

# Smallholder food crop production

Wout van Hoof

Wageningen, 2-12-2015

## ***Human race and agriculture***

### ***- History of agriculture***

The Pygmies in South-East Cameroon are hunter-gatherers. They don't have houses and they live from what they can collect in the tropical forest.

Other African tribes are nomads and they live from the products that their livestock provide. They live in arid and semi-arid areas.

Where the rainfall is more abundant, the Africans practised shifting cultivation, which means using the land for a couple of years for growing crops and thereafter leaving it in fallow for many years in order to restore the soil fertility.

With an increasing population pressure, the agriculture changed into permanent farming.

Small scale producers feed over 80 % of the people in Sub-Saharan Africa.

Self-subsistence smallholders can not afford to use fertilizers and other agricultural inputs that cost money. They can make use of techniques such as multiple cropping to diminish the degradation of the land and to maintain a modest production level.

### ***- A smallholder farm near Jimma, South-West Ethiopia***

The farm size is about 1 ha. The land is prepared for sowing by three plowings to eliminate the weeds. Two oxen are used for plowing and for threshing the tef. The crops which are sown are maize, sorghum, tef, barley, peas and other leguminous species. Other crops which are grown on the farm are bananas, enset, taro, noug, cabbage, pumpkin, red chili pepper, coffee and tchat. *Rhamnus pauciflorus* is used to give a bitter taste to tella beer and tedj.

Acacia trees provide firewood and contribute to maintain soil fertility by fixing nitrogen from the atmosphere. Traditional beehives hang in the acacia trees and provide honey. Communal land is used for grazing by the farm animals. Deforestation has denuded the slopes and has caused serious degradation of the soil by soil erosion. The hot chili pepper is dried and sold for export to the USA, in order to be used for dyeing meat. Banana and enset leaves are used for making banana art cards by a group of young women in Jimma.

### ***- A smallholder farm in the Kaloleni area, Coast Province, East Kenya***

The farm size is about 3 ha. During the last century the population of the Mijikenda tribe has increased from 100.000 to 1 million persons. Therefore, the population pressure exceeds largely the carrying capacity of the land. Slopes were denuded from trees and shrubs. The work on the field is done by the women. The men construct the houses and collect the sap from the coconut palms for using it as palm wine. Traditional crops are sorghum, millet and cowpeas. However, nowadays maize, rice and cassava constitute the main food crops. Other crops which are grown on the farm are pigeon peas, lablab beans, sweet potato, yam, banana, green gram, pumpkin, African eggplant, calabash, groundnuts, bambara nut, turmeric, castor, pineapple, sugar cane, sesame, tobacco, cinnamom, tamarind, jackfruit, mango, guava, soursop, coconut palms, orange, lemon, lime, pawpaw, clove, kapok, cashew and jambolan. Livestock consist of cattle, goats, sheep, chicken, ducks and donkeys. Young boys herd the cattle, which at night stay in a coral. Fishing, hunting and collecting wild plants contribute to the diet. Surplusses of the harvest and honey and wax from the beehives are sold on the market, as well as arrow poison. The farmer's family consists of 9 persons of which 4 persons constitute the labour force. Because money is needed for health care and for school fee of the children, 1 person per family is doing off-farm work in Mombasa, Kilifi or Malindi, most of the time poorly paid casual jobs.

### ***- A smallholder farm near Mzuzu, North Malawi***

Kasasire Farm is situated in a remote forest area near Mzuzu, in the northern part of Malawi. A large area has been planted with young Macadamia trees. Part of the Macadamia trees has recently started to produce fruits. The owners of Kasasire Farm are concerned for the social and economical wellbeing of the smallholders in the neighbourhood. They make young Macadamia trees available for the farmers who mainly grow food crops on their farms. By interplanting young Macadamia trees within the mixed crop of maize and beans, the soil on sloping fields will be better protected against soil erosion. Kasasire Farm provides extension to the smallholders on Macadamia growing and stimulates study clubs of farmers. Dehusking and processing of the Macadamia fruits is a tough job. By delivering the Macadamia fruits to the Macadamia estate for processing and marketing, the smallholders become outgrowers for Kasasire Farm. Macadamia trees need a good pollination for its fruit set. Therefore, for each hectare planted with Macadamia trees 5 beehives are advised in order to assure a proper pollination.

### ***How to maintain or to improve soil fertility in a self-subsistence farm?***

#### ***- Mixed cropping and multiple cropping***

A cereal crop and a pulse crop constitute a good combination, such as a combination of maize and groundnuts and a combination of sorghum and cowpeas. Beans, groundnuts, soya beans and other leguminous crops have an interesting nitrogen fixing capacity in their root nodules which helps to maintain a reasonable soil fertility. However, if the canopy of the maize reaches a level of a leaf area index higher than 4, the groundnuts will not produce well and in that case it is better to practise relay cropping or sequential cropping. One hectare of a mixed crop of groundnuts and maize produced in average a 10% higher yield in West Africa than the combined yield of 0,5 hectare of a sole maize crop and 0,5 hectare of a sole groundnuts crop. This can be explained by a higher interception of light, a more efficient use of the intercepted light and a more efficient use of the available water. Moreover, the risk of a crop failure is considerably diminished.

#### ***- Planting perennial crops on sloping fields***

Planting in sloping fields has to be done following the contour lines. Then, the rain water will better infiltrate into the soil and soil erosion will be diminished. Trees and bushes will keep the soil better protected from erosion.

#### ***- Applying farm manure and a mulch layer to the soil***

Farm manure provides soil nutrients for the crop and mulch is good for increasing the organic matter content of the soil, as well as for the microbiological activity within the soil.

#### ***- Fertilizer application and improved planting material***

When there is an income from selling farm products, the removed plant nutrients within the sold products should be compensated by a proportional application of fertilizers. This will develop into intensive farming, especially for vegetables and fruits.