Bold Approaches to Fertilizer Use: Estate Scale Experimentation

Fertilizer is a major expense to plantations. After thousands of trials, we know about its general benefits to sustained high productivity. However, how much do managers really know about the payback from fertilizer on their estates? In practice, agronomists can say little about the effect of fertilizer on specific estates which they have yet to trial because the effects of soil, climate and interactions with management factors, such as harvest processes, introduce huge uncertainties. Estate scale experimentation (ESE) enables managers to see how fertilizer performs on their own plantations, producing a stream of intelligence about the return on variable costs to operations. The principle of ESE for fertilizer use is simple: introduce a deliberate variation into the pattern of fertilizer input and analyze its effect in production. The results are the 'real thing', and provide clear meaning to managers and agronomists that can help them make changes confidently.

ESE is a form of online experimentation. Online experimentation is proving very popular in modern info-tech industries, but has a history in manufacturing, or medicine. The difference with conventional agricultural experimentation is the 'online' part. Conventional agricultural experimentation has dealt almost wholly with "pots and plots", experimentations on abstractions from field production systems, rather than the system itself. Online experimentation has not been easy before for three basic reasons: (1) varying input was not possible over most large production systems, (2) measuring output was not possible over large areas for most production systems, and (3) there was no conventional method of socializing the results from ESE for management change. The first two limitations do not apply to oil palm, which has a history of detailed recorded keeping of inputs and outputs at the block level. The third limitation applies, but less so, since large plantation operators, at least, are organized to manage the flow of information and to act accordingly.

ESE is designed to impose minimal additional costs to managers beyond analysis. ESE uses standard operating procedures whenever possible, and are developed with managers to ensure that risks are minimal. Benefits are accrued through better management that comes from more certain (clearer) insight. It is more certain because results apply directly to the plantation in which ESE is installed. The insight will help managers focus on winners. For example, suppose the ESE identified 20% of a plantation that produced 2t/ha more with an additional 50 kg/ha of fertilizer per hectare. For a plantation of 6,000 ha, this can represent an additional productivity valued at about $300,000 each year. If the ESE also identified the area where fertilizer was not producing more, this

change comes at virtually no cost, since inputs are shifted from non-responsive to responsive areas. Often, ESE will show what good managers suspected, but with evidence that can be presented to support change.

IPNI and partners are currently conducting trials using various methods to analyze the results of ESE. Insights are anticipated in the identification of areas with a high likelihood of positive response to fertilizer, and high-risk areas with a low likelihood of positive response. ‘Puzzle areas” identify sections of the plantation that fail to respond for no clear reason. Here, further (trial) work is needed.