

# Integrated Soil Fertility Management

## Opportunities for smallholders in West Africa

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Low soil fertility is the main reason as to why West African farmers deplete their soils. Integrated Soil Fertility Management (ISFM) provides a way to reverse this (LEISA Magazine Vol.16, No.1, pp24-25). ISFM aims at progressive improvement of soil quality and nutrient, water and labour efficiency through the combined use of soil amendments and inorganic fertilisers.

### ISFM in practice

Experience shows that ISFM is effective in all climate zones having one or two rainy seasons, from the Sahel to Guinea savannah. In time, ISFM leads to improved agronomic efficiency of inorganic fertiliser, especially of N, but also of P. It usually takes 2 - 4 years or longer before this becomes visible to farmers in the form of increasing crop yields.

A three-fold increase of total millet biomass has been obtained in the Sahel, where five-fold fodder yield increases have been obtained. Similar fodder yield increases have been obtained in the Soudanian savannah. Maize yield increases due to ISFM are reported from the Soudanian, the Guinea and the Coastal savannah. While average farmer production is in the order of 1000 kg/ha, grain yields up to 6000 kg/ha have been registered with ISFM. Other crops that have reacted positively are sorghum and irrigated rice.

A whole series of soil amendments and related production systems in combination with inorganic fertilisers has been tested already. It concerns crop residues, manure, compost and household wastes, legumes and phosphate rock, agroforestry and perennial grass-crop rotations, leading to improved soil organic matter status. Part of the testing and validation is done in cooperation with rural development projects. An example is the use of a leguminous cover crop (*Mucuna*) in combination with local phosphate rock, to improve fertiliser use on a maize-cassava relay cropping system. An IFAD-funded project for village organisation and agricultural development in Southern Togo enabled IFDC to test and improve this ISFM option in 60 villages during 4 successive years. Such opportunities are exploited to develop and understand numerous options, to write and test technical advisory notes, and to develop a general guide on ISFM.

### Strategic site selection

Three zones are distinguished in this context: 1 - zones where the use of inorganic fertilisers is already economically feasible; 2 - zones where the use of inorganic fertilisers can become feasible thanks to ISFM; 3 - zones where due to present fertiliser and crop prices, even ISFM cannot result in favourable cost benefit ratios for the use of inorganic fertiliser. Large parts of Africa comprise of marginal lands falling into zone 3.

For effective introduction of ISFM in zone 2, strategic site selection is a must. IFDC-Africa has developed two types of selection: Type I - for the choice of zones and villages, and Type II - for the choice of fields. Criteria for type I are the availability of inputs, relatively good production conditions, the accessibility of markets, and serious overpopulation with strong overexploitation of natural resources. The last criterion selects farmers with growing difficulties to make a living out of their land. Further resource depletion may be just enough for bare survival, but insufficient for courageous farmers seeking to improve their income and conditions. Such farmers are therefore very motivated to try new ways.

In West Africa, combinations of favourable conditions are found around cities with their market for cereals, fresh vegetables and fruits, in regions with intensive production of cash crops like cotton, and in regions with irrigated rice. Another example is regions with crop-livestock integration where intensification of animal husbandry through intensive fodder production is economically feasible. The Soudanian savannah, in particular, has strong comparative advantages for ISFM based crop-livestock intensification. The IFDC-Africa approach exploits the opportunities created by favourable conditions within strategic regions, and aims for progressive inclusion of more marginal adjacent zones.

The second type of strategic site selection concerns the choice of fields at village and farm level. Practice shows that increasing cash income is the best stimulus for farmers to turn soil mining into sustainable production. Therefore, fertilisers and other external inputs have to be used on the best soils, not on the poorest or most depleted ones. Compound fields often offer the best chance of making fertilisers profitable. Farmers in Northern Togo succeeded in increasing maize production by almost 1000 kg/ha using 50 kg/ha of urea, while the same dose resulted in an increase of only 370 kg/ha on bush fields.

### Participatory and holistic ISFM introduction

IFDC-Africa is introducing ISFM in a participatory and holistic way, working with farmers through NGOs, extension services and national research institutes. The process approach is indispensable: ISFM development can only take place through a careful integration of outside scientific knowledge and indigenous knowledge and experience, in particular where conditions are heterogeneous and the technology options are diverse and flexible. It is only by working together, evaluating progress and failures, and assuring that cooperation adds capacity to farmers and other stakeholders that progress can be made.

Investments are required to increase the capacities of farmers and other stakeholders, and to enable networking. Even for the relatively favourable strategic sites, ISFM can not be introduced without external financial support for credit, training and networking.

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*A full version of the article is available on [www.ileia.nl](http://www.ileia.nl)*

### Reference

- Schreurs MEA, Maatman A. and Dangbégnon C, 2002. **In for a penny in for a pound. Strategic site-selection and on-farm client-oriented research to trigger sustainable agricultural intensification.** In: B. Vanlauwe, J. Diels, N. Sangana and R. Merckx (Eds.). *Integrated plant nutrient management in sub-Saharan Africa.* CABI Publishing. pp. 63 -74.



The effect of green manure is clear, but farmers have to find a way to fit it into their farming system. Photo: Henk Breman