

# INTERCROPPING BOOSTS FOOD PRODUCTION

## Maize-beans and maize-cowpea intercropping in the Noreste

Intercropping is a traditional method of cultivation widely practised by farmers in tropical developing countries. Whilst in arid and semi-arid areas it is very common with annual basic food crops, in the humid tropics it is done with perennial crops and cash crops.

Intercropping can be defined as the growing of two or more crops simultaneously, on the same piece of land. The benefits this system can provide are:

- a) more efficient use of water and soil nutrients
- b) minimal risk of crop failure due to climatic variation or fluctuations in market prices
- c) reduction in costs of weed, pest and disease control
- d) nitrogen economy when legumes are included
- e) a more balanced diet of energy and protein for the farmer's family

Intercropping is common throughout Brazil, but is mainly practised by small subsistence farmers with a few hectares, especially in the poorest Northeast ("Noroste") state of Brazil. Here, crops are grown primarily under rainfed conditions, but with a high risk of failure due to prolonged drought. The traditional farming systems in the arid Northeast comprise a subsistence agriculture in which cattle-raising, cotton and food crops are the main activities. The family's staple food crops are maize, beans, cowpeas and cassava. The main cash crops are cotton, castor beans and sisal (fibre). Out of a number of intercropping combinations, maize-beans (in the more reliably rainy region of "Agrate") and maize-cowpeas (in the drier region of the "Sertao") are particularly important. Authentic figures for the region are not available, but at the national level it is estimated that 56% of all cultivated maize and 64% of beans are intercropped. Whilst in the Northeast, probably more than 90% of cowpeas are grown with maize

Although, on the whole, intercropping has not received as much research attention as cash crops, maize-beans and maize-cowpea systems have been examined by a number of people. There is strong evidence that both combinations give higher yields than their respective monocropping. The farmers' aim is to harvest both a cereal and a legume. So the overall land productivity - and the chances of satisfying the minimum subsistence needs - is a crucial factor when assessing the value of intercropping.

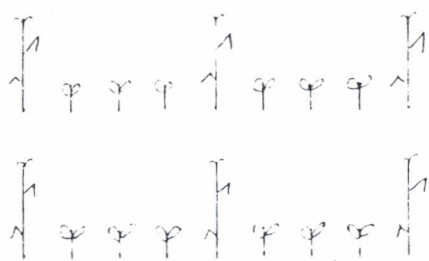


FIG. 1 MAIZE-BEANS INTERCROPPING

Average increases in yield of 32% with maize-beans, and of 41% with maize-cowpeas were recorded at one experimental station in the Northeast. The best cropping pattern for maize-beans was one row of maize for three rows of beans (Figure 1), with an optimum of 20,000 and 150,000 plants per hectare respectively. For maize-cowpeas, the best row proportion was one row of maize for two rows of cowpeas (Fig.2), with 20,000 and 50,000 plants per hectare.

### Fertilisation and N-fixation

The low levels of soil fertility and technology limit the agricultural potential of the semi-arid tropics of Northeast Brazil. Although the land is exploited intensively year after year, draining the soil of plant nutrients, the farmers do not



FIG. 2 MAIZE-COWPEA INTERCROPPING

apply any chemical fertiliser to their crops; quite simply because they cannot afford it. Besides, the rainfall is so variable in volume and distribution that the farmers would not risk any money on such an input.

So, when developing fertilisation practices for intercropping systems, particularly on small farms, it is important that the economics be considered along with the biological potential. It is already known that some leguminous plants can fix nitrogen from the atmosphere through a symbiotic relationship with specific bacteria; the nitrogen fixed in this way can supply most of the plants' needs. The commonest combination is of a legume crop with a non-legume crop, and it has been assumed that the presence of the legume must provide some nitrogen benefit to the system. Two main mechanisms are put forward to explain the benefits of legumes on non-legume crops:

- a) Current transfer, in which transfer of nitrogen from the legume occurs during the life of both crops
- b) Residual effects, in which the nitrogen fixed by the legume is used by a subsequent non-legume crop after decomposition of its organic residues

Studies on biological nitrogen fixation in beans and cowpeas have been improved in Brazil recently. There are some specific strains of bacteria (genus *Rhizobium*) which can be used. The practice of inoculation of seeds with "suitable" bacteria - which is a very low-cost input - could help the farmers of semi-arid areas in Brazil to improve the nitrogen supply in their intercropped fields, since the legume would not compete with the cereal for soil nitrogen.

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## "ALTERNATIVE TECHNOLOGIES" AND FARMER-FRIENDLY NETWORKS

The South of Minas Gerais is a very fertile region. The modernisation of farming - Brazil's green revolution - took hold there very early on. After a few years, though, farmers saw their costs of production - and so their indebtedness - rise sharply, whilst yields had levelled off. Meeting the "Alternative Technologies" project has opened up, for some farmers, new ideas on how to produce in a different way. It is a project of FASE - the Federation of Social Assistance and Educational Organisations.

### A Network in every respect

Creating good relationships between farmers, educators and researchers; valuing the farmers' knowledge and applying it to scientific know-how; spreading methods appropriate to small farms; trying to involve government agencies in a strategy of alternative technologies. These are the main aims of

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