomposition and mineralization of the residues increases the soil organic and nutrient contents that contribute to the higher soil fertility.

ECONOMIC EVALUATION

The average bunch size that can be obtained from the first and second banana harvests that are planted on inland soils is 13.0 kg and 9.5 kg respectively. For the first cycle of banana planting, the cost of production for two harvests is RM 6653 for the zero burning technique and RM 8360 for the clean clearing technique. Based on 95% of the banana plants produce marketable bunches, the gross and net income per hectare of the integration for the zero burning technique are RM 15 048 and RM 8395, respectively, and for the clean clearing technique RM 18 125 and RM 9765. The return for every RM 1 invested is RM 2.26 for the zero burning technique and RM 2.16 for the clean clearing technique.

On coastal soils, the average bunch size of the banana is 14.5 kg for the first harvest and 11.0 kg for the second harvest. The net income from two rounds of harvesting is RM 10 400 for the

zero burning technique and RM 12 182 for clean clearing technique. The return for every RM 1 invested is RM 2.56 and RM 2.46, respectively.

CONCLUSION

Banana integration with oil palm maximizes land use, increases land productivity and generates additional income to oil palm growers

especially during the immature phase of oil palm. Double avenue planting of oil palm increases light penetration to the ground that enables other crops, be planted in oil palm area at all ages. Besides generating additional income, the banana integration reduces oil palm production cost and improves soil properties that enhance higher production of the oil palm.

For more information kindly contact:

Director-General
MPOB
P. O. Box 10620
50720 Kuala Lumpur, Malaysia.
Tel: 03-89259155, 89259775
Website: <http://mpob.gov.my>
Telefax: 03-89259446