

Modernising intercropping systems

Problem

Growing demand for agricultural products in urban centres, together with market policies, are pushing cereal and legume producers from subsistence- to market-oriented enterprises.

Many farms in Mozambique are expected to abandon long-established practices of intercropping maize with legumes and cassava, preferring sole crops and more intensive maize production. This would come at the expense of valuable ecosystem services of traditional intercropping in exchange for higher economic returns on investing in cereal intensification compared to legume production.

Applicability box

Theme

Biodiversity and nature conservation, Agroecology, Sustainable Communities, Cropping systems, People and skills

Keywords

Ecosystem services, Intercropping, Socioeconomic development, Indigenous knowledge

Context

Coastal area of Maputo, Inhambane, and Gaza provinces in Mozambique, under subhumid tropical climate

Solution

Preserving intercropping requires compensation for farmers for the trade-off between the short-term benefits of intensifying cereal production and the long-term benefits of ecosystem service delivery. Both technical and policy adjustments are required to handle this trade-off.

Modern intercropping solutions, designed using participatory design methods, should increase the economic return of intensified intercropped systems compared to intensified sole cropping in rotation or maize monocropping. Cereal-legume combinations appropriate for the more intensive agriculture that would emerge in this transition need to be identified for Sub-Saharan Africa, including spatial arrangement of species, sowing dates, and cultivars.

Policy must develop markets for agricultural products and inputs to ensure access for farmers to adapted seeds, especially legumes. The relative price of maize and legume products paid to farmers must support the maintenance of legume production to the economic advantage at farm level of intercropping over sole cropping.

Benefits

- Increased food diversity and security.
- Enhanced biodiversity, nutrient cycling, soil protection against erosion, and atmospheric nitrogen capture by legume compared with sole crops of cereals and cassava.
- Reduced weeds pressure, integrated diseases and pest control maintained at high level when compared to sole crops.
- Reduced needs for (in)organic fertiliser inputs compared to sole crops.
- Reduced labour demand at farm scale.

Practical recommendations

It is helpful to develop a multi-local network of participatory design experiments to compare the agronomic performances of legume-cereal intercropping and sole cropping. The experiments should take place under current conditions on smallholder farms (low nutrient availability in soil) and conditions of reasonably in-

tensified agriculture (involving N fertilisation of 50-80kg/ha), and a variety of spatial arrangements of legume and cereal species with key candidate cultivars. Methods for this type of participatory design are available (e.g., mother-baby trials).

Organise an advisory panel of agricultural science institutions, experts of extension services, farmer representatives, and legume, cereal, and cassava value chain actors. They can assess the economic feasibility of reconciling intensification with intercropping systems at farm level, under the observable price at the farm gate, and given potential technical options resulting from the experiments above. The panel will identify and advise the Ministry of Agriculture on market correcting measures to favour intercropping over sole cropping for market-oriented farms.

Identify and convince sponsors to contribute to the operational expenses of the network of experiments to develop a price monitoring system and support meetings with the advisory panel. Additionally, sponsors should help to increase the limited public funding available in Mozambique.



Figure 1: Typical traditional, low input and low yielding intercropping system with cassava, maize and groundnut. Photo: F. Affholder, CIRAD, UEM.



Figure 2: prototype of intensified intercropping system with maize and cowpea. Photo: F. Affholder, CIRAD, UEM.



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Figure 3: Different patterns of intercropping maize with cowpea, in a CICS trial to identify the most appropriate pattern for intensified, modern intercropping. Photo: Joao Nuvunga.



100 Maize + 50% cowpea



100% cowpea



50 % maize +50 % cowpea



75 % maize +25% cowpea



75% maize +25% cowpea



Further information

Further readings

- Nuvunga, J., Couedel, A., Famba, S., Hauggaard-Nielsen, H., Falconnier, G., Giva, N., Affholder, F., Submitted. "Is cereal-legume intercropping a relevant option for ecological intensification in sub-Saharan Africa? A review." *European Journal of Agronomy*. Forthcoming.

Weblinks

- <https://www.remix-intercrops.eu/>
- Check the [Organic Farm Knowledge Platform](#) for more practical recommendations.

About this practice abstract

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IntercropVALUES aims to exploit the benefits of intercropping to design and manage productive, diversified, resilient, profitable, environmentally friendly cropping systems acceptable to farmers and actors in the agri-food chain. As a multi-disciplinary and multi-actor project, it brings together scientists and local actors representing the food value chain. It includes 27 participants from 15 countries (3 continents) from a wide diversity of organizations and stakeholders. The project will run for four years and started in November 2022.

Project website: <https://intercropvalues.eu/>