

**Y**ellow sugar cane (*Saccharum officinarum*) (Figure 1) is the most common variety grown in Malaysia. The main product from it is the juice. The juice is squeezed from the stems and drink fresh, usually served cold. The juice is also canned and commonly sold in restaurants and retail outlets throughout the country.

Yellow sugar cane is a fast growing crop and can be harvested 9 - 10 months after planting. At mature stage, the stem is 1.5 – 2.5 m long with the diameter of 2.5 – 5.0 cm. The skin of the stem is light yellow and softer compared to other sugar cane varieties. The crop can be grown on a wide range of soils, especially well to moderately well drained sandy clay alluvial soils. It prefers flat to gentle slopes, being quite susceptible to wind damage in hilly areas. The optimum annual rainfall is 1500 – 1800 mm. The cane can be inter-cropped with oil palm for about two years during which three harvests can be made - the first harvest from the main crop and then two ratoon crops. After two years, with



Figure 1. Mature yellow sugar cane.

the oil palm canopy closing, the yield is depressed as a result of low light penetration.

## METHODOLOGY

Two rows of cane are planted along every oil palm inter-row. The distance between the rows is 2.7 m and between plants in a row 2.4 – 2.7 m (Figure 2). On coastal alluvium or areas prone to flooding, field drains have to be constructed every two to eight oil palm inter-rows depending on the severity of flooding.

The area for planting the yellow sugar cane is cleared of weeds and worked three times to 20 to 30 cm depth - two rounds of disc ploughing, one round of rotovation to loosen the soil and improve its structure, kill off the weeds and enhance root establishment. Planting furrows are dug with the dimension 35 cm top width, 30 cm depth and 30 cm bottom width (Figure 3).

The cane is planted using sets (cuttings) of 25 – 30 cm length with three buds, laid down every 30 cm and covered with soil to about 5 cm. Before planting, the sets are treated with a fungicide, such as benomyl. The cane is planted either after oil palm lining or planting. For uniform and vigorous early growth (Figure 4) and to ensure good establishment, planting is done at the onset of the rainy season.

Initially, manual weeding is done around the bases of the canes every 1 – 1.5 months. Chemical weeding can be used after six months. To encourage root development, mounding is carried out two to three months, usually before fertilizer application.

The fertilizer programme for sugar cane is in Table 1.

The dead leaves are removed and used to mulch the bases of the canes (Figure 5) every three to four weeks. The canes are harvested by cutting the stems at their bases, near the soil surface,

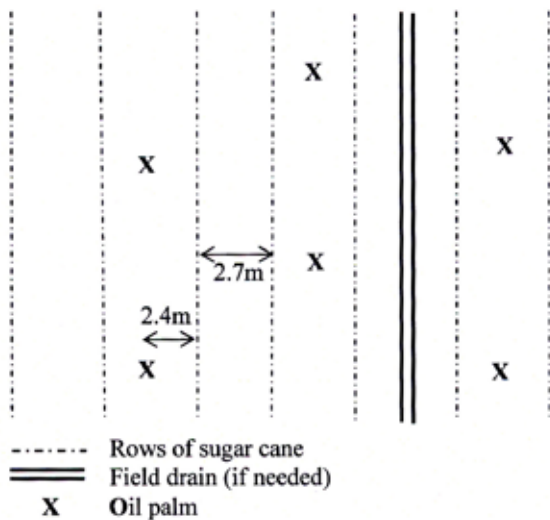


Figure 2. Sugar cane planting under oil palm.

and three-quarters of the shoots pruned. The first ratoon is harvested six to seven months after and the second ratoon another six to seven months later (Figure 6).

### ECONOMIC EVALUATION

The yield per hectare for the three harvests are 16 000 – 18 000 canes, 13 000 – 15 000 canes and 10 500 – 11 800 canes, respectively. The gross income and cost of production over all the harvests are RM 33 760 and RM 15 551, respectively (Table 2). Therefore, the gross margin is RM 18 551. The return for every RM 1 invested is RM 2.17.

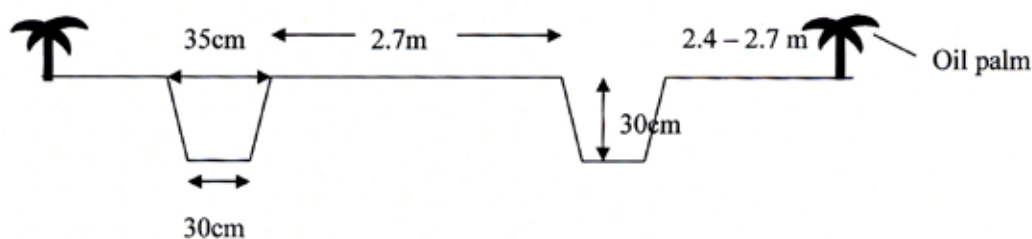


Figure 3. Drills for planting sugar cane.



Figure 4. Three-week-old sugar cane.



Figure 5. Seven-month-old sugar cane growing vigorously.



Figure 6. Second ratoons of sugar cane.

**TABLE 1. FERTILIZER PROGRAMME FOR SUGAR CANE**

Time of application	Fertilizer	Rate (kg ha <sup>-1</sup> )
<b>Main Crop</b>		
Basal dressing	Compound 15:15:15	150
2 – 3 months after planting	Compound 15:15:15	150
	Urea	75
5 months after planting	Compound 15:15:15	150
<b>First ratoon</b>		
1 – 2 months after 1 <sup>st</sup> harvest	Compound 15:15:15	150
3 – 4 months after 1 <sup>st</sup> harvest	Compound 15:15:15	150
<b>Second ratoon</b>		
1 – 2 months after 2 <sup>nd</sup> harvest	Compound 15:15:15	150
3 – 4 months after 2 <sup>nd</sup> harvest	Compound 15:15:15	150

**TABLE 2. COST OF PRODUCTION AND REVENUE FROM SUGAR CANE INTEGRATED WITH IMMATURE OIL PALM (ha<sup>-1</sup>)**

Item	Main crop		First ratoon		Second ratoon		Total (RM)
	Quantity/price (RM)	Cost (RM)	Quantity/price (RM)	Cost (RM)	Quantity/price (RM)	Cost (RM)	
Cost of Materials							
1. Planting material	1 400 canes @ 1	1 400	-	-	-	-	1 400
2. Fertilizer							
NPK 15:15:15	450 kg @ 62/50 kg	558	300 kg @ 62/50 kg	372	300 kg @ 62/50 kg	372	1 302
Urea	75 kg @ 76/50 kg	114	-	-	-	-	114
3. Pesticides			20 kg @ 5/kg				
Carbofuran	20 kg @ 5/kg	100	-	100	20 kg @ 5/kg	100	300
Benomyl	0.5 kg @ 34/0.5 kg	34	4 lit @ 58/4 lit	-	-	-	34
Paraquat	4 lit @ 58/4 lit	58		58	4 lit @ 58/4 lit	58	174
Total Cost of Material		2 264		530		520	3 324
Labour Cost							
1. Ploughing	Contract	420	-	-	-	-	420
2. Construction of drills	Contract	50	-	-	-	-	50
3. Cutting of canes for planting	2 m.d @ 25/m.d	50	-	-	-	-	50
4. Planting	8 m.d @ 25/m.d	200					200
5. Fertilization	6 m.d @ 25/m.d	150	5 m.d @ 25/m.d	125	5 m.d @ 25/m.d	125	400
5. Weed control	8 m.d @ 25/m.d	200	8 m.d @ 25/m.d	200	8 m.d @ 25/m.d	200	600
6. Pest control	3 m.d @ 25/m.d	75	3 m.d @ 25/m.d	75	3 m.d @ 25/m.d	75	225
7. Maintenance of canes	20 m.d @ 25/m.d	500	20 m.d @ 25/m.d	500	20 m.d @ 25/m.d	500	1 500
8. Harvesting	17 000 canes @ 0.2/cane	3 400	14 000 canes @ 0.2/cane	2 800	11 200 canes @ 0.2/cane	2 240	8 440
Total Labour Cost	-	5 045	-	3 700	-	3 140	11 885
Total Production Cost	-	7 309	-	4 230	-	3 670	15 209
Revenue							
1. Gross revenue	17 000 canes x 0.80	13 600	14 000 canes x 0.80	11 200	11 200 canes x 0.80	8 960 3	33 760
2. Production cost		7 309		4 230		670	15 209
3. Net revenue		6 291		6 970		5 290	18 551

## CONCLUSION

Yellow sugar cane can be integrated with immature oil palm. It maximizes land use, increases land productivity and generates additional income to the oil palm grower during the immature phase of the oil palm. The pruned leaves of the canes can be used to mulch the soil to improve its fertility; and improve the yield of the oil palm.

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