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“Bridging the gap between increasing knowledge and decreasing resources”

## On Farm Energy Analysis of Sweet Orange Production in Nigeria

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### Abstract

Efficient use of energy is one of the principal requirements of sustainable agriculture. Energy use in agriculture has been increasing in response to increasing population, limited supply of arable land, and a desire for higher standards of living. Continuous increasing demands of food products have resulted in intensive use of chemical fertilisers, pesticides, agricultural machinery, and other natural resources. Efficient use of energy in agriculture will minimise environmental problems, prevent destruction of natural resources, and promote sustainable agriculture as an economical production system. The study was undertaken to investigate the energy inputs and outputs of a group of citrus research farms in Nigeria. Data used in this study was collected *in situ* on yearly basis; therefore the analysed and discussed energy values were averages of data collected over the years. The research results indicated that total energy inputs were 46.64 GJ ha<sup>-1</sup>. About 35 % was generated by human labour, 38 % from diesel oil and machinery, while other inputs contributed 29 % of the total energy input. About 87 % of the total energy inputs used in sweet orange production was from direct sources (seeds, fertilisers, manure, chemicals, machinery) and 13 % was from indirect sources (human labour, diesel). Mean orange yield was about 41 t ha<sup>-1</sup>. The net energy and energy productivity value was estimated to be 31.3 GJ ha<sup>-1</sup> and 0.88 kg MJ<sup>-1</sup>, respectively. The ratio of energy outputs to energy inputs was found to be 1.67. This indicated an intensive use of inputs in sweet orange production not accompanied by increase in the final product. Cost analysis revealed that total cost of production of sweet orange production was \$ 5590 ha<sup>-1</sup>. Benefit-cost ratio was calculated as 2.2. A methodological shift from the use of energy from non-renewable sources to renewable ones could bring about an improvement in the energy use pattern of the research citrus farms in Nigeria.

**Keywords:** Energy sources, energy use indices, Nigeria, sweet orange