INTEGRATION OF PINEAPPLE (SARAWAK VARIETY) WITH OIL PALM PLANTED IN DOUBLE AVENUE PLANTING SYSTEM

by: NORKASPI KHASIM; SUBOH ISMAIL and RAJA ZULKIFLI RAJA OMAR

318

MPOB INFORMATION SERIES • ISSN 1511-7871 • JUNE 2006 MPOB TT No. 311

The pineapple (*Ananas comosus*) is a member of the Bromeliaceae, a large, diverse family of about 2000 species. It was introduced to Malaysia in the 16th century by the Portuguese, and it is believed to have originated from South America. The plant is a rosette-forming, herbaceous monocot, 60-20 cm tall and 90 cm – 120 cm wide and the leaves have spines at the tips.

The Sarawak variety (*Figure 1*) is one of the common varieties planted in Malaysia for table consumption. It can be planted on well-drained sandy loams, pH 4.5–6.5. It grows well in areas with a temperature of 30˚C and annual rainfall of 500 mm – 3000 mm.

Under the conventional triangular oil palm planting system, pineapple can be integrated for 1.5–2.0 years after planting the oil palm. Under double avenue planting of the oil palm, the integration can be extended several years more. The larger area between the avenues allows increased light penetration for the pineapple.

Figure 1. Fourteen-month-old Sarawak *pineapple plant.*

METHODOLOGY

Oil palm is planted in double avenues at a spacing of 6.1 m x 9.1 m x 15.2 m with a planting density of 136 palms per hectare as shown in *Figure 2*. The planting distance between palms in a row is 6.1 m, between rows 9.1 m and between two double avenues 15.2 m. The planting technique and agronomic practices are as per the normal estate practices.

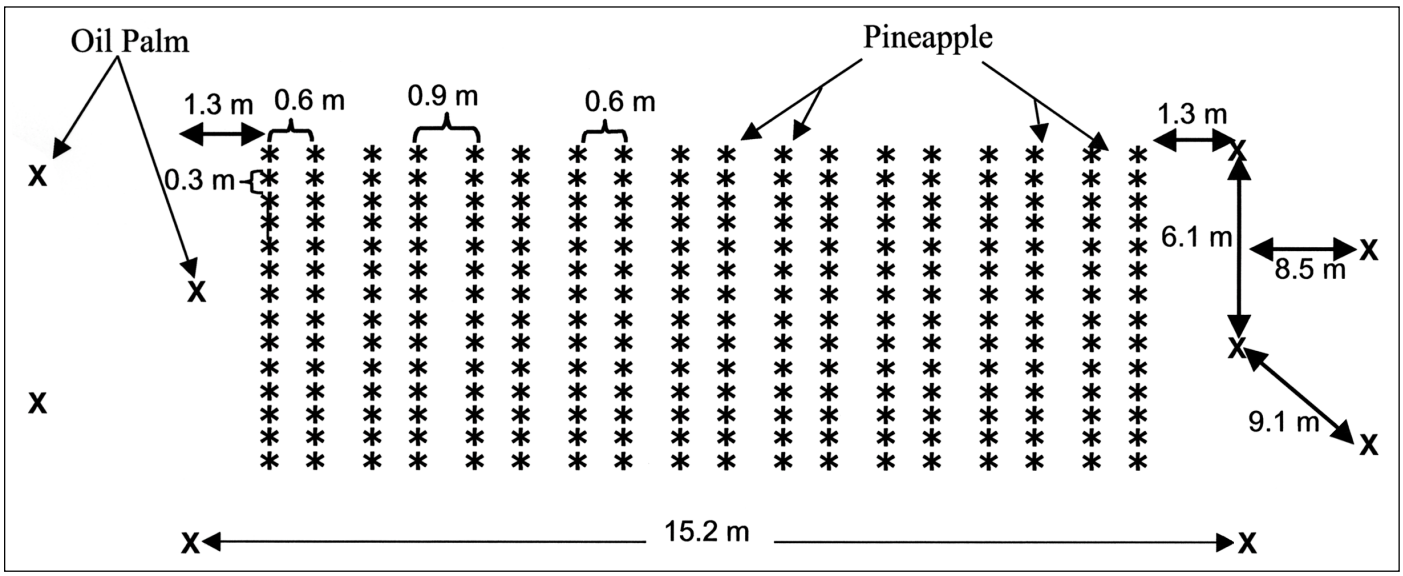

Figure 2. Arrangement of pineapple integrated with oil palm in a double avenue panting system.

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

The area for pineapple planting is cleared of 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 alluvials or flooded areas, a field drain is needed between the second and third avenue rows of pineapple.

The pineapple is planted in nine double avenue rows between two oil palm double avenues at a spacing of 0.9 m x 0.6 m x 0.3 m as shown in *Figure 2*. The density is 26 100 plants per hectare. The planting is by suckers (*Figure 3*). The suckers are graded according to size, *i.e.* small (about 30 cm long), medium (about 45 cm long) and large (60 cm long).

For a plot, the same grade suckers should be used for uniform growth. Before planting, the suckers are treated with a mixture of insecticide (Malathion) and fungicide (Benomyl).

The suckers are planted in 10-15 cm deep holes. A sucker is placed upright and firmly padded down with top soil. For early vigour and good survival, planting is done at the onset of the rainy season. Six rounds of weeding are carried out at intervals of two months. Selected herbicides can be used to control the weeds, *e.g.* Gesapax at a 120 g in 18 litres of water.

The fertilization programme is according to the age of pineapple (*Table 1.*)

The hormone, Ethrel, is applied to stimulate flowering at eight to 10 months. The application rate is 10 ml and 180 g urea in 16 litres of water. The solution is sprayed directly on the plants at 30 ml each in the early morning or late evening for good results. At 13 months, a fruit hormone, Fruitone is applied to obtain fruits of good and uniform size (*Figure 4*). A mixture of 18 to 20 ml Fruitone in 16 litres of water is sprayed directly on the plants at 50 ml each.

The Sarawak pineapple starts flowering at 9–10 months and matures at 15–16 months. The fruit is mature when the green colour at its base changes to yellow. The disease, marbled fruit, caused by the fungus,

Figure 3. Pineapple suckers ready for planting in the field.

Figure 4. Uniform fruit size of pineapples between oil palm rows.

TABLE 1. FERTILIZER PROGRAMME FOR PINEAPPLE (Sarawak variety)

Age (months after planting)	Fertilizer	Rate (kg ha^{-1})
1	NPK 15:15:15	550
2	Mixture *	Spray at the rate of 30 ml per plant
3	NPK 15:15:15	550
6	NPK 12:12:17:2	550
9	NPK 12:12:17:2	550

Note: * Mixture of 0.5 kg zinc sulphate, 0.25 kg ferrous sulphate, 0.5 kg copper sulphate and 8.0 kg hydrated lime in 225 litres of water.

Erwinia ananas, usually occurs in rainy seasons. The symptoms include lesions (yellowish brown to dark brown) in the inner part of the fruit. It is suggested that the dosage of potassium in the fertilizer be increased in order to increase the acid level in the fruits. The weight of fruit ranges from 1–3 kg with an average of 1.5 kg per fruit (in inland soil). The suckers can be collected and sold to generate additional income.

PRODUCTION COST AND INCOME PER HECTARE

The average yield per hectare is 31 000 kg. The cost of production for one planting season is RM 24 120 (*Table 2*). Assuming that 80% of the plants produce marketable fruits, the gross income and gross margin per hectare of pineapple underplanted in the oil palm are RM 37 200 and RM 13 080 respectively. The return for every RM 1 invested is RM 1.54. This does not include the additional income from the sale of suckers.

CONCLUSION

Pineapple (Sarawak variety) has great potential for integration with oil palm. Integration maximizes land use, increases land productivity and generates additional income for oil palm growers. The pineapple biomass, such as leaves, suckers and stems, left in the field after harvesting can act as mulch to improve the soil fertility.

TABLE 2. ESTIMATED REVENUE AND PRODUCTION COST (per hectare) OF PINEAPPLE (Sarawak variety) INTEGRATED WITH OIL PALM IN DOUBLE AVENUE PLANTING

Items	Quantity/price (RM)	Value (RM)
a) Revenue		
Sale of fruits	31 000 kg @ 1.20 per kg	37 200
Total Gross Income		**37 200**
b) Cost		
i) Input Cost:		
1. Planting material (include 10% for supply)	28 710 @ 0.65	18 661
2. Fertilizer		
a. NPK 15:15:15	22 bag @ 58 per bag	1 276
b. Foliar		
Zinc sulphate	4 kg @ 3.50 per kg	14
Ferrous sulphate	2 kg @ 2.50 per kg	5
Copper sulphate	4 kg @ 4 per kg	16
Hydrated lime	75 kg @ 12/25 per kg	36
3. Flowering hormone – Ethrel	3 litre @ 30/0.5 per litre	180
4. Fruiting hormone – Fruitone	1.5 litre @ 26/0.25 per litre	156
5. Weedicide	7.5 kg @ 34 per kg	255
Total Input Cost		**20 599**
ii) Labour Cost:		
1. Land preparation, ploughing	Contract @ 350	350
2. Planting	Contract @ 0.03 per plant	861
3. Fertilizer application	10 m.d @ 25/m.d	250
4. Weed control (6 rounds)	25 m.d @ 25/m.d	625
5. Flowering hormone	7 m.d @ 25/m.d	175
6. Fruiting hormone	7 m.d @ 25/m.d	175
7. Harvesting and Transportation	Contract (31) @ 35 per tonne	1 085
Total Labour Cost		**3 521**
Total Cost of Production		**24 120**
Net income		**13 080**
Return on investment (per RM)		**1.54**

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