# About This Special Issue

I am pleased to introduce this special issue of *Better Crops International* (BCI), in which the various aspects of oil palm production are highlighted. Our recognition of the importance of this world class crop is reflected in the fact that we have devoted 56 pages to this issue of BCI. Ordinarily, the magazine is 24 to 32 pages in length. Special thanks are due Dr. Ernst Mutert and Dr. Thomas Fairhurst, Director and Deputy Director of PPI/PPIC East and Southeast Asia Programs, for their leadership in compiling and organizing the material presented here. We trust you will find the information useful.

David W. Dibb, President
Potash & Phosphate Institute

# Introduction to Oil Palm Production

By T.H. Fairhurst and E. Mutert

**In this special edition of *Better Crops International*, we offer readers useful insights on oil palm agronomy provided by scientists working in some of the oil palm growing areas worldwide and outline some of the services available from PPI/PPIC.**

Over the past 30 years, the worldwide area planted to oil palm (*Elaeis guineensis* Jacq.) has increased by more than 150 percent (**Figure 1**). Most of this increase has taken place in Southeast Asia, with spectacular production increases in Malaysia and Indonesia (**Figure 2**).

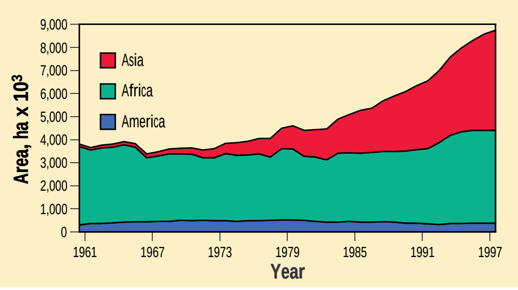


Figure 1. Expansion of the area planted to oil palm in Asia, Africa and America (FAO, 1999).

There are several reasons for this rapid expansion. Crude palm oil and kernel oil prices have been strong, due to the rapid increase in consumption of dietary oils and fats in the developing economies of China and India. This has encouraged investors to develop plantations on the large areas of suitable land found in peninsular Malaysia and the islands of Sumatra in Indonesia and Borneo, where part belongs to Malaysia (Sabah and Sarawak) and part to Indonesia (Kalimantan). So far, the expansion of oil palm in Southeast Asia has not been limited by unmanageable pest and disease problems.

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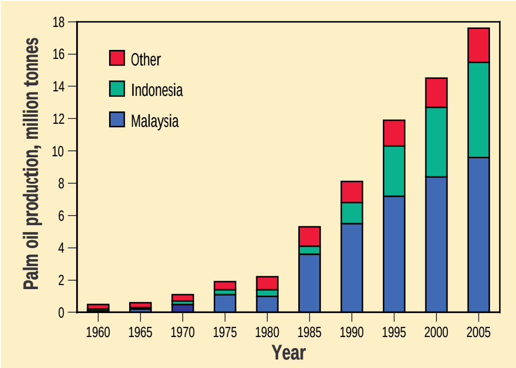


Figure 2. Development of oil palm production in Indonesia and Malaysia compared with the rest of the world, 1960-2005 (PPI/PPIC, 1998).

Crude palm oil and palm kernel oil are adaptable vegetable oils and now have a wide range of markets in the food and oleochemical industries (**Figure 3**). In addition, palm oil has been found a very healthy component of the human diet.

The oil palm remains a formidable competitor with other vegetable oil crops in terms of oil yield per hectare and resource use efficiency due to its unrivalled ability to transform solar energy into vegetable oil. For example, the oil yield from properly maintained oil palms is over six times larger than oil yields from commercially grown rapeseed (**Figure 4**). Additionally, the energy balance expressed by the ratio of energy output to input is wider for oil palm than other commercially grown oil crops (**Figure 5**).

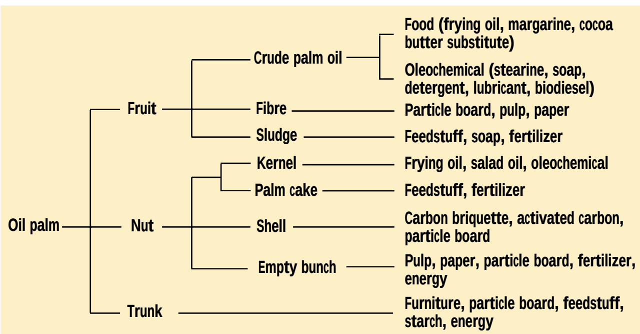


Figure 3. Uses of palm oils and biomass in food and manufacturing industries.

These characteristics will undoubtedly favour the oil palm as a renewable energy source in the future. On most soils, mineral fertilizers are required to sustain large yields and account for most of the energy used in production inputs.

These production indices help to explain why oil palm produces 22 percent of the world's vegetable oil on only 2 percent of the land planted to major vegetable oil crops (**Figure 6**).

Yields are higher in Southeast Asia compared to West Africa due to the effect of more favourable climatic conditions (solar radiation and rainfall distribution) on palm growth and yield (**Figure 7**). Over the past 30 years, yields have increased in both Southeast Asia and Central and South America due to the introduction of modern planting materials and improved field management techniques (particularly mineral nutrition and pest and disease control). The introduction of the pollinating weevil *Elaeidobius kamerunicus* in the 1970s ended the costly and inefficient process of hand pollination and resulted in sharp increases in yield in many oil palm producing regions. However, the proportion of total worldwide palm products...crude palm oil (CPO) and palm kernels...produced in Southeast Asia continues to increase (**Figure 8**) due to increases in the planted area and larger fruit bunch yields.

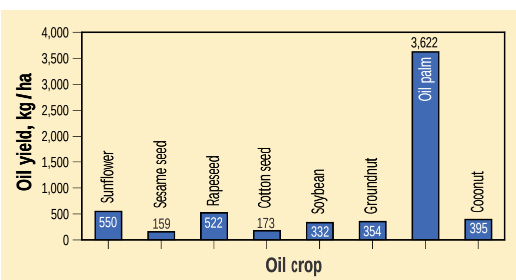


Figure 4. Oil yield (in oil equivalents) for major vegetable oil crops (after Mielke, 1991).

The nutrient demand of oil palm depends on the site's yield potential, which is determined by climatic conditions and the genetic potential of the planting material used. Thus in West Africa, nutrient demand is smaller than in Southeast Asia due to less favourable climatic conditions, particularly the effect of the prolonged dry season, on flowering.

Nutrients are removed in harvested bunches, immobilized in the palm trunk, and recycled through pruned leaves, male flowers, and leaf wash. Nutrients may also be recycled to the field in the form of empty fruit bunches, the principal residue resulting from the factory oil extraction process.

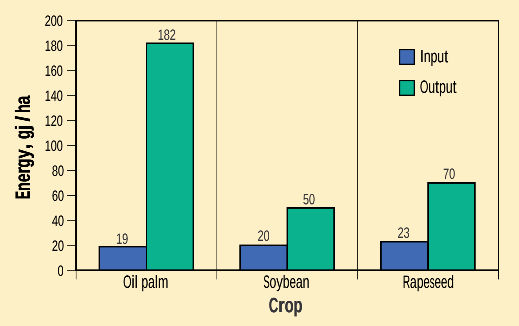


Figure 5. Resource use efficiency for oil palm, soybean and rapeseed (Wood and Corley, 1991).

Nutrient demand is small in the first year following field planting as the palm becomes established and develops a root system. However, there is a steep increase in nutrient requirements in years 3-4-5, but thereafter nutrient demand remains rather stable as shown for nitrogen (N), phosphorus (P), potassium (K), and magnesium (Mg) in **Figure 9**.

The oil palm has the potential to play an important role in the drive for more sustainable farming systems in the next century. Some of the positive aspects of oil palm cultivation with regard to the environment are as follows:

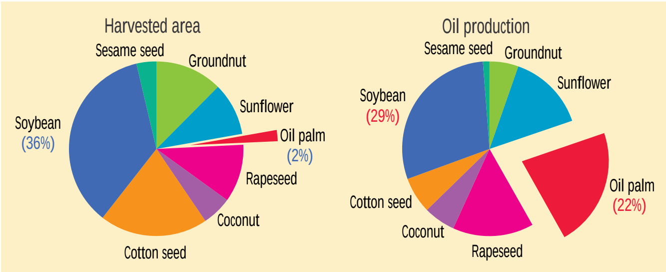


Figure 6. Harvested area and oil production for major vegetable oil crops (Mielke, 1991).

- Although oil palm is most efficiently grown as a monoculture, pesticide use is seldom required, provided proper ground conditions are maintained to supply the habitat necessary for the build-up of naturally occurring pest predators.
- As with other tree crops, the oil palm provides year-round ground cover which protects the soil from erosion.
- Well managed oil palms sequester more carbon (C) per unit area than tropical rainforests, and oil palm estates are predicted to become an important part of C offset management in the next century.
- About 25 percent of the harvested biomass may be returned to the field as a nutrient rich mulch, providing opportunities for growers to recycle nutrients and biomass from more fertile to less fertile parts of the estate.

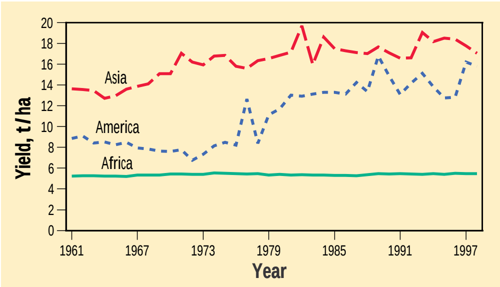


Figure 7. Fruit bunch yield in Latin America (excluding Brazil), Africa, and Asia (FAO, 1999).

Although primarily an estate crop, the oil palm has been successfully adapted to suit the needs of smallholders and has proved a powerful tool for poverty alleviation in developing countries. For example, approximately 2.5 and 1.3 million ha have been developed as

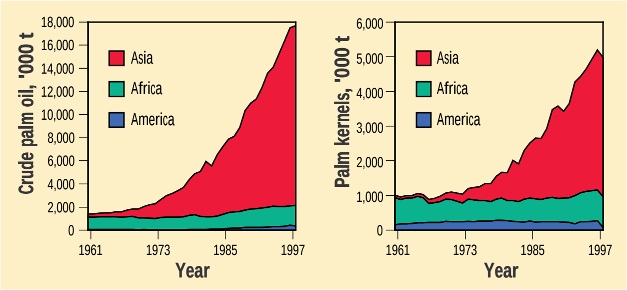


Figure 8. Regional production of CPO and palm kernels in Asia, Africa, and America (FAO, 1998).

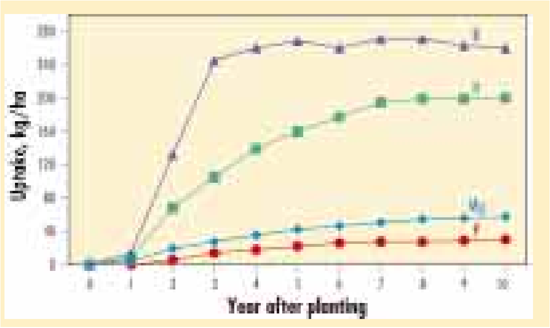


Figure 9. Nutrient uptake in oil palm (Ng, 1977).

smallholder projects, respectively, in Indonesia and Malaysia, bringing improved standards of living to 12 million people. **BCI**

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## References

The FAO (1999) Statistical database. FAO website at http://www.fao.org.

Mielke, S. (1991) Economic prospects for oilseeds, oils and fats toward the 21st century. In: Basiron, Y. and Ibrahim, A. (eds.) *The Proceedings of the 1991 PORIM International Palm Oil Conference. Module iv: Promotion and Marketing.* September 9-14, 1991, Kuala Lumpur. Palm Oil Research Institute of Malaysia, Kuala Lumpur, pp. 1-16.

Ng, S.K. (1977) Review of oil palm nutrition and manuring – scope for greater economy in fertilizer usage. In: Earp, D.A. and Newall, W. (eds.) *International Developments in Palm Oil. The Proceedings of the Malaysian International Symposium on Palm Oil Processing and Marketing.* Kuala Lumpur, Malaysia, June 17-19, 1976, Incorporated Society of Planters, pp. 209-233.

Wood, B.J. and Corley, R.H.V. (1991) The energy balance of oil palm cultivation. In: Basiron, Y., Sukaimi, J., Chang, K.C., Cheah, S.C., Henson, I.E., Kamaruddin, N., Paranjothy, K., Rajanaidu, N., Dolmat, T.H.T. and Arrifin, D. (eds.) *Proceedings 1991 PORIM International Oil Palm Conference.* PORIM, Kuala Lumpur, pp. 130-143.