PS12 BREEDING POPULATION FOR HIGH OLEIC ACID PALM OIL

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MPOB INFORMATION SERIES • ISSN 1511-7871 • JUNE 2006 MPOB TT No. 313

There is high demand for monounsaturated and polyunsaturated dietary oils and fats; hence, an increase in their unsaturation is desirable. Higher unsaturation in palm oil enables better penetration into the liquid oil market. The current palm oil is semi-solid at room temperature (28ºC), limiting its use as liquid oil in temperate countries. MPOB has developed new breeding materials with high oleic acid (C18:1) through conventional breeding. The level of unsaturation can be further improved through fractionation.

SELECTION

Screening of MPOB oil palm germplasm for fatty acid composition (FAC) using gas chromatography (GC) (PORIM Test Method, 1995) has revealed a wide variation. The current oil palm planting materials have an oleic acid content (C18:1) of between 37% and 40% (Rajanaidu *et al*., 2000). Progeny tests have shown oleic acid content to be highly heritable. Previous studies indicated that oleic acid and iodine value (I.V.) are positively correlated. Hence, the palms selected for high oleic acid will also have high I.V.

Fifteen palms with oleic acid contents exceeding 48% were selected as a PS12 breeding population (*Table 1*). On average, they have the potential to increase the oleic acid and I.V. contents in the current commercial materials by about 10% and 11%, respectively. With fractionation, the I.V. of the olein should reach 70 (Rajanaidu *et al.*, 1999). This population will be useful for developing planting materials with a more liquid oil.

NOVELTY OF TECHNOLOGY

A more liquid palm oil is nutritionally desirable and will command a premium prices (*Figure 1*). It can also be used as liquid oil in temperate countries, and, with this, has the potential to increase by at least 10% the total export value of Malaysian palm oil.

COMMERCIALIZATION POTENTIAL

The high oleic acid breeding population will be progeny tested before the production of commercial *dura* x *pisifera* (DxP) planting materials. The palm olein price is always about 10% higher than that of normal palm oil (Basri, 2003).

Figure 1. High oleic oil has a higher iodine value (more liquid) and can be used as salad oil in temperate countries.

ECONOMIC ANALYSIS

The average crude palm oil price in 2005 was RM 1394 per tonne with a total export of 13.45 million tonnes (MPOB, 2005). Based on the year, with a projected 10% higher price for the high oleic oil and 10% higher production (for the liquid oil market), the oil can increase the total export revenue of Malaysian palm oil products by 1.35 million tones, or generate additional RM 2 billion.

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ISSN 1511-7871
9 771511 787001

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TABLE 1. PS12 BREEDING POPULATION FOR HIGH OLEIC ACID (C18:1)

Palm No.	Progeny	Parent	Fruit type	FFB (kg palm^{-1} yr^{-1})	FFB/H (t ha^{-1} yr^{-1})	N	M/F (%)	K/F (%)	S/F (%)	F/B (%)	O/B (%)	K/B (%)	OY (kg palm^{-1} yr^{-1})	KY	N1	C16:0 (%)	C18:0 (%)	C18:1 (%)	C18:2 (%)	C18:3 (%)	I.V.
0.290/252	PK 1177	0.150/2333 x 0.150/2333	D	182.5	27.0	3	47.9	12.4	39.6	61.0	15.4	7.5	28.1	13.7	1	37.1	3.4	50.2	8.4	0.2	58.3
0.290/1593	PK 1215	0.151/1662 x 0.151/146	D	174.6	25.8	3	48.8	11.4	39.8	66.1	16.7	7.6	29.2	13.3	2	34.5	4.0	50.3	10.2	0.3	61.7
0.290/2577	PK 1145	0.150/1276 x 0.150/5375	D	171.0	25.3	3	59.8	7.9	32.3	61.8	17.5	4.9	29.9	8.3	2	34.8	4.5	48.1	11.5	0.3	62.1
0.292/9	PK 1151	0.150/1969 x 0.150/1969	T	176.5	26.1	3	80.6	7.6	11.8	61.9	21.2	4.8	37.5	8.4	3	32.0	5.1	51.5	10.2	0.3	62.9
0.292/10	PK 1151	0.150/1969 x 0.150/1969	T	192.0	28.4	3	77.4	9.3	13.4	60.2	23.5	5.6	45.2	10.7	2	33.7	4.5	49.7	11.1	0.3	62.7
0.292/20	PK 1021	0.149/14388 x 0.149/12279	T	229.4	34.0	3	82.5	7.6	9.9	59.0	22.8	4.5	52.4	10.3	4	37.0	4.1	48.9	8.9	0.3	58.2
0.292/818	PK 1105	0.149/11526 x 0.149/11526	T	184.5	27.3	4	87.1	6.1	6.8	60.6	21.8	3.7	40.1	6.8	2	34.5	5.4	48.0	11.4	0.2	61.5
0.292/905	PK 1138	0.150/1837 x 0.150/1544	T	140.8	20.8	3	79.0	12.3	8.7	58.3	21.8	7.2	30.7	10.1	1	34.5	5.4	49.3	10.0	0.1	60.1
0.292/1236	PK 1151	0.150/1969 x 0.150/1969	T	142.2	21.1	3	81.4	10.6	8.0	63.1	24.5	6.8	34.8	9.6	4	31.9	6.2	52.5	8.5	0.3	60.7
0.306/319	PK 540	0.151/128 x 0.151/128	T	145.8	21.6	7	73.0	9.2	17.8	63.1	21.2	5.8	24.7	6.8	2	34.2	5.2	48.9	11.2	0.2	61.8
0.337/172	PK 1254	0.150/5976 x 0.150/5978	T	196.8	29.1	5	73.5	11.0	15.5	66.0	23.9	7.3	47.1	14.3	4	35.8	3.8	49.5	9.9	0.2	60.3
0.337/186	PK 1201	0.150/2360 x 0.150/1969	T	273.5	40.5	10	85.3	6.9	7.8	59.0	23.8	4.1	65.1	11.2	5	33.6	7.1	48.4	10.1	0.2	59.6
0.337/249	PK 1254	0.150/5976 x 0.150/5978	T	209.0	30.9	6	68.9	13.8	17.3	62.3	20.8	8.6	43.5	18.0	3	33.8	6.8	48.9	9.6	0.2	59.2
0.337/506	PK 1201	0.150/2360 x 0.150/1969	T	218.0	32.3	5	76.0	10.3	13.7	66.6	24.4	6.8	53.2	14.8	4	34.0	5.0	48.8	11.2	0.2	62.1
0.337/1062	PK 1040	0.150/1714 x 0.150/1544	T	179.0	26.5	4	75.0	10.7	14.3	61.0	22.4	6.5	40.0	11.6	2	35.1	5.7	48.4	9.9	0.3	59.7
Mean (1 – 15)																		49.4			60.7
Current Dx P																		*37 - 40*			*50.0*

Notes:
FFB = fresh fruit bunch, FFB/H = fresh fruit bunch/ha, M/F = mesocarp/fruit, K/F = kernel/fruit, S/F = shell/fruit, O/B = oil/bunch, K/B = kernel/bunch, OY = oil yield, KY = kernel yield, I.V. = iodine value, C16:0 = palmitic, C18:0 =stearic, C18:1 = oleic, C18:2 = linoleic, C18:3 = linolenic .

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