A Note on the Long-term Palm Oil Yield Trend

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ABSTRACT

National data for Malaysia on annual palm oil yields per hectare were re-examined in the light of their apparent lack of improvement over the last few decades. Published yields were compared to yields re-calculated from basic data on total crude palm oil (CPO) production and mature planted area. While some discrepancies were evident between the data sources, the general conclusion that yields for the country as a whole have stagnated was confirmed. However, this was not the case for Sabah where yields showed a consistent rise over the 26 years from 1976, and have exceeded those for the Peninsula since ca. 1995. The decline in oil extraction rate (OER) and differences in mean palm age do not seem to account for the differing trends in palm oil yield.

INTRODUCTION

The apparent stagnation in the average yield of palm oil per unit area in Malaysia over the past 20 or so years has recently been the subject of much discussion and speculation as to its causes (Kok et al., 2000; Tinker, 2000; Pushparajah, 2001; Jalani et al., 2002). The lack of improvement is considered surprising in view of the concerted efforts to raise yields by the introduction of superior planting materials and better agronomic practices.

The data on which the yield trend is based are those published annually, formerly by PORLA and now by MPOB, in a booklet on oil palm statistics (PORLA, 1999; MPOB, 2001). In addition, monthly data are now available on the MPOB website. These data do indeed show a long-term stability, with oil yield for Malaysia as a whole averaging 3.63 ± 0.07 t ha⁻¹ over 26 years from 1976 to 2001 (Figure 1). The average yield between 1992 and 2001 was actually lower than this, being only 3.50 ± 0.06 t ha⁻¹.

But has the yield really remained static? Reports from individual estates certainly show yield increases over time in tune with technical advances (Davidson, 1993; Goh et al., 1994). It has nevertheless been argued that the average yield has been pulled down by factors such as the substantial expansion of the planted area into less favourable environments, reductions in agronomic inputs due to depressed prices, labour shortages leading to sub-standard harvesting and infrastructural problems (Jalani et al., 2001; Khoo, 2001). Another factor is the decline in OER which acts to offset the improvement in fresh fruit bunch (FFB) yield.

Due to certain perceived anomalies in the FFB and palm oil yield data, such as the peak yields during the years 1984-86 (Figure 1), it was decided to re-examine the data to check the assumption of yield stagnation. In addition to the directly listed yield data to be found in Palm Oil Bulletin 45 (November 2002) p. 1 – 5

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The three data sources are described in the text. Only the recalculated data show a significant trend: \( y = 0.014x + 3.3587; r^2 = 0.2194 \) (\( P < 0.05 \)).

The period of analysis was dictated by the availability of data. Published data on mature and immature areas were available only from 1975 onwards. Due to the use of areas averaged over two years, the re-calculated yields cover the period 1976-2001.

The calculations were first performed using data for the whole country and then separately for Peninsular Malaysia and Sabah. Sarawak was not examined alone as its area of production was too small while for the individual states in the Peninsula, data on mature, as opposed to total areas, were not readily available and there was also likely to be movement of FFB across state boundaries leading to less precise estimates of yield.

**RESULTS AND DISCUSSION**

The results presented in Figure 1 show discrepancies between the DOS and PORLA/MPOB data although neither show a significant trend over time. The recalculated values, however, show a small but significant (\( P < 0.05 \)) positive trend in oil yield of 0.014 t ha\(^{-1}\) yr\(^{-1}\) and a total increase of 0.36 t ha\(^{-1}\) over 26 years, a very modest rise indeed!

When the data for Peninsular Malaysia are examined (Figure 2), none of these shows any significant increase in oil yield over time. (Here, the PORLA/MPOB data, available only for 1984 onwards, agree with the DOS data, so only the former are shown.)
The results for Sabah (Figure 3) show a clear significant ($P<0.001$) upward trend in palm oil yield with time, averaging 0.061 t ha$^{-1}$ yr$^{-1}$ (recalculated values) and 0.069 t ha$^{-1}$ yr$^{-1}$ (PORLA/MPOB values), equivalent to total increases of 1.6 and 1.8 t ha$^{-1}$ respectively over the 26 year period. A similar increase was calculated for Sarawak between 1976 and 1990, but thereafter, the yield declined (data not presented).

The increasing trend in East Malaysia, and especially in Sabah, thus appears to be the cause of the positive slope for Malaysia as a whole. These increases contrast to the situation in Peninsular Malaysia where the yields have been static. The oil yield in Sabah (and Sarawak) started, however, from a very low base (for Sabah, 2.42 t ha$^{-1}$), which may largely account for the increase. Oil palm planting only commenced in Sabah in 1959 and the present mean palm age is lower than in the Peninsula (Henson, 2003). Thus, a higher proportion of newly bearing palms may have resulted in the lower yields in Sabah in the earlier years. To check this, the annual changes in mean palm age were calculated for 1976 onwards for Peninsular Malaysia and Sabah. The results (Figure 4) show that prior to 1982, the mean palm age was similar or even lower in Peninsular Malaysia than in Sabah. So, although the mean palm age in Sabah has since been kept low due to a high rate of new planting, age differences were not the cause of the initial yield differences between Sabah and the Peninsula in the late 1970s.

![Figure 2. Annual mean yield of palm oil (t ha$^{-1}$) for Peninsular Malaysia from 1976 to 2001. Neither trend line has a significant slope.](image)

![Figure 3. Annual mean yield of palm oil (t ha$^{-1}$) for Sabah from 1976 to 2001.](image)

<table>
<thead>
<tr>
<th>Year</th>
<th>Recalculated</th>
<th>Linear (recalculated)</th>
<th>PORLA/MPOB</th>
<th>Linear (PORLA/MPOB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1976</td>
<td>3.3</td>
<td>3.5</td>
<td>3.4</td>
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<tr>
<td>1981</td>
<td>3.5</td>
<td>3.7</td>
<td>3.6</td>
<td>3.6</td>
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<tr>
<td>1986</td>
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<td>4.0</td>
<td>3.9</td>
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<tr>
<td>1991</td>
<td>4.0</td>
<td>4.2</td>
<td>4.1</td>
<td>4.1</td>
</tr>
<tr>
<td>1996</td>
<td>4.3</td>
<td>4.5</td>
<td>4.4</td>
<td>4.4</td>
</tr>
<tr>
<td>2001</td>
<td>4.6</td>
<td>4.8</td>
<td>4.7</td>
<td>4.7</td>
</tr>
</tbody>
</table>

For PORLA/MPOB data, $y = 0.0693x + 2.352$; $r^2 = 0.627$ ($P<0.001$).
For recalculated data, $y = 0.0618x + 2.3585$; $r^2 = 0.7362$ ($P<0.001$).
One factor restricting the increase in oil yield was the progressive decline in OER. However, while the OER declined significantly ($P<0.001$) in Peninsular Malaysia from 1984 to 2001 (OER data for earlier years were not available), the FFB yield showed no significant trend (results not presented). Thus, while reduced OER would have contributed in suppressing oil yield increases, it was not a main cause as there was also no significant increase over time in FFB yield.

In conclusion, annual palm oil yields (and FFB yields) have remained effectively static in Peninsular Malaysia over the last 26 years. In contrast, oil yields in Sabah have progressively increased at a rate of ca. 0.06 t ha$^{-1}$ yr$^{-1}$ from the low base in 1976. They presently exceed those in the Peninsula. The reasons for the differences between Peninsular Malaysia and Sabah are not clear, but differences in mean palm age do not seem to be involved.

The fact that Peninsular Malaysia yields are presently below those anticipated on the basis of experimental trials must be accounted for by other factors, as discussed elsewhere (Jalani et al., 2001; Henson, 2003).

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REFERENCES


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