# Citrus production in the savannah of western Nigeria: current status and opporunities for research input

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## ABSTRACT

A diagnostic survey of citrus production was conducted in the savannah zone of western Nigeria (Oyo North). The aim was to assess the current status of citriculture ,the impact of improved production technologies generated by two decades of research and to identify in collaboration with farmers, major production constraints which could be redressed by available technologies. The citrus trees were 11-35 years old and generally in a state of declining productivity. Most farmers(73%) intercropped their citrus trees with at least two of the following cropps:cassava, yam, plantain, maize, pepper, plantain, cocoa and mango. The proportion of farmers who had adopted the recommended production technologies were 11% (use of budded seedlings of improved citrus varieties), 14% (fertilizer application) and 20% (7m x7m spacing). Under the farmrers'cropping sytem, most ot the orchards (58%) yielded < 10 t / ha worth < N5000(240DM)/ ha.Ninety-.six percent of the farmers planned to expand citrus production the following year. The most prefered species were sweet orange (*Citrus sinensis*) and tangelo (*C.reticulata x C.pardisi*). Major production constraints listed by farmers were high pest and disease infestation and dearth of budded seedlings of improved citrus varieties. Although this was not mentioned by farmers, it was observed that some of the crops cobined with the citrus trees were likely deterimental to optimum fruit production.Based on farmers' plans, preferences and production constraints, the major interventions suggested for increased productivity of citrus in Oyo North are the training of the local Agricultural Extension agents in integrated pest management management of citrus, the establishment of decentralised citrus nurseries to produce mainly sweet orange and tangelo budlings and the introduction of intercrops which are acceptable to the farmers but not deterimental to the performance of the citrus trees.

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## INTRODUCTION

Citrus (*Citrus spp*) was introduced to Nigeria by the Federal Department of Agriculture and missionaries in the 1930s (Adigun, 1993). Subsequently, it spread throughout the country and is currently rated as the most widely planted fruit tree in Nigeria. It currently features in diverse cropping systems which include the multistoried homegardens, cocoa plantations, food crop plots and a few pure stand cirus orchards (Amih, 1985, Oladokun,1990). Due to its importance, it has received top priority research attention at the National Horticultural research Institute for more than two decades. Our study was conducted to assess the current status of citriculture in western Nigeria, the impact of various technologies for improved citrus production genarated by citriculture research in the past two decades and to identify current production constraints which could be solved by existing technologies. We focused on the citrus-foodcrops cropping system which ahs received little attention compared with the citrus-cocoa-kola cropping system which has been relatively more documented (Agboola,1979).

## MATERIALS AND METHODS

In July 1994, twenty -nine citrus farmers in the savannah zone of western Nigeria (Oyo North were interviewed using a structured questionaire. Respondents were chosen without bias for or against gender or social rank. The interview was complemented by farm visits. Yields mentioned by farmers (usually in volumetric units of baskets or truckloads) were converted to standard gravimetric units for computation of orchard yields. Gross revenue from orchards represents the mean for three years ;1991-1993(N1= 0.05DM). Values of yiels and revenue are of cummulative yields for three succesive years. Constaints reported are ony those considered of highest priority by the farmers.

## RESULTS

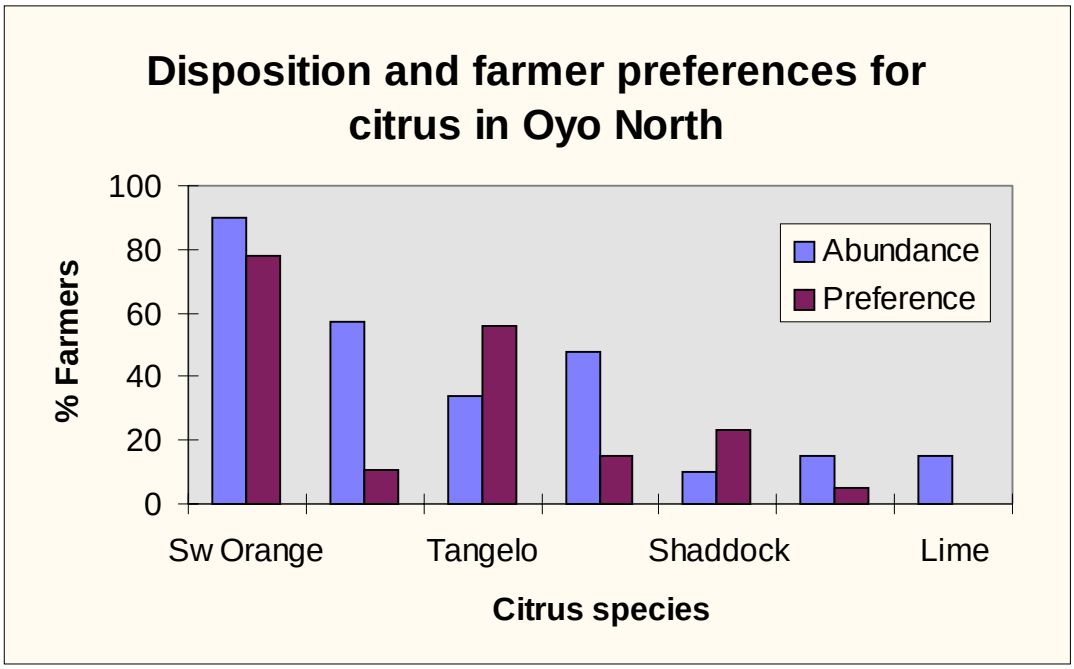
Farmers' profile and cropping system

All respondents were male resource poor farmers managing less than two hectares of citrus. Most of the farmers (73%) intercropped their citrus trees with other foodcrops or fruit trees at least in the first six years of establishing the orchard. Their major reason was system diversification. Intercrops included cassava (72%), yam (65%), maize (54%), plantain (35%), mango (29%), and pepper (27%). The choice of intercrop depended on the fertility status of the orchard. Plantain (Musa AAB) featured in the first two years of orchard establishment when the soil was still very fertile. Intercropping with maize continued until the fourth year while intercropping with cassava or yams continued until the sixth year of orchard establishment.

There was a low adoption of the reccomended practices for use of budded seelings, tree spacing, fertilizer application and pest control. Eleven percent of the farmers used buded seedlings while otthers used unbuded seedlings raised fron saved seeds. Only 20% of the citrus farmers adopted the recommended spacing of 7m x7m (NIHORT, 1982). Other spacings used by farmers were 3m x3m (19%), 4m x4m (8%), 5m x5m (6%), 6mx 6m (20%), 10m x10m ( 9%) and irregular (18%). Soil fertility was maintained by incorporation of weed residues/green manure (41%) and fertilizer application. Some farmers (34%) had no strategy for soil fertility maintenace in their orchards. None of the farmers had knowledge on pest and disease control of citrus.

Orchard characteristics

Majority of the orchards were in the 11-20year (43%) and 21-35 (37%) year age bracket. Farmers planted mainly an assortment of sweet orange (*Citrus sinensis*) landraces (Fig .1). Next in prevalence were tangerine ( *C.reticulata*) and grapefruit (*C.paradisi*). Most of these were seedling trees which commenced poroduction 5-10 years after transplanting. Under the farmers' management practice, the fruit yields per hectare were less than 10 t (58%), 10 - 30 t (11%) , 31 - 70 t (17%) and more than 70 t(14%). Revenues per hectare from the orchards were less than N6000(67%), N6000 - N9000 (18%), N10000 - N20000 (5%) and larger than N20000 (10%). N1 = 0.04 DM.




Production constaints

Major constaint listed by farmers in order of importance were pest and disease infestation premature fruit drop due to attack by noctural fruit piercing moths, termite damage to stem bark and tree roots and gumosis (52%), dearth of budded seedlings (19%), lack of capital/inputs (12%), severe soil moisture stress during the dry season which leads to high seedling mortality(7%) and seasonal labour shortages especially for weeding (5%).

Farmers´future outlook

Most of the farmers (75%) considered that there was a gradual yield decline in their citrus orchards. Consequeltly they planned to establish new orchards the following year. Their species preference was highest for sweet orange (*C.sinensis*) and tangelo (*C.reticulata x C.pardisi*),(Fig.1).

**DISCUSSION**

Compared with yields reported by Kolade and Olaniyan (1998) from on-station research plots in a similar region, only 14% of the orchards in the savannah of western Nigeria produce optimally. This could be due to the failure of farmers to adopt the recommended practices. For instance, the use of seedling trees rather than budded seedlings means that fruit production is delayed by 2 -6 years. The

study of Fawusi and Fayemi (1978) considered N and Zn limiting to optimal citrus yield in the savannah thus absence of fettilizer application by farmers leads to loss of tree vigour. The farmers' practice of intercropping gives good weed control and supplementary revenue from the orchard at the early stages of establishment (Aiyelaagbe and Kintomo,1999; Aiyelaagbe,2001). However, some of the crop mixtures especially the cassava + maize+ citrus mixture delay and decrease fruit yield of of citrus (Aiyelaagbe, 2001).

The absence of high farmer adoption of the recommended practice is partly due to lack of information and largely due to socioeconomic reasons. Implementation of some of the recommended practices requires considerable cash input which the farmers usually did not have to spare. How can the productivity of citrus orchards in the savannah of western Nigeria be increased? The solution probably lies in resolving the conflict between the efficacy of the recommended (research) production technologies and their social compatibility and affordability by farmers. The interventions must be chosen in collaboration with farmers and addressed to their prioritised constraints .

The pescribed solution for pest and disease infestation is training of the local Agricultural Extension Agents in inegrated pest and disease mangement of citrus. They will assist the farmers in the first instance and ultimately train the farmers to do it themselves.To address thedearth of budded seedlings of improved citrus varieties, decentralised citrus nurseries managed by farmers` cooperatives or individual entrepreneurs could be established .This will be preceded by a Train the Trainers ´ course on nursery establishment and management to be attended by Agricultural Extension Agents and a few farmers. A collection block to supply budwood and rootsock material could be established alongside using certified budded seedlings obtainable from the National Horticultural Research Institute (NIHORT). The Agicultural Extension agents of the state Agricultural Development Proramme and Non Govermental Organisation could give training courses on production of budded seedlings on an annual basis to further decentralise seedling production.The issue of lack of capital/inputs could be resolved by the establishment of Farmers` Cooperative could help share overhead costs and source credit to purchase inputs and hire labour. Results obtained by Aiyelaagbe (2001) show that the adoption of more productive and sustainable cropping mixtures such as the chili + amaranth +citrus mixture could also ultimately resolve cash flow problems of citrus farmers. The problem of soil moistre stress can be addressed by using drought tolerant root stocks, water harvesting and prompt planting of citrus budded seedlings as soon as the rains stabilize.

**CONCLUSION**

Productivity of citus orchards in the savannah of western Nigeria (Oyo North) is currently sub-optimal. The orchard expansion plans of the farmers provides an opportunity to introduce research technologies which could lead to increased productivity. To succeed, the interventions must be selected and executed as a collaborative effort between reseach scientists, extension personel and the citrus farmers.

**ACKNOWLEDGEMENT**

This study was funded as part of Project PRP 102 of the National Horticultiral Reseach Institute, Ibadan, Nigeria. Authours are grateful for the input of the Oyo State Agricultural Development Programme in selecting survey sites.

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