COMBATING FOOD INSECURITY ON SANDY SOILS IN ZIMBABWE: THE LEGUME DILEMMA

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Maize, the staple food of Zimbabwe, is the most widespread crop grown under rainfed conditions in these systems but average maize yields remain low (<0.5 t ha^{-1}), threatening household food security. There are calls for diversification into high value crops, which may include both food and non-food leguminous crops as a means of sustaining household food security. However, several key questions with respect to diversification need to be answered. Firstly, what opportunities exist? Secondly, who has the capacity to diversify? Thirdly, which crops should be considered in this diversification process? The objectives of this study were to: (i) quantify farm-level maize and legume benefits generated through use of ISFM technologies; and (ii) promote appropriate targeting of ISFM technologies to different farmer-resource groups, paying particular attention to their capacity to adapt such technologies at field/farm levels.

The study was carried out on smallholder farms in Chinyika (32°20: 18°14' S), rainfall 650–750 mm $year^{-1}$. Farmer participatory research approaches were used in farmer and field selection. Three distinct farmer resource groups were identified on the basis of resource-endowment (Mtambanengwe and Mapfumo, 2005). These were: (i) resource-endowed farmers; (ii) intermediate farmers; and (iii) resource-constrained farmers. Four field sites were selected in this initial phase and each site was then sub-divided into six sub-plots. Three sub-plots were planted to maize; they received either (a) fertilizer alone, (b) cattle manure plus mineral N, or (c) woodland litter plus mineral N. One was planted to the soyabean (*Glycine max*) varieties, Solitaire and Storm. Sugarbean (*Phaseolus vulgaris*) and sunnhemp (*Crotalaria juncea*) occupied the last two sub-plots. The organic nutrient sources were used in combination with varying quantities of mineral-N fertilizer depending on what the different farmers could ideally afford.

F. D. Dakora et al. (eds.), *Biological Nitrogen Fixation: Towards Poverty Alleviation through Sustainable Agriculture*.

The biomass and grain yield levels for all the four crops tested were consistent with farmer classification. Although the soyabean variety, Storm, had high biomass production (0.2–4 Mg ha^{-1}) compared to the variety Solitaire, grain yields were about 10–25% higher on farmer-managed fields (Figure 1). Sugarbean grain yield varied from 15 to 250 kg ha^{-1}, whereas sunnhemp yields were about 15 t ha^{-1} for resource-endowed, 9 t ha^{-1} for intermediate, and 0.8 t ha^{-1} for the resource-constrained farmer. Researcher-managed plots yielded about 6 t ha^{-1}. Manure generally gave superior maize yields on farmers' fields compared to woodland litter and fertilizer alone. Yields were generally far below potential levels, even on the resource-endowed farmer's fields. Farmers do have the intention to grow legumes within their cropping cycles, but continue to be frustrated by persistent low yields that are in turn linked to poor soil fertility.

Several studies have confirmed these low yields (e.g., Mpepereki and Pompi 2003; Nhamo et al., 2003). Results from on-station work showed >100% yield gain following incorporation of *C. juncea* and *C. calothyrsus* (both leguminous) compared to same quantities of the traditional cattle manure.

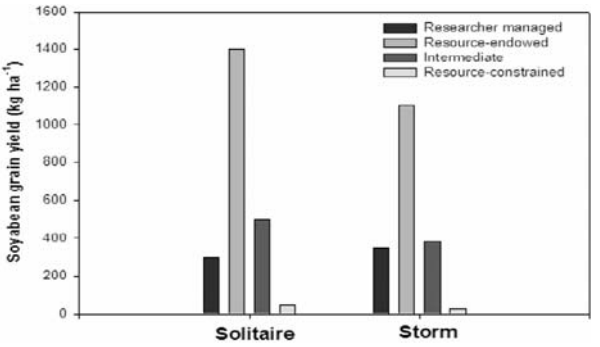

Figure 1. Soyabean grain yield on fields belonging to farmers differing in resource endowment.

The results show that there is scope for enhancing the contribution of legumes to both soil fertility and household nutriation within smallholder farming systems. The challenge is improving accessibility to quality and improved legume seed and promoting the use of mineral fertilizers to stimulate high biomass productivity. A significant part of the legume-BNF research should focus on promoting utilization aspects along specific legume value chains.

Acknowledgement

This work was conducted under the auspices of the Soil Fertility Consortium for Southern Africa (SOFECSA) and funded by the Rockefeller Foundation.

References

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