



# Domestication and improvement of tree species in the department of Thiès, Senegal

## Introduction

Association Sénégalaise pour la Promotion de l'Agriculture Biologique et Biodynamique (ASPAB - The Senegalese Association for the Promotion of Organic Agriculture) was created in 1987 on the initiative of leaders of several farmers' development associations. The founders came to the realisation that the degradation of the environment was increasing. "Modern" practices, like monocultures, chemical fertilizers and pesticides, which accelerate the degradation process, were being favoured over traditional agricultural practices like protection of trees, vegetation soil cover, natural crop protection, integrated farming with livestock and fallow periods. Drought and desertification significantly worsen the level of environmental degradation.

ASPAB has a long experience in supporting rural and peri-urban horticulture. They contributed to the establishment of several biological and ecological agriculture technologies for restoring soils, integrating livestock with crop farming, protecting the environment, restoring biodiversity and providing training on environmental matters.

One of the projects of ASPAB is called 'Domestication and improvement of tree species in the department of Thiès'. The project is supported by the Embassy of the Netherlands in Senegal, in partnership with International Union for Conservation of Nature (IUCN). The aim of the project was to train farmers in the technical skills needed for the cultivation of orchard fruit tree species, including monitoring. Ten local wild fruit tree species were domesticated in the project.

The project was located in the department Thiès, in west Senegal, which is in the transition zone from the Sudan-savannah zone to the Sahel. The duration of the project was two years and benefitted farmers from 30 villages. The farmers involved are organized in an association called Peasant Council for Management of the Environment (COPAGE). 300 local training assistants worked in the project on domestication of forest fruit species and the wide dissemination of improved varieties of jujube trees with large fruits. The training assistants were active in the 30 target villages, including 10 village locations for training activities. These assistants were from the villages and each has a farm as well. They organized training sessions in their respective villages. The training included soil fertility improvement through composting, the establishment of tree nurseries, but also practices to enhance biodiversity such as agroforestry, the introduction of legumes in their fields and in their fences and natural regeneration of plants. In addition trees of the jujube 'Gola' variety were grafted on farms, potentially increasing farmers' income.



Figure 1. Agroforestry system



## Description of the Agroecology system

Historically, African people collected wild fruits in nature. However, overexploitation of some species observed in recent years, associated with climate change, led to the threat of genetic extinction of these species. In addition, natural resources are fragile and highly degraded, rainfall is irregular and uneven, economic activities are weak, there is a lack of technical competence within communities and soil degradation was reaching an alarming level.

Recently awareness on the ecological and economic importance of these species has been increasing, leading to protection programs and to improvement, domestication and enhancement of local fruit tree species. The species included are first of all jujube (*Zizyphus mauritiana*) and tamarind (*Tamarindus indica*), secondarily cashew (*Anacardium occidentale*), the baobab (*Adansonia digitata*), the mad (*Saba senegalensis*), desert date (*Balanites aegyptiaca*) and the dimb (*Cordyla pinnata*).

The professional horticulture training centre (CFPH) joined this research action. The approach of CFPH was to implement a species improvement program with medium and long term objectives. A quick way to improve fruit production has been explored which involves the import of foreign plant material. In this project improved varieties of Indian jujube were imported to Senegal.

Thus, as a first step towards the profitable exploitation of the species, after the improved Indian jujube varieties were imported, plant multiplying methods were tested and developed for different varieties as well as conservation techniques.



Figure 2. Improved Jujuba 'Gola' variety

The importation of improved jujube varieties was done successfully at the grafting stage for adult varieties as well as in the nurseries. ASPAB, having the expertise in this area, aims for continuation of the multiplication and dissemination of improved jujube varieties in other villages. Indeed, both the staff of ASPAB as well as the farmer trainers have been trained in the appropriate vegetative multiplying techniques (grafting and other technologies).

The specific objectives of the project are to:

- Strengthen the technical capacity of beneficiaries for domestication of fruit tree species, on methods of multiplication and crop management adapted to these species;
- Create “incubators” that can introduce fruit tree species most appreciated by the people;
- Introduce species to be domesticated in existing orchards, through application of techniques used in fruit cultivation (e.g. planting density, size, fertilization, irrigation, plant protection);
- Encourage the grafting of local jujube varieties with Indian improved varieties, for instance the 'Gola' variety (Figure 2).

The activities undertaken in the project are:

1. An information and organization mission in the 10 villages was implemented;
2. Compost production and training workshops on different soil restoration methods have been organised;
3. A nursery training was conducted and the establishment of 10 nurseries with 50,000 plants was realised;



4. Training on pruning and grafting of local older jujube trees and practice in the field was also implemented;
5. Training on grafting jujube trees produced in nurseries and in the field was implemented;
6. Ten wells were drilled and deepened.

### Implementation mechanism

The domestication and improvement of fruit tree species were considered as priority in the strategy of enhancing biodiversity and safeguarding the natural environment. This forestry approach was kept in the project framework and is already well received by the target populations. The domestication of species consisted of planting the trees in fields or gardens and treating them as cultivated species.

Forest species produced in the nurseries are:

- Jujube (*Zizyphus mauritiana*)
- Tamarind (*Tamarindus indica*)
- Soump (*Balanites aegyptiaca*)
- Nebeday (*Moringa oleifera*)
- Néou (*Parinari macrophylla*)
- Darkassou (Western *anacardium*)
- Nere (*Parkia biglobosa*)
- Baobab (*Andansonia digitata*)

The local jujube variety was grafted with an Indian variety called 'Gola' whose fruits are 15 to 20 times bigger than the local variety. The Gola variety is very popular and demand is increasing. This variety has already been introduced in several villages in Thiès department. ASPAB had sufficient potential grafts enabling to spread jujube Gola among the demanding villages. Nurseries with local jujube were created and grafting was done using grafts of the Gola variety. The Gola grafts have also been used to directly graft local adult jujube trees. The ASPAB staff used their expertise to perform technical improvement through grafting. In the rural area, ASPAB already grafted enough adult jujube trees from which grafts can be taken to continue the multiplication and dissemination of improved jujube varieties in other villages.



Figure 3. Increase of biodiversity

## Outcomes of the practices

In each of the 30 target villages, 10 indigenous assistants were trained in composting techniques and other soil restoration methods. In each of the 10 village training sites compost pits were created for training purposes. This approach was extended to all 30 target villages, each of the 10 assistants created similar compost pits for the training of 15 to 20 farmers (men and women).

In addition, the village assistants were trained in nursery management wild fruit trees. In each of the 10 training sites, a nursery of 5000 wild fruit trees was implemented by assistants including 1000 local jujube seedlings. These local jujube seedlings were grafted in the nursery with the Gola variety. In each of the 30 villages sites 50 local elderly jujube trees were grafted by trained assistants of the variety Gola.



Figure 4. Farmer training in the field

In each of the village training sites, the assistants were trained in pruning techniques for the older jujube trees. The assistants also conducted the extension of training activities obtained at the training sites. A monitoring and evaluation mechanism has ensured the extension.

From an economic point of view, farmers' incomes have been increased due to improved fruit quality; consequently this increased the market value and also contributes to food security. From an ecological point of view, the erosion of genetic heritage was mitigated. The pressure on the collection of fruits has been reduced. The economic and ecological importance of wild edible species has led rural people to better protect and promote local fruit species. The positive impact created by this operation has also encouraged people to expand and improve the domestication of jujube.

### Message from farmer to farmers

A Wolof proverb says: " Weddy guiss booku ci" or "to disagree does not apply when we see tangible evidence"

Farmers who applied agroecological techniques and technologies have had tangible results (improvement of soil fertility, reduced wind and rain erosion, enhanced biodiversity, increased diversified production, increase in income), these results convinced the other farmers, which contributed to the dissemination and reproducibility of agroecological techniques throughout the area.