

The Importance of In-Field Bunch Analyses for Plantation Management

The commercial oil palm industry is a century old, yet to this day growers only know the yield of fresh fruit bunch (FFB) harvested from their fields, and not the yield of final products of the crop viz. crude palm oil (CPO, or oil) and palm kernels (PK, or kernel). At the same time, the palm oil mills that process the FFB target specific oil and kernel extraction rates without knowing how much CPO and PK are actually contained in the crop received for milling.

Likewise, smallholders who sell their FFB to mills are not paid based on the assessment of the oil and kernel contents of their crop. Instead payment is based on an oil extraction rate that the mills define, with price deductions for other FFB characteristics deemed to reduce oil extraction efficiency of the mill. No account is made for the kernel content. There is, thus, no direct incentive for smallholders to specifically aim for FFB with high oil and kernel contents.

In plantation groups that mill their own FFB, the plantation and mill are commonly managed separately, with high FFB yield expected from the former, and high oil extraction rate expected from the latter, on the presumption that both these parameters can be increased independently.

From the foregoing we conclude that the industry pays scant attention to kernel, and yield intensification efforts have focused on the oil. Intensifying oil yield depends on: (a) increasing the FFB yield; (b) increasing the oil content (OC) of the FFB; and (c) extracting more of the oil from the FFB, i.e. improving the oil recovery efficiency (ORE) rather than the oil extraction rate per se.

The Southeast Asia Program of the International Plant Nutrition Institute (IPNI SEAP), working with plantation partners in Indonesia at commercial scale, found that agronomic best management practices that maximize FFB yield produced higher oil yield but not higher oil extraction rate (Oberthür *et al.*, 2012). In the course of the project, IPNI SEAP showed that a modified bunch analysis procedure can be used to estimate the OC of commercially harvested FFB before any harvest losses occur. The procedure was tested at five locations in Indonesia between Dec-2009 and Jun-2011, involving a total of 13,760 bunches sampled during routine harvesting in 50 commercial blocks. The IPNI SEAP bunch analysis method can be implemented without much difficulty or need for sophisticated facilities.

Ripe bunches, defined as a bunch with at least 1 loose fruit (LF), were analyzed including all their LF, to give an estimate of the OC of ripe FFB. A representative sample of ripe FFB was obtained on each occasion of harvesting using the procedure described by Oberthür *et al.* (2012). The mean OC value of the sample of harvested ripe bunches was taken as the OC value (before any

field losses) for the total weight of FFB of the entire harvest on that occasion and enabled the estimation of potential oil yield from the FFB yield before any harvest loss occurred.

Plantations already routinely carry out harvest audits to assess the quality of harvested FFB. The number of uncollected LF and the percentage of unripe bunches in the harvest can be used to estimate the oil lost from the harvested FFB based on the results of such harvest audits. A pre-milling estimated OC (after field harvest losses) is thus obtained for the harvested FFB.

Combining bunch analysis and harvest audit data allows growers to estimate their potential oil yield (before losses) and actual oil yield (after losses). With this, they can calculate their Field ORE (FORE), which gives an assessment of the effectiveness of field practices on crop recovery and oil content.

Knowledge of the pre-milling estimated OC of harvested FFB then allows mills to measure their process performance more objectively based on their Mill ORE (MORE), and pay growers for the oil content of their crop, further motivating growers to improve FORE. A virtuous cycle of estimating potential product contents of individual FFB deliveries, and using the information to improve crop recovery in the plantation, may thus start.

References:

Oberthür, T., C.R. Donough, K. Indrasuara, T. Dolong, and G. Abdurrohlim. 2012. Successful intensification of oil palm plantations with best management practices: Impacts on fresh fruit bunch and oil yield. p. 67 – 102. In: E. Pushparajah (ed.) Proc. Int'l. Planters' Conf. 2012. The Incorporated Society of Planters, Kuala Lumpur.