

## **Development of Quantitative Land Evaluation for Sustainability of *Elaeis guineensis* Cultivation in Peninsular Malaysia**

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### **Introduction**

Oil palm is the most important agricultural crop in Malaysia. With the sudden occurrence of regional economic and currency crisis the oil palm industry will stay as the major contributor to the agricultural sector an important contributor to Malaysia GDP. The expansion of oil palm areas in Malaysia will likely to slow down but in Indonesia, Vietnam, Laos and Cambodia is likely to develop rapidly. Many Malaysian companies are actively engaged in the latter and face challenges in the agronomic and management skill to ensure successful investments. In agronomic aspect it is probably best done using land evaluation technique either qualitatively or quantitatively. Land evaluation system for oil palm cultivation in Peninsular Malaysia using the Framework for Land Evaluation (FAO, 1976) which is a qualitative land evaluation has been reported by Adzemi (1999). FAO(1993) promoted the use of economic or quantitative land evaluation subsequent to the physical evaluation or in parallel with it and work on this field of land evaluation for oil palm is new.

### **Materials and Methods**

Fifty soil series from five oil palm plantations in Peninsular Malaysia were used to evaluate the impact of agromanagement changes on the sustainability of oil palm plantations using the sustainability criteria of profitability, productivity, stability and environmental friendliness. Each of the plantations was divided into areas with fertile soil, lateritic and non-lateritic soil for site-specific management. Yield data, leaf nutrient content, soil nutrient status and vegetative growth were recorded for each area. The economic return in each area was assessed using benefit cost ratio and break even costs at two oil palm prices of RM800 and RM1,200. The productivity was determined using actual yield. Productivity stability was measured using coefficient of variation of yields. Changes in soil nutrient status were used to determine the impact of agromanagement inputs on the environment

### **Results and Discussion**

Quantitative land evaluation showed that major oil palm yield limitation were low in nutrient status, poor root activity and water stress in areas with poor management practices. By overcoming these limitations increased FFB yields from 16 mt to 26 mt ha<sup>-1</sup> year<sup>-1</sup>. Production stability was found to improve FFB. Cost of production of FFB mt<sup>-1</sup> was found to reduce from RM100 to RM80 with increases in the profit. The break even price of palm oil was found to reduce RM600. Nutrient balance study showed that the nutrient applied were mainly retained by soil, taken up by oil palm growth and removed by FFB production.

### **Conclusions**

New plantation crop investment require changes in agromanagement practices to ensure profitability. These changes must also maintain the sustainability of the estate. The study indicates that quantitative land evaluation provide good measure of production limitations and examining the impact of corrective measure on the sustainability of the plantations as determined by productivity, profitability, protection and stability. Further research is required to examine long term impact on the sustainability of oil palm plantation in Malaysia

### **Benefits from the study**

This approach provides a valuable tool for agrotechnology transfer to new areas of development of oil palm plantation in the neighbouring countries

**Patent(s), if applicable:**

Nil

**Stage of Commercialization, if applicable:**

Nil

**Project Publications in Refereed Journals:**

Nil

**Project Publications in Conference Proceedings:**

Nil

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