

PS4 – HIGH CAROTENE *E. OLEIFERA* PLANTING MATERIALS

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154

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The American oil palm, *Elaeis oleifera* (Figure 1) possesses attributes of interest such as slow height increment rate (Hardon and Tan, 1969; Obasola, 1973; Meunier and Boutin, 1975; Tam *et al.*, 1977) and high I.V. (Hardon, 1969; Macfarlane *et al.*, 1975). Lately, its high carotene content has been advocated as potentially useful for the pharmaceutical industry (Choo and Yusof, 1996). However, this species has not been commercially exploited simply because of its extremely low oil yield (*ca.* 0.5 t ha⁻¹yr⁻¹). Nevertheless, it is believed that this oil as produced coupled with some pretreatment can be encapsulated for pharmaceutical applications (Figure 2).

MPOB *E. oleifera* germplasm collections have been screened for high I.V. and high carotene content (Table 1). Almost all palms screened have high I.V. in excess of 80, which is higher than the current commercial DxP with I.V. of 50 – 53. As for the carotene, palms with values in excess

of 3000 ppm have been identified. The carotene of current commercial DxP is between 500 – 700 ppm. MPOB has taken the initiative to produce high carotene planting materials or PS4 by intercrossing high carotene *E. oleifera* in a full diallel crossing scheme (Table 2).

ECONOMIC VIABILITY OF PS4

Increasing evidence have shown that palm oil presents a very important potential source of alpha-carotene, beta-carotene, lycopene and other carotenoids which are important for human health. Among the commercial product which can be obtained from this planting material is palm oil carotene capsule (Choo and Yusof, 1996). Assuming 1 g of such oil can fetch RM0.10, then 1 t of *E. oleifera* palm oil would fetch 1 000 000 x RM0.10 = RM100 000. Hence at production of 0.5 t ha⁻¹yr⁻¹ of *E. oleifera* oil, the expected revenue is RM50 000 ha⁻¹yr⁻¹. Alternatively, the palm oil producer can invest in the finished product by putting up the encapsulation plant. The targeted price for *E. oleifera* palm oil containing 2500 I.U. of vitamin A activity is RM0.38. Thus, the required daily dosage of 1.5 g (two capsules) is worth RM0.38 or RM0.26 g⁻¹ of oil.

CONCLUSION

It is MPOB's wish that the industry would consider to plant *E. oleifera* for its high carotene oil and/or to invest in the high value health product by putting up the encapsulation plant.

REFERENCES

CHOO, Y M and YUSOF, B (1996). *Elaeis oleifera* palm for the pharmaceutical industry. PORIM Information Series. PORIMTT No. 42:1-4

HARDON, J J (1969). Interspecific hybrids in the genus *Elaeis*. II. Vegetative growth and yield of F1 hybrids *E. guineensis* x *E. oleifera*. *Euphytica*. 18 : 380.

HARDON, J J and TAN, G Y (1969). Interspecific hybrids in the genus *Elaeis* I. Crossability, cytogenetics and fertility



Figure 1. *Elaeis oleifera* palm and fruit bunch.



Figure 2. High value carotene and carotene capsules.



TABLE 1. ELAEIS OLEIFERA PALMS WITH I.V. MORE THAN 80 AND CAROTENE CONTENT MORE THAN 3000 PPM

No.	Palm No.	Country of origin	I.V.	Carotene (ppm)
1	0.211/142	Costa Rica	85.5	3 021.1
2	0.211/143	Panama	87.6	3 038.8
3	0.211/233	Panama	82.5	3 042.5
4	0.211/991	Costa Rica	88.0	3 083.5
5	0.211/1212	Panama	86.9	3 106.2
6	0.211/1196	Panama	87.6	3 110.0
7	0.211/1200	Panama	88.7	3 115.6
8	0.211/1051	Costa Rica	88.9	3 196.1
9	0.211/1151	Costa Rica	90.7	3 208.9
10	0.211/1152	Costa Rica	92.3	3 292.8
11	0.211/1144	Panama	88.9	3 336.5
12	0.211/1131	Costa Rica	89.0	3 377.0
		<i>Commercial DxP</i>	50 - 53	500 - 700

TABLE 2. FULL DIALLEL CROSSING SCHEME FOR PRODUCTION OF PS4

Parents	0.211/ 142	0.211/ 143	0.211/ 233	0.211/ 991	0.211/ 1212	0.211/ 1196	0.211/ 1200	0.211/ 1151	0.211/ 1051	0.211/ 1152	0.211/ 1144	0.211/ 1131
0.211/142	X	X	X	X	X	X	X	X	X	X	X	x
0.211/143	X	X	X	X	X	X	X	X	X	X	X	x
0.211/233	X	X	X	X	X	X	X	X	X	X	X	x
0.211/991	X	X	X	X	X	X	X	X	X	X	X	x
0.211/1212	X	X	X	X	X	X	X	X	X	X	X	x
0.211/1196	X	X	X	X	X	X	X	X	X	X	X	x
0.211/1200	X	X	X	X	X	X	X	X	X	X	X	x
0.211/1051	X	X	X	X	X	X	X	X	X	X	X	x
0.211/1151	X	X	X	X	X	X	X	X	X	X	X	x
0.211/1152	X	X	X	X	X	X	X	X	X	X	X	x
0.211/1144	X	X	X	X	X	X	X	X	X	X	X	x
0.211/1131	X	X	X	X	X	X	X	X	X	X	X	x

Note: X: crosses to be made.

of F1 hybrids of *E. guineensis* x *E. oleifera*. *Euphytica*. 18:372-379.

MACFARLANE, N; SWETMAN, T, and CORNELIUS, J A (1975). Analysis of mesocarp and kernel oils from the American oil palm and F1 hybrids with the West African oil palm. *J. Sci. Fd. Agric.*, 26:1293 and *Oil Palm News*, 19:12 and 20:1.

MEUNIER, J and BOUTIN, D, (1975). L'Elaeis melanococca et l'hybride *E. melanococca* x *E. guineensis*. Premieres donnees. *Oleagineux*, 30:5.

OBASOLA, CO (1973). Breeding for short-stemmed oil palm in Nigeria.

J. Nig. Inst. Oil Palm Res. 5(18):43.

TAM, T K; LIM, C S; YEOH, G H and OOI, S C (1977). The oil palm and other characteristics of interspecific (*Elaeis guineensis* x *E. oleifera*) hybrids planted in Malaysia and their significance for future breeding programmes. *International Developments in Oil Palm* (Earp, D A and Newall, W eds.) Incorporated Society of Planters. Kuala Lumpur. p. 27-38.

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