HIGH OIL PALM PLANTING DENSITY ON PEAT

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Planting density, defined as the number of planting points per unit area of land, is one of the important factors determining oil palm productivity. On the other hand, agronomic optimum planting density refers to the density that gives the highest cumulative yield, and economic optimum planting density is defined as the density giving the highest cumulative discounted profit over a given period.

There is no single optimum density applicable to all environments. Palms planted on peat, for example, are especially prone to losses due to leaning/lodging and basal stem rot disease caused by *Ganoderma*. To obtain a more reliable estimate of optimum density, a spacing experiment should be laid down for each environment.

EXPERIMENTATION

One such trial was carried out in 1985 at MPOB's peat research station in Teluk Intan testing two replicates of a split-plot design in which three planting densites (120, 160 and 200 palms ha^{-1}) were in the main plots and the sub-plots tested fertilizer treatment in 2N x 3^2PK factorial combination. The original peat depth measured was between 3 to 4 m before hitting the clay subsoil. Guthrie commercial DxP materials were used in the trial. Thirteen years of FFB yield and bunch analysis data were used to calculate the financial performance of the three planting densities by examining the variable costs and determining the internal rate of return (IRR), the net present value (NPV) assumed at a discount rate of 10% and the benefit to cost ratio (BCR). Analysis carried out was based on the actual annual market FFB prices obtained over the years of the trial (1988 – 2000) and all costs incurred by the plantation's management.

RESULTS

The FFB yield and oil/bunch (O/B) at different planting densities, and the summary of financial analysis are shown in *Tables 1, 2* and *3* respectively. The FFB yield obtained is also shown diagrammatically in *Figure 1*.

DISCUSSION AND CONCLUSION

Results based on 13 years of yield record (or 16 years planting) showed continued increase in average and cumulative FFB yield with increase in planting densities observed in spite of the relatively higher *Ganoderma* incidence on palms at the higher densities (*i.e.* 14.8% at 120 palms ha^{-1}, 15.4% at 160 palms ha^{-1} and 20.8% at 200 palms ha^{-1} at 16 years of planting). Yield fluctuation observed was also due to leaning palms affecting yield about seven to eight years after planting. The palms took about four years to recover and yield normally. Based on the bunch analysis carried out over the years (slightly over 1000 bunches/density), an increase in the planting density increased the O/B which was largely due to improvements in the fruit-set and oil/dry mesocarp.

Economic analysis carried out showed that at all three levels of general charges tested, oil palm planted at 200 palms ha^{-1} gave the highest IRR, NPV and BCR values even though the payback period of seven years was equal between 160 and 200 palms ha^{-1}. Palms planted at 120 palms ha^{-1} performed the worst.

RECOMMENDATION

The findings from this trial showed that oil palm planted at 200 palms ha^{-1} is the agronomically and economically optimum planting density and a better proposition compared to the current commercially practised 160 palms ha^{-1}. It is recommended that this density be adopted for all future oil palm planting on deep peat.

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TABLE 1. MEAN FFB YIELD OF OIL PALM PLANTED AT DIFFERENT PLANTING DENSITIES ON DEEP PEAT (t ha^{-1} yr^{-1})

Planting density (palms ha^{-1})	Year of harvesting												
	1	2	3	4	5	6	7	8	9	10	11	12	13
120	13.0	15.7	19.1	23.7	25.1	24.2	23.0	18.8	19.1	20.7	18.9	22.7	22.3
160	17.5	20.2	25.0	30.1	28.5	27.1	25.8	24.9	26.0	28.4	24.0	29.2	28.1
200	21.5	24.5	28.9	32.6	30.0	27.6	27.4	29.0	29.9	29.8	26.6	33.3	31.0

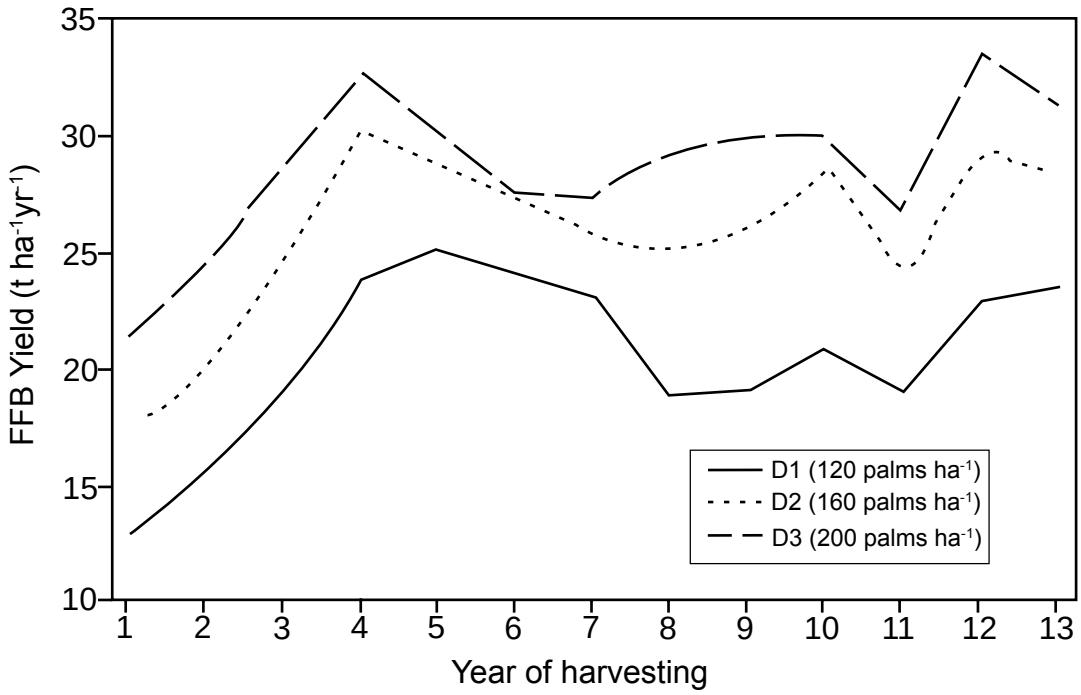

Figure 1. FFB yield of oil palm planted at different planting densities on deep peat.

TABLE 2. AVERAGE OIL/BUNCH AT DIFFERENT PLANTING DENSITIES

Planting density (palms ha^{-1})	O/B (%)
120	21.3
160	21.8
200	22.3

Note: data based on analyses of 3352 bunches.

TABLE 3. FINANCIAL ANALYSIS

At general charges RM 400 ha^{-1}	Planting density (palms ha^{-1})		
	120	160	200
IRR (%)	23	27	28
NPV (10%) (RM)	10 483	15 716	18 434
BCR	1.63	1.80	1.85
FFB production cost (RM t^{-1})	96	90	91
Average FFB yield (t ha^{-1} yr^{-1})	21	26	29
Cumulative FFB yield (t)	267.3	334.8	372.1
Payback period (yr)	8	7	7

At general charges RM 450 ha^{-1}	Planting density (palms ha^{-1})		
	120	160	200
IRR (%)	23	26	28
NPV (10%) (RM)	10 092	15 324	18 042
BCR	1.58	1.77	1.81
FFB production cost (RM t^{-1})	98	92	93
Average FFB yield (t ha^{-1} yr^{-1})	21	26	29
Cumulative FFB yield (t)	267.3	334.8	372.1
Payback period (yr)	8	7	7

At general charges RM 500 ha^{-1}	Planting density (palms ha^{-1})		
	120	160	200
IRR (%)	22	26	27
NPV (10%) (RM)	9 701	14 933	17 651
BCR	1.55	1.74	1.78
FFB production cost (RM t^{-1})	101	94	95
Average FFB yield (t ha^{-1} yr^{-1})	21	26	29
Cumulative FFB yield (t)	267.3	334.8	372.1
Payback period (yr)	8	7	7

For more information kindly contact:

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