

## Cereal and Legume Intercropping in Smallholder Conservation Agriculture (CA) Systems

### *What is intercropping?*

The growing of two or more crops on the same piece of land in the same season is called intercropping. Crops grown as intercrops should be of different growth habits, canopy structure and rooting architecture. Maize for example can be intercropped with cowpea, groundnuts, common beans, velvet beans and pigeonpea. Cotton and sunflower can also be intercropped with grain legumes.

### *Advantages of intercropping*

Advantages of intercropping cereal and legume crops include:

- Diversified crop production - cereals and legumes are grown on the same piece of land in one growing season
- Spreading the risk of crop failure - each crop species grown in an intercrop has different degrees of susceptibility to dry spells, drought, pest and disease pressure
- Protection of crops against some pests and diseases as cycles are broken by the different crop species
- High cereal and legume yields when compatible crop species are intercropped
- Improved soil fertility when grain legumes or leguminous green manure cover crops are intercropped with cereals
- Reduced soil erosion as more crop canopy in between the rows of the main crop protects the soil from raindrops and wind erosion
- More income, food and livestock feed can be generated simultaneously in an intercropping system

### *Types of intercropping*

The types of intercropping system can vary according to the needs of the farmer and their circumstances. Generally, there are three types of intercropping systems found in southern Africa:

- 1. Row-intercropping:** One or more crops are planted in regular rows and the other crop(s) may be grown simultaneously in the same row with the first crop.
- 2. Mixed-intercropping:** Growing two or more crops simultaneously with no distinct row arrangement.
- 3. Relay-intercropping:** Growing two or more crops simultaneously during part of the life cycle of each. The second crop is usually planted when the first has reached its reproductive stage but before physiological maturity.

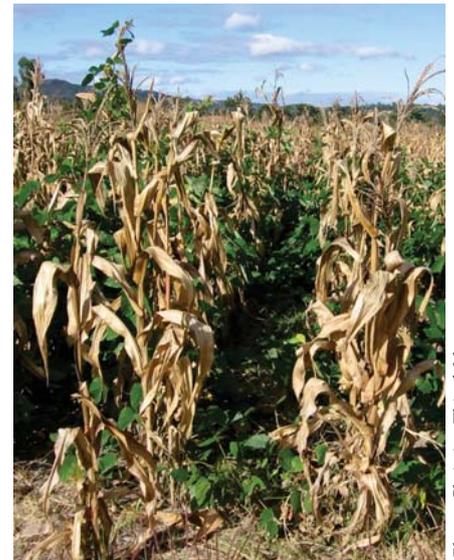


Photo: Christian Thierfelder

**Maize relay-cropped with velvet beans (*Mucuna pruriens* L.)**



Photo: Christian Thierfelder

**Maize intercropped with pigeonpea (*Cajanus cajan* L. Millsp.)**

## *Spatial arrangement of cereal and legume crops in intercropping systems*

Spatial arrangement of component crops is an important factor that can determine the success or failure of an intercropping system. Arrangement of component crops can be:

1. Alternating rows of component crops - i.e. one row of cereal followed by a row of legume
2. Two rows of legume planted between rows of a cereal crop
3. Alternate positions of cereal and legume crops in the same row



Maize intercropped with double rows of cowpea (*Vigna unguiculata* (L.) Walp) (left) or in single rows (middle) and planted in the same row as the maize (right)

### *When to seed the cereal and legume crops in an intercropping system?*

Cereal and legume crops in an intercropping system can be seeded:

- (a) on the same day - this can result in high competition between the two crops. However, when compatible crops are selected, no negative effects on crop growth and yield are experienced
- (b) on different dates i.e. relay planting - the cereal is often seeded first and the legume can be seeded up to eight or more weeks after seeding the cereal depending on the species and purpose of the legume selected.

### *Fertilizer application in cereal-legume intercropping systems*

- Basal fertilizer can be applied to the cereal and legume component crops
- Topdressing inorganic fertilizer is required for the cereal crop only; the legume intercrop fixes its own nitrogen
- Organic manure can be applied to both cereal and legume crops
- Cereals often show more positive responses to fertilizer compared to legumes but legumes still need adequate nutrient supply especially phosphorus
- However, legume intercrops can be grown on residual fertility if the farmer has no access to fertilizer

### *Practical recommendations to optimize intercropping*

- Select compatible component crops - i.e. combine crops with different growth habits, canopy structures, rooting patterns
- Carefully select seeding rates of component crops. The seeding rates may depend on: (a) prevailing conditions e.g. soil type, available soil moisture, dry spell and drought frequency; (b) production objectives e.g. food, income generation, livestock feed
- Carefully select seeding dates of different component crops based on their growth habits and cycles
- When using chemical weed control, select herbicides that are compatible with all component crops
- Avoid climbing intercrops as they complicate harvest procedures



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