
GRADING OF FFB FOR PALM OIL MILLS IN MALAYSIA

(An abridged copy of the paper by En. Abdul Jalil Murad of PORLA presented at the 1994 National Palm Oil Milling and Refining Technology Conference)

INTRODUCTION

To complement the industry's aspiration in the search for quality and efficiency improvement, PORLA took the initiative to publish "The PORLA FFB Grading Manual" so as to promote quality awareness amongst the mills, the plantations and the smallholding sectors. This manual is published as a reference especially for those that do not have their own grading schemes. For mills and estates that have their own grading schemes this manual can serve as an alternative to them if they purchase fruits from outside suppliers.

OBJECTIVE

The main aim of the manual is to improve the quality and quantity of crude palm oil and palm kernel production in Malaysia.

The specific objectives are as follow:

- i. To improve the quality of fresh fruit bunch (FFB) received at the mills.
- ii. To improve the quality of Malaysian crude palm oil.
- iii. To improve the efficiency of oil and kernel extraction rates in the mills
- iv. To ensure that the suppliers and millers obtain a fair deal from their transactions.

IMPLEMENTATION OF THE GRADING SCHEME

Grading site

Grading can be done anywhere inside the premises of the mill or its agent. Normally, it is best done on a platform beside the loading ramp.

Who can perform the grading

Grading should only be done by the Grading Staff of the mill or an agent appointed by the mill who has the capability and experience in the grading of FFB.

Documents required

Documents that are required for grading are the Grading Report, Weighbridge ticket and suppliers agreement documents (if any). Only FFB received from suppliers with a valid PORLA license are to be graded.

GRADING PROCEDURES

Sampling Procedures

Select about 50-100 bunches at random as a sample from each consignment to be graded. The sample taken should represent the top, middle and bottom portions of the consignment.

The minimum sample size of each consignment to be graded should be determined based on the following criteria:

- i. If the net weight of the consignment is less than 5 tonnes, the minimum sample size should be 50 bunches.
- ii. If the net weight of the consignment is 5 tonnes or more, the minimum sample size should be 100 bunches.

The sample size should be economical, practical and able to detect any change in the bunch quality especially the degree of ripeness at 95% level of confidence.

4.1.3 The bunches that have been sampled for grading should be separated from the rest of the bunches.

Grading frequency

The minimum grading frequency for each supplier of FFB with a long term contract should not be less than 10% of the total consignments or at a ratio of 1:10 lorries. If there are variations in the quality of FFB supplied or doubts regarding the FFB quality, the grading frequency should be increased to fifty percent (50%) of the total consignments or at a ratio of 1:2 lorries.

For suppliers without a long term contract, grading should be done on all consignments.

Bunch Classifications

FFB can be classified and graded according to the following criteria:

- i. Ripe Bunch
Ripe bunch is a bunch which has reddish orange colour fruits and has at least 10 sockets of detached fruitlets and more than fifty percent (50%) of the fruits still attached to the bunch at the time of inspection at the mill.

- ii. **Underripe Bunch**
Underripe bunch is a bunch which has reddish orange colour fruits and has less than 10 sockets of detached fruitlets at the time of inspection at the mill.
- iii. **Unripe Bunch**
Unripe bunch is a bunch which has purplish black colour fruits and without any socket of detached fruitlets at the time of inspection at the mill.
- iv. **Overripe Bunch**
Overripe bunch is a bunch which has darkish red colour fruits and has more than fifty percent (50%) of detached fruitlets but with at least ten percent (10%) of the fruits still attached to the bunch at the time of inspection at the mill.
- v. **Empty Bunch**
Empty bunch is a bunch which has more than ninety percent (90%) of detached fruitlets at the time of inspection at the mill.
- iv. **Rotten Bunch**
Rotten bunch is a bunch partly or wholly, including its loose fruits, has turned blackish in colour, rotten and mouldy.
- vii. **Long Stalk Bunch**
Long stalk bunch is a bunch which has a stalk of more than 5 cm in length (measured from the lowest level of the bunch stalk).
- viii. **Unfresh/Old Bunch**
Unfresh or old bunch is a bunch which has been harvested and left in the field for more than 48 hours before being sent to the mill. The whole fruit or part of it together with its stalk has dried out. Normally, this type of bunch is dry and blackish in colour.
- ix. **Dirty Bunch**
Dirty bunch is a bunch with more than half of its surface covered with mud, sand, other dirt particles and mixed with stone or other foreign matter.
- x. **Small Bunch**
Small bunch is a bunch which has small fruits and weighs less than 2.3 kg (5 lb.).
- xi. **Pest Damaged Bunch**
Pest damaged bunch is a bunch with more than thirty percent (30%) of its fruits damaged by pest attack such as rat *etc.*
- xii. **Diseased Bunch**
Diseased bunch is a bunch which has more than fifty percent (50%) parthenocarpic fruits and is not normal in terms of its size or its density.

- xiii. **Dura Bunch**
Dura bunch has fruits with the following characteristics:
 - a. Shell thickness 2-8 mm
 - b. Ratio of shell to fruit 25-50%
 - c. Ratio of mesocarp to fruit 20-60%
 - d. Ratio of kernel to fruit 4-20%
 - e. No fibre ring around the shell
- xiv. **Loose Fruit**
Loose fruit is a fruit detached from a fresh bunch because of ripeness and is reddish orange in colour.
- xv. **Wet Bunch**
Wet bunch refers to a consignment of FFB which has excessive free water.

GRADING METHODS

The sample that has been selected should be graded to determine the quality of the bunches and the extraction rate that can be given to the supplier. During grading the following should be carried out:

- a. Inspection and assessment of the bunch quality.
- b. Calculation of penalty for poor quality bunch.
- c. Determination of the basic extraction rate.
- d. Calculation of the awarded extraction rate.

Inspection and assessment of the bunch quality

The grading of the consignment of FFB should be done in the presence of the supplier or his representative such as the lorry driver or his attendant.

The lorry with the consignment of FFB which has been selected to be graded is directed to unload on the platform near the loading ramp. Ensure that the bunches are evenly laid out, no overlapping or layering should occur.

Count the number of bunches in the consignment and calculate the average bunch weight by the following formula:

$$\text{Average Bunch Weight} = \frac{\text{Net Weight (kg) as per Weighbridge}}{\text{Total Number of Bunches}}$$

Record the information in the Grading Report.

From these bunches, select at random 50-100 sample bunches and separate them from the rest of the bunches. Selection of the minimum sample size should be based on the net weight of the consignment.

Grade, classify and count the sampled bunches into five groups based on the criteria of bunch classifications as stated:

- i. Ripe Bunch
- ii. Underripe Bunch
- iii. Unripe Bunch
- iv. Empty Bunch
- v. Rotten Bunch

Record the number and the percentage of each group in the Grading Report.

Grade, classify and count again all the sampled bunches into three groups as follows:

- i. Long Stalk Bunch
- ii. Dirty Bunch
- iii. Dura Bunch

The grading should be based on the criteria of bunch classifications as stated.

Record the number and percentage of each group in the Grading Report.

Any consignment of FFB that has poor quality bunches exceeding:

- i. the 20% maximum allowable limit for empty bunches or;
- ii. the 30% maximum allowable limit for dirty bunches.

Should be rejected and the whole load returned back to the supplier.

In practice, it is not possible to obtain one hundred percent good quality bunches and hence a reasonably good quality consignment should comprise the following combination of bunch quality :

<u>Bunch Category</u>	<u>Limit</u>
Ripe Bunch	> 90%
Long Stalk Bunch	< 5%
Underripe Bunch	< 10%
Unripe Bunch	0%
Dura Bunch	0%
Empty Bunch	0%
Rotten Bunch	0%
Dirty Bunch	0%

GRADING REPORT

Sample grading report

All observations and calculations during grading must be recorded in the Grading Report Form.

Particulars that have to be recorded are as follows:

- a. Net weight
- b. Number of bunches
- c. Average bunch weight
- d. Number and percentage of unripe bunches
- e. Number and percentage of underripe bunches
- f. Number and percentage of ripe bunches
- g. Number and percentage of empty bunches
- h. Number and percentage of rotten bunches
- i. Number and percentage of long stalk bunches
- j. Number and percentage of dirty bunches
- k. Number and percentage of Dura bunches
- l. Observations on bunch quality
- m. Name and signature of Grading Officer

Use a separate Grading Report Form for each consignment.

This form to be completed in duplicate. The original copy to be kept by the mill and the second copy to be given to the supplier or his representative.

CONCLUSION

It is an accepted fact that the extraction rate and quality of crude palm oil and kernel produced at the mills are limited by the type of FFB received by the mills. Beyond that they are determined by the efficiency of machinery and the style of management adopted by the various mills. The grading system as practiced in the majority of mills is considered an equitable system because it is designed to differentiate the payment for FFB received according to quality and thus encourage suppliers to adopt a good harvesting standard. For those mills that do not have their own grading scheme, PORLA FFB Grading Manual serves as a useful reference.

(Note: In this abridged copy of the paper we have concentrated on "grading of FFB" only. We would suggest that for information on penalties for poor quality bunches and calculations of extraction rates you should obtain a copy of PORLA's FFB Grading Manual).