



PERFORMANCE OF SELFED AND RECIPROCAL INTERCROSSED OIL PALM DELI ULU REMIS PROGENIES BASED ON SELECTED AGRONOMIC TRAITS

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INTRODUCTION

Oil palm is the most efficient oil producing crop compared to other vegetable oils. With the limitation of arable land for planting, oil palm breeding has been geared towards increasing yield production per hectare of land. The Deli is considered as the best *dura* for breeding and seed production. The Deli *dura* is usually featured as the maternal parent in almost all commercial *dura* x *pisifera* (DxP) hybrid seed production programmes (Figure 1).

In this study, three sets of selfed and reciprocal intercrossed oil palm Deli Ulu Remis progenies were evaluated at the Malaysian Palm Oil Board (MPOB) Research Station in Kluang, Johore, Malaysia. The project aims to assess the performance of selfed and reciprocal intercrossed progenies for bunch yield and bunch quality components, as well as determine the combining ability for the selected agronomic traits based on parental types.

Deli *dura*

- Best *dura* for breeding and seed production
- Produce fewer but heavier bunches
- The fruits are darker coloured and larger
- High mesocarp content
- High oil to bunch



Figure 1: Deli *dura*

MATERIALS AND METHODS

Materials

Three sets of selfed and reciprocal intercrossed oil palm Deli Ulu Remis progenies were evaluated at the Malaysian Palm Oil Board (MPOB) Research Station in Kluang, Johore, Malaysia (Figure 2). A total of 12 progenies were planted in two trials, namely Trial No. 0.484 and 0.488.



Figure 2: Deli Ulu Remis

Methods

- Bunch yield was started recorded at 36 months after field planting with two rounds per month by recording the bunch weight (BWT) and bunch number (BNO) on individual palm basis.
- Bunch analysis were done to determine the bunch and fruit quality components of each palm.

Data Analyses

All the data collected were analysed by using analysis of variance (ANOVA), while the comparison between the progeny means was by Fisher's Least Significant Difference (LSD) at the minimum 5% level of probability.



Figure 3: Phenotypic Data Collection

RESULTS AND DISCUSSION

Analysis of variance (ANOVA) and genetic combining ability (GCA) were conducted using SAS 9.4. ANOVA showed significant differences between selfed and intercrossed progenies where the intercrossed progenies produced higher yield compared to selfed progenies. Intercrossed progeny, PK4687 (0.332/45 x 0.332/83) produced the highest fresh fruit bunch (FFB) yield of 218.77 kg/p/yr. The high FFB yield was due to the highest bunch number (BNO) (13.91 bunches/p/yr) and moderate average bunch weight (ABW) (15.68kg/p/yr) (Table 1). Table 2 showed the performance of selfed and intercrossed progenies based on bunch quality components.

Table 1: Performance of selfed and intercrossed progenies based on bunch yield characters

Set No.	Progeny	Pedigree	Type	N	MFFB (kg/p/yr)		MBNO (no.)		MABW (kg/p/yr)	
					Mean	CV	Mean	CV	Mean	CV
A	1	PK4554	0.332/83 x 0.332/83	self	37	175.97b	25.87	13.48ab	21.34	13.10b
	2	PK4619	0.332/83 x 0.332/45	intercross	12	160.69b	19.71	11.88b	18.43	13.74b
	3	PK4678	0.332/45 x 0.332/45	self	31	160.25b	28.28	12.56ab	26.67	12.90b
	4	PK4687	0.332/45 x 0.332/83	intercross	44	218.77a	23.69	13.91a	18.50	15.68a
				Mean	124	185.66	25.18	13.25	21.49	14.03
				LSD		26.62		1.62		1.36
B	1	PK4419	0.332/451 x 0.332/83	intercross	53	186.16a	27.16	11.32bc	24.68	16.48a
	2	PK4514	0.332/451 x 0.332/451	self	15	153.34b	20.10	10.37c	14.38	14.87b
	3	PK4515	0.332/83 x 0.332/451	intercross	39	173.81ab	31.21	11.99b	25.56	14.41b
	4	PK4554	0.332/83 x 0.332/83	self	37	175.67ab	25.87	13.48a	21.34	13.10c
				Mean	144	176.70	27.58	11.96	23.36	14.88
				LSD		25.32		1.45		1.20
C	1	PK4232	0.332/382 x 0.332/382	self	48	138.10b	31.38	11.40a	24.72	11.99c
	2	PK4514	0.332/451 x 0.332/451	self	15	153.34b	20.10	10.37a	14.38	14.87b
	3	PK4566	0.332/382 x 0.332/451	intercross	69	179.09a	25.75	11.04a	23.53	16.36a
	4	PK4567	0.332/451 x 0.332/382	intercross	50	156.82b	32.18	10.45a	29.6	15.08b
				Mean	182	160.04	28.52	10.91	25.06	14.73
				LSD		22.25		1.33		1.15

Notes: MFFB= Mean Fresh fruit bunch, MBNO= Mean Bunch number, MABW= Mean Average bunch weight

Table 2: Performance of selfed and intercrossed progenies based on bunch quality components

Set No.	Progeny	Pedigree	Type	N	MTF (%)		KTF (%)		STF (%)		OTDM (%)		OTB (%)	
					Mean	CV	Mean	CV	Mean	CV	Mean	CV	Mean	CV
A	1	PK4554	0.332/83 x 0.332/83	self	34	65.57ab	7.85	4.62c	28.46	29.82a	14.49	77.43b	2.76	20.69b
	2	PK4619	0.332/83 x 0.332/45	intercross	11	67.71a	4.62	4.72c	15.57	27.58a	11.40	79.59a	1.63	22.79a
	3	PK4678	0.332/45 x 0.332/45	self	27	63.60b	8.64	7.33a	22.26	29.07a	19.21	79.36a	2.38	22.26a
	4	PK4687	0.332/45 x 0.332/83	intercross	40	64.17b	4.31	6.14b	18.16	29.70a	8.30	79.94a	1.51	23.56a
				Mean	112	64.80	6.73	5.82	22.17	29.38	13.75	79.01	2.17	22.30
				LSD		2.61		0.77		2.42		1.03		1.53
B	1	PK4419	0.332/451 x 0.332/83	intercross	50	63.59ab	5.41	6.41a	18.97	30.00ab	10.22	79.81a	1.93	22.98a
	2	PK4514	0.332/451 x 0.332/451	self	15	65.10a	6.26	6.36a	29.01	28.54b	10.68	79.71a	1.58	21.92ab
	3	PK4515	0.332/83 x 0.332/451	intercross	35	62.36b	7.49	5.79a	41.52	31.85a	13.26	78.53b	2.85	20.38b
	4	PK4554	0.332/83 x 0.332/83	self	34	65.57a	7.85	4.62b	28.46	29.82b	14.89	77.43c	2.76	20.69b
				Mean	134	63.94	6.76	5.79	29.29	30.28	12.33	78.86	2.39	21.6
				LSD		1.98		0.9		1.99		1.00		1.66
C	1	PK4232	0.332/382 x 0.332/382	self	48	68.07a	7.10	4.77b	44.20	27.16b	15.79	77.00b	3.33	19.35b
	2	PK4514	0.332/451 x 0.332/451	self	15	65.10b	6.26	6.36a	29.01	28.54b	10.68	79.71a	1.58	21.92a
	3	PK4566	0.332/382 x 0.332/451	intercross	63	65.31b	6.55	5.98a	24.57	28.71ab	12.09	78.78a	2.79	21.64a
	4	PK4567	0.332/451 x 0.332/382	intercross	41	64.31b	6.74	6.42a	23.08	29.27a	11.43	79.75a	2.62	22.35a
				Mean	167	65.84	6.75	5.78	29.66	28.39	12.91	78.59	2.83	21.18
				LSD		2.22		0.86		1.83		1.11		1.52

Notes: MTF= Mesocarp to fruit, KTF= Kernel to fruit, STF= Shell to fruit, OTDM= Oil to dry mesocarp, OTB= Oil to bunch

Analysis on general combining ability (GCA) revealed that palm no. 0.332/45 has been identified as having good GCA for FFB, ABW, kernel to fruit and oil to bunch ratios as female parent. Meanwhile, palm no. 0.332/83 appeared to be a good combiner as male parent for FFB and BNO (Table 3).

Parental lines of advanced breeding materials are continuously being improved at MPOB, where crossing programmes involving palms with different economic characters are routinely conducted. The best materials obtained from the new combinations are further evaluated to develop the next generation parental lines for commercial seed production, which is necessary for the sustainable development of the Malaysian oil palm industry.

Table 3: General combining ability estimates based on type of parent

No.	Female	N	MFFB (kg/p/yr)	MBNO (no.)	MABW (kg/p/yr)	N	MTF (%)	KTF (%)	STF (%)	OTDM (%)	OTB (%)
1	0.332/045	75	21.74	1.55	-0.18	67	-0.94	0.74	0.20	0.83	1.34
2	0.332/083	88	-0.05	0.80	-0.94	80	-0.42	-0.74	1.15	-0.67	-0.85
3	0.332/382	117	-10.58	-0.62	-0.14	111	1.62	-0.42	-1.21	-0.87	-1.05
4	0.332/451	118	-3.3	-0.97	0.97	106	-0.8	0.53	0.26	0.89	0.89

No.	Male	N	MFFB (kg/p/yr)	MBNO (no.)	MABW (kg/p/yr)	N	MTF (%)	KTF (%)	STF (%)	OTDM (%)	OTB (%)
1	0.332/045	75	-12.47	0.57	-1.57	38	-0.09	0.70	-0.61	0.55	0.71
2	0.332/083	88	21.12	0.96	0.57	124	-0.56	-0.05	0.6	0.32	0.84
3	0.332/382	117	-25.2	-0.89	-1.15	89	1.46	-0.35	-1.12	-0.62	-0.94
4	0.332/451	118	1.42	-0.54	0.85	113	-0.51	0.09	0.41	-0.05	-0.41

Notes: MFFB= Mean Fresh fruit bunch, MBNO= Mean Bunch number, MABW= Mean Average bunch weight, MTF= Mesocarp to fruit, KTF= Kernel to fruit, STF= Shell to fruit, OTDM= Oil to dry mesocarp, OTB= Oil to bunch.

CONCLUSION

- Based on current results, intercrossed progenies produced higher yield compared to selfed progenies.
- GCA good combiner
 - As female parent (palm no. 0.332/45) – FFB, ABW, KTF and OTB
 - As male parent (palm no. 0.332/83) – FFB, BNO and OTB
- Palms 0.332/45 and 0.332/83 would be used as female and male parents, respectively, to develop the next generation of Ulu Remis progenies

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