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## Sustainable Root & Tuber Crop Production Systems for Sub-Saharan Africa

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### Abstract

Root & tuber (R&T) crops are the mainstay of many smallholders across Sub-Saharan Africa (SSA). Yam and cassava, two of IITA's mandate crops, have undergone differential changes over the last 50 years. While cassava is ascending from a marginal subsistence crop to a major commercial cash crop, yam, previously a major staple, is threatened by declining soil quality no longer supporting high and reliable yam yields. Cassava germplasm improvement created high yield potential and pest & disease tolerance/resistance. In yam very little genetic improvement was attained. Agronomic research to increase production has not received adequate attention and funding over the last 20 years. The fact that cassava with a yield potential of  $>80 \text{ Mg ha}^{-1}$  realises  $12 \text{ Mg ha}^{-1}$  in Nigeria today, almost as much as 30 years ago, raises the question how to realise more of the potential by farmers.

Today R&T agronomy receives major attention in IITA with the final goal to develop site specific crop management expert systems (CMES) that will be at farmers' disposal through an open access software application. The CMES will be a decision support tool comprised of 5 modules along the production process: (1) varietal choice, (2) soil and crop management including land clearing and preparation, tillage, planting density and pattern, intercrops, and weeding regimes, (3) nutrient supply, (4) pest and disease control and (5) locally adapted methods to maintain or improve soil fertility.

Currently research is on locally optimised cassava varieties, planting density, choice of intercrops and pattern, tillage and weed control methods and frequency. The nutrient supply expert system is developed in collaboration with the International Plant Nutrition Institute (IPNI). Trials on nutrient limitations, fertiliser responses and application rates are conducted in 4 countries across SSA. Legume integration, erosion control, soil amendments and fertiliser are options to improve, maintain or rehabilitate soil quality to support R&T crop production. The IITA Bio-control Center in Cotonou, Benin provides expertise on pest and disease control in R&T systems focusing on bio-pesticides to avoid environmental damages.

The R&T agronomy research focuses on interventions that farmers can implement without major capital and labour investment and those that are gender neutral or improve the situation of women, children and the youth. With a large number of projects investigating component technologies the next step is developing efficient approaches to take cassava agronomy to scale across the major producer countries in SSA.

**Keywords:** Agronomy, cassava, legume integration, nutrient manager expert system, scaling, weed control, yam