CROPPING SYSTEMS ON PERMANENT SOIL COVER FOR MADAGASCAR HIGHLANDS

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In Madagascar Highlands, population pressure and intensive rice cultivation in the lowlands has led to cultivation on the fragile, low fertility soils of the hillsides. Fertilisation being limited, yields remain low while erosion leads to paddy field silting-up and destruction of downstream infrastructures. To overcome these problems, experiments on direct planting on permanent soil cover (DPPSC) have been conducted since 1991 in the Andranomanelatra farm and since 1994 in farmers’ fields, covering a wide range of biophysical and socio-economic situations.

Crossing systems under investigations

Traditional cropping practices (with ploughing) are compared with systems that allow a better integration with animal raising, a major activity in Madagascar Highlands:

- Direct planting on crop residues, with (eventually) relay cropping of forages (oats, etc.).
- Association of the main crop with perennial species (maize grown on Desmodium uncinatum or Trifolium semipilifolium, soybean or green bean on kikuyu grass - *Pennisetum clandestinum* - etc.).

Several fertilisation levels (adapted to soil types and cultivated species) are compared to soil smouldering, a traditional technique in high altitude areas, involving slow burning in trenches of organic material (*Aristida* sp., *Acacia mearnsii*, etc...) covered with soil.

Main results

Maize

- Maize yield increases with time under DPPSC and decreases when soil is ploughed.
- Tremendous impact of soil smouldering (performed only once, in 1996) leading to yields similar to those achieved with a high fertilisation level which farmers can not afford.
- Lower effect of mineral fertilisation with DPPSC than with ploughing.
- Lower sensitivity of DPPSC to climatic hazards.

Fig. 1: Trends in maize yield (kg/ha), according to soil and crops management. Ferrallitic soils, Andranomanelatra farm.

Green bean

- Reduction in disease pressure (healthy plants).
- Increase in bean yield, profit and labour productivity.

Fig. 2: Trends in green bean yield (kg/ha), according to soil and crops management. Ferrallitic soils, Andranomanelatra farm.

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References


Conclusions

Theses systems, which require minimal investment, have been adopted by over one thousand small farmers in Madagascar highlands. TAFA efforts now concentrate on training of extension staffs / executives and on support to extension.

A similar creation-diffusion approach is being developed for various agro-ecological zones of Madagascar. It should lead to sustainable improvement of agricultural production.