

# INTEGRATION OF BACTRIS (*Bactris gasipaes*) FOR PALM HEART WITH OIL PALM PLANTED IN DOUBLE AVENUE PLANTING SYSTEM

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**B**actris (*Bactris gasipaes*) is also known as peach palm and has two genotypes; spineless and spiny. It is a monoecious and self-incompatible plant with male and female flowers develop on a rachilla. Bactris is a fast growing palm with large palm heart, stem diameter of 12 to 26 cm, and can grow up to 6 to 24 m tall (Figure 1). In general, a number of suckers grow from its basal axillary buds and some of these suckers develop into multiple stems that form a clump. The stems are straight, cylindrical and unbranched. The palm starts fruiting at the age of three to five years after planting. For palm heart production, spineless genotype is cultivated for easier management and handling. The common uses of bactris palm heart are for making salad, vegetable and pickles.



Figure 1. Clumps of *bactris* at eight years old.



Figure 2. Palm hearts of *bactris*.

The palm heart has a good taste, fine texture and low in calcium oxalate content that lowers the browning factor of the heart (Figure 2).

Bactris grows well in areas with an average temperature of 24 °C – 28°C and annual rainfall of 2000 – 4000 mm. It can be grown on a wide range of well-drained soils.

## METHODOLOGY

### Oil Palm Planting

Since *bactris* is a perennial plant and grows tall, it is not suitable for integration with oil palm planted in conventional triangular planting system because there will be a strong competition for light and space between the two crops. The oil palm has to be planted in a double avenue system which provides wider space; thus, higher light penetration through the oil palm canopy can be utilized by the *bactris*.

Oil palm is planted at a distance of 6.1 m x 9.1 m x 18.3 m as shown in Figure 3 The planting density is 120 palms ha<sup>-1</sup>. Planting technique and other agronomic practices adopted for oil palm follows the normal estate practices.

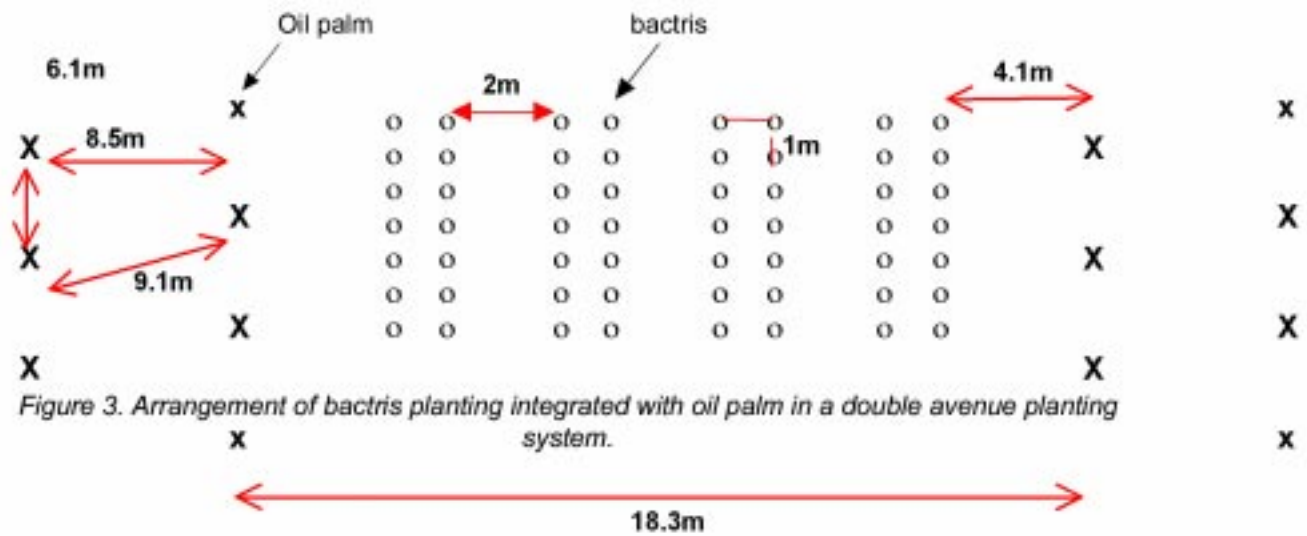
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### Bactris Field Planting

Bactris is planted by using seedlings. Germinated seeds of bactris are sown in 15 cm x 23 cm polybags and transferred into 35 cm x 56 cm polybags at the age of two to three months. The seedlings are planted in the field at the age of 10 – 12 months after sowing which have two to three pinnate leaves.

The area for planting of bactris is cleared from all vegetation and ploughed three rounds to a depth of 20 to 30 cm. Ploughing consists of two rounds of disc plough and one round of rotovation to loosen the soil, improve soil structure, reduce weed regeneration and enhance root establishment. Ground magnesium limestone (GML) is applied to the soil at the rate of 0.5 to 1.0 t ha<sup>-1</sup> to improve the soil pH.

The seedlings are planted in two parallel rows in the area between two double avenues of oil palm at a distance of 1 m x 1 m x 2 m as shown in Figure 3. The area between oil palm rows within the avenue is kept empty for easier overall management of the field. There will be eight rows of bactris between two oil palm double avenues and the planting density will be about 2960 palms ha<sup>-1</sup>. For early growth vigour and to ensure high survival rate of the



Figure 4. Two-month-old bactris.



Figure 5. Sixteen-month-old ready for first harvest.



Figure 6. Twenty-six-month-old ready for third harvest.

crop, planting activity is carried out at the onset of raining season.

Weeding is carried out every two months for the first year, and every three to four months for second year onwards. For the first two rounds, weeding is carried out manually to avoid injury to the crop. Selected herbicides can be used to control weeds in the area between bactris palms.

Cockchafers, *Apogonia* spp. and *Adoratus compressus*, are the main leaf eating pests at a young stage of the crop that can retard growth and reduce the production of bactris palm heart. For control measures, the crop is sprayed with selected insecticides such as carbaryl, trichlorphon and fenvalerate at 0.1% a.i. In a zero burning technique of oil replanting, rhinoceros beetle can cause severe damage at four to six months after planting. Carbofuran at the rate of 10 – 20 g plant<sup>-1</sup> and cypermethrin, 0.1% – 0.2% can be applied alternately, at every two weeks if heavy infestation occurs.

Fertilizer is applied by overall broadcasting around the bactris palm base. The fertilization programme according to the age of bactris is shown in *Table 1*.

Bactris for palm hearts can be harvested 16 – 18 months (*Figure 5*) after planting when the stem length has reached about 1.3 m from the ground to the juncture of the last leaf. During harvesting, the leaves and other unwanted parts of the bactris are stacked on the area between bactris rows. Two or three healthy and vigorous suckers at different stages are kept and managed for the next harvest. Subsequent harvests are carried out at every six to eight months.

For the first four years, five cycles of harvesting can be obtained, one cycle in the second year, two cycles in the third (*Figure 6*) and fourth year. The palm heart production is as follows:

- Year 1 - 2664 kg ha<sup>-1</sup>
- Year 2 - 4022 kg ha<sup>-1</sup>
- Year 3 - 3108 kg ha<sup>-1</sup>

#### **PRODUCTION COST AND INCOME PER HECTARE**

The total production cost for palm heart in the first four years is RM 48 651. If palm heart is marketed at RM 7 kg<sup>-1</sup>, the gross income and gross margin of investment are RM 68 558 and RM 19 907 respectively as shown in *Table 2*. The NPV will be RM 10 433.84 and RM 7 064.43 at 10% and 15% discount respectively. The IRR will be at 31% and the BCR at 10% discount 1.3.

**TABLE 1. FERTILIZATION PROGRAMME OF BACTRIS**

Age of bactris palm (year)	Type of fertilizer	Rate (g palm <sup>-1</sup> )	Times yr <sup>-1</sup>
1	Rock Phosphate	0.2	At planting
	Urea*	200	
	Compound 5:15:15	500	
2	Compound 15:15:15	1 000	4
>3	Compound 15:15:15	2 000	4

Note: \* Urea is applied six to eight months after planting.

**TABLE 2. ESTIMATED REVENUE AND PRODUCTION COST PER HECTARE OF BACTRIS PALM HEART INTEGRATED WITH OIL PALM (2960 palms ha<sup>-1</sup>)**

Items	Quantity/price (RM)				Value (RM)			
	Year 1	Year 2	Year 3	Year 4*	Year 1	Year 2	Year 3	Year 4*
<b>Revenue</b>	-	2 664 kg @ 7	4 022 kg @ 7	3 108 kg @ 7		18 648	28 154	21 756
<b>Input Cost:</b>								
1. Planting material @ RM 6	3 079	-	-	-	18 474	-	-	-
2. Fertilizers								
- RP @ 0.45	592 kg	-	-	-	266	-	-	-
- NPK G @ 0.95	1 480 kg	2 960 kg	5 920 kg	5 920 kg	1 406	2 664	5 328	5 328
- Urea @ 0.67	592 kg	-	-	-	397	-	-	-
3. Weedicides								
- Paraquat	12 lit	8 lit	8 lit	8 lit	165	110	110	110
4. Insecticides								
- Carbofuran	208	-	-	-	990	-	-	-
- Cypermethrin	7.5 lit	-	-	-	113	-	-	-
- Somicidin	0.75 lit	-	-	-	24	-	-	-
5. Fungicides								
- Thiram	0.5 kg	-	-	-	20	-	-	-
- Benlate	0.5 kg	-	-	-	36	-	-	-
<b>Total Input Cost</b>	-	-	-	-	21 891	2 774	5 438	5 438
<b>Labour Cost</b>								
1. Land preparation	Contract	-	-	-	310	-	-	-
2. Planting	Contract	-	-	-	5 920	-	-	-
3. Fertilizer application	4 m.d	4 m.d	6 m.d	6 m.d	80	80	120	120
4. Weed control	12 m.d	8 m.d	8 m.d	8 m.d	240	160	160	160
5. Manual weeding	30 m.d	2 m.d	-	-	600	-	-	-
5. Pest & disease control	7 m.d	-	2 m.d	2 m.d	140	40	40	40
6. Pruning and thinning	2 m.d	4 m.d	4 m.d	4 m.d	40	80	80	80
7. Harvesting	-	64 m.d	96 m.d	74 m.d	-	1 280	1 920	1 480
<b>Total labour cost</b>					7 330	1 580	2 320	1 880
<b>Total production cost</b>					29 221	4 354	7 758	7 318
<b>Gross margin</b>					-2 921	14 294	20 396	14 438
<b>Cumulative gross margin</b>					-29 221	-14 927	5 469	19 907

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