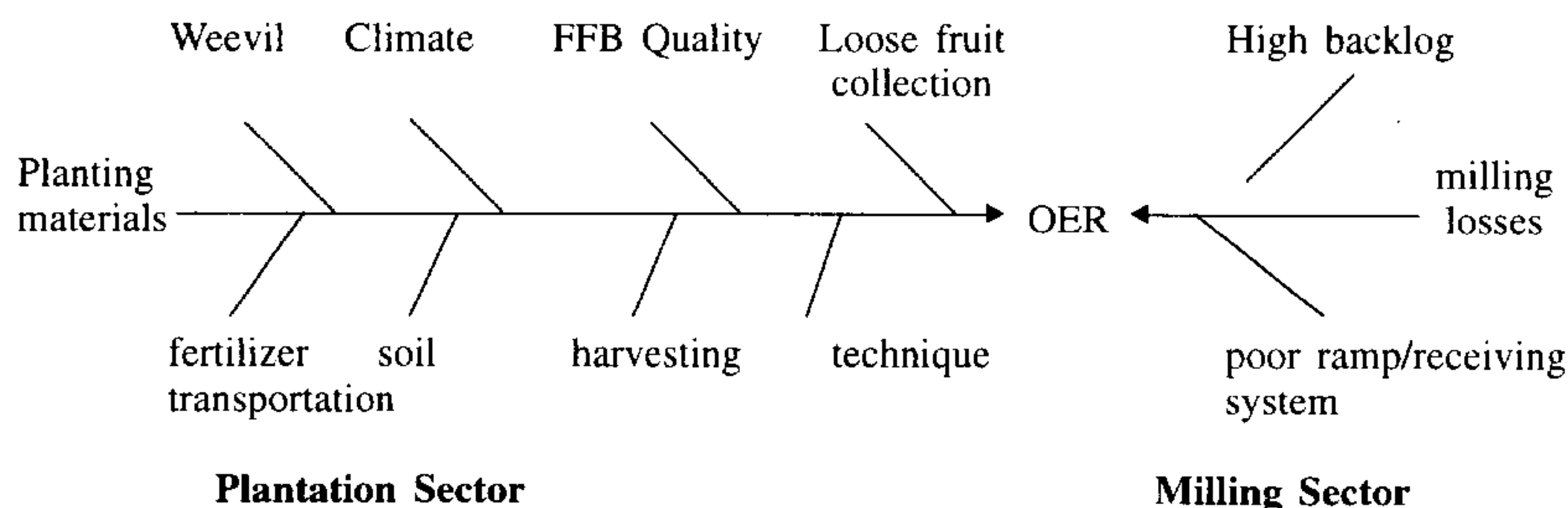


CASE STUDY ON OIL EXTRACTION RATE AND ITS ISSUES

1.0 INTRODUCTION

Over the last seven years, a declining trend in the OER has been observed and it has caused great concern to the oil palm industry. The decline of 1.24% in the national yearly average OER was recorded between the years 1988 to 1994. For Peninsular Malaysia, the total drop during the period was 1.36%. However, the situation was stable in Sabah and Sarawak until 1993 when the OER began to decline. This problem is not only affecting private millers but also the plantation agencies. The possible factors that contributed to the downward trend can be categorized into two (2), i.e., uncontrollable and controllable factors. These factors can be seen in the fish bone chart below.



The introduction of weevil in early 1980's, has brought changes in the fruit-sets and bunch geometries. The current oil palm planting material produced oil to bunch (O/B) ratio ranging from 22.29% to 24.99%. Allowing for harvesting and milling losses, the potential OER ranges from 19.06 to 21.37%. These values are comparable to planting materials produced in Indonesia as reported by Rajanaidu & Jailani, 1993.

2.0 FACTORS AFFECTING OER

A national seminar was held in 1993 to discuss and identify the factors that contributed to the low OER. Among the factors identified were weather, geographical factors, planting materials, age of palm, soil condition, fruit-sets and bunch geometries (a result of the introduction of the weevil), which are not within the management control. In addition, there were other contributory factors that were within the management control such as fertilizer application, loose fruits collection, poor quality fruits, unripe/under ripe fruits, mill oil losses etc. The general conclusion was that the labour shortage had resulted in loose fruits not being collected which in turn contributed to the lowering of the OER, since the outer fruits contain more oil.

In 1995, PORIM and PORLA undertook a detailed joint-study on the low OER and examined the manageable factors, namely the quality of fruits and milling efficiency that contributed to the low OER. Several measures and action plans were identified that could be implemented to improve the OER. The study compiled detailed information from a stratified sample of the mills in Peninsula and East Malaysia from June to November 1995.

In 1996, PORIM also undertook a study on FFB quality at 6 mills (Agency mills) in Peninsular Malaysia.

2.1. FFB Quality

During the case study, the FFB on the ramp was inspected and the following qualitative observations were noted.

a) The FFB ripeness which ranged from 64.7% to 73.6% was far below the PORLA Grading Manual Standard, 1993 in most mills in Peninsular Malaysia. No significant drop was observed in Sabah.

- b) Very high percentages of unfresh/old bunches were observed indicating that the FFB was not transported immediately to the mills.
- c) The inattentive collection of loose fruits and improper mechanization had resulted in a high level of trash and dirt.
- d) Most of the mills do not follow the proper grading system when accepting the FFB. Mishandling of fruits at some mills contributed a wastage and loss of fruitlets.
- e) The presence of rotten and empty bunches together with FFB consignment was generally unsatisfactorily high ranging from 3% to 8.3%.
- f) The undesirable practices by some dealers (eg. mixing lower quality fruits with better quality fruits, excessive wetting of the bunches) also contributed to poor quality of FFB.
- g) From the case study, Dura contamination was not really critical, except in one or two areas.
- h) It was observed that there was a high carry-forward of FFB stock during processing. Thus, the FFB that had been graded were not processed immediately, which resulted in some variation in the mill's OER with respect to the FFB quality (lag-effect).

2.2 Oil To Bunch Analysis

Palm oil is produced at the plantation while mills only extract the available oil in the fruits. Therefore, it is important to look at the oil composition in the bunch

from various sources. A study of 33 ripe tenera bunches, indicated that there was no reduction in oil to bunch ratio.

2.3 Milling Efficiency

The main findings of the study undertaken by PORIM on the milling losses are:

- (a) The average mill oil loss was found to be 2.41% to FFB. This exceeds the acceptable level of 2.0%.
- (b) High oil losses were found in the unstripped bunches (USB), press cake fibre (PCF) and sterilizer condensate (SC).
- (c) The average oil loss from Fruits in Unstripped Bunch was found to be 0.63% to FFB.

2.4 MPD Analysis

Analysis on the Mass Passing to Digester (MPD) aimed to assess the quantity of fruits processed based on fruit components.

- (a) There was a high level of trash (17%) in MPD. This non oil bearing materials together with the FFB load will lower the OER.
- (b) There was a decline in the percentage of mesocarp to fruits. This was suspected due to spillage, unripe and damaged bunches, uncollected loose fruits, consisting mainly of the outer fruits that contain more oil compared to the middle and inner fruits.

3.0 CONCLUSIONS

Poor quality FFB, uncollected loose fruits, trash, bruised and smashed-up fruits, and high milling losses are the major causes for the low OER. Possible errors in estimating FFB processed and ullage measurement may effect the daily OER.

Labour shortage (specially harvesters) and high turnover of workers could result in harvesting poor quality FFB, poor pruning standards, and poor loose fruits collection.

The mill management should, nonetheless, also fine tune the milling operation by daily constantly monitoring the throughput, oil losses at different stages of the process, down-time stoppages and breakdowns, and steam supply for sterilization. Shortcoming of any of these could contribute to low oil extraction rate.

Very close coordination and cooperation between planters or dealers or smallholders and millers to find ways to solve the problems associated with the decline in OER are required.

4.0 RECOMMENDATIONS

The following recommendations are given for the improvement of oil and kernel extraction rates:-

Plantations/Estates/Smallholders

1. Strictly harvest ripe bunches to achieve a 90 percent ripeness standard (PORLA Grading Manual Standard, 1993).
2. In order to achieve the above, it is preferable to implement 10-15 days harvesting cycle. (Gan, LT et al., 1993).

3. Loose fruits collection is a must with a minimum of trash contamination.
4. Improved pruning standards will increase harvesting quality and develop efficient methods and technologies for loose fruits collection.
5. Less handling, less long stalks and transport the bunches to the mills immediately.

Dealers

1. Install sufficient ramp capacity according to the daily crop received to reduce bruised, smashed and unfresh FFB.
2. Perform FFB grading for every crop consignment and to impose the necessary penalty for poor quality crops.
3. Give a better price for good quality FFB and reject those of poor quality.

Millers

1. Mill management must have at least one qualified person to grade the incoming crops and to impose the necessary penalty or rejection of the whole load of poor quality crop.
2. Minimizing the FFB left over after each processing day in order to avoid over or under estimation of the closing stock of FFB.
3. Recalibration of the CPO storage tanks is required after a number of years in order to avoid errors in the measurement of CPO weight.
4. The mill management should increase the ramp capacity to cater for the daily crop received, avoid spillages of fruit and damage of FFB during FFB handling.
5. Try to achieve a low or zero percentage of USB by installing a crusher or muncher followed by double threshing or beater-arm machine.
6. Employ double pressing in order to recover some of the oil loss in press cake and to enhance kernel recovery.

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REFERENCES

- Gan, L T; H O, C T; Chiew, J S and Lam, K S (1993). "Effect of Harvesting Practices on Oil Extraction Ratios. In Proceedings of the National Seminar on Palm Oil Extraction Rate: Problems and Issues. PORIM Kuala Lumpur
- Rajanaidu N. and Jailani B S (1993). Influence of Planting Materials on Oil Extraction Ratio (OER). In Proceedings of the National Seminar on Palm Oil Extraction Rate: Problems and Issues. PORIM Kuala Lumpur.
- PORLA Fresh Fruit Bunch Grading Manual (1995).
- (Contributed by Zulkifli A.R. of PORIM; Noh M.S. and Jalil M. of PORLA)