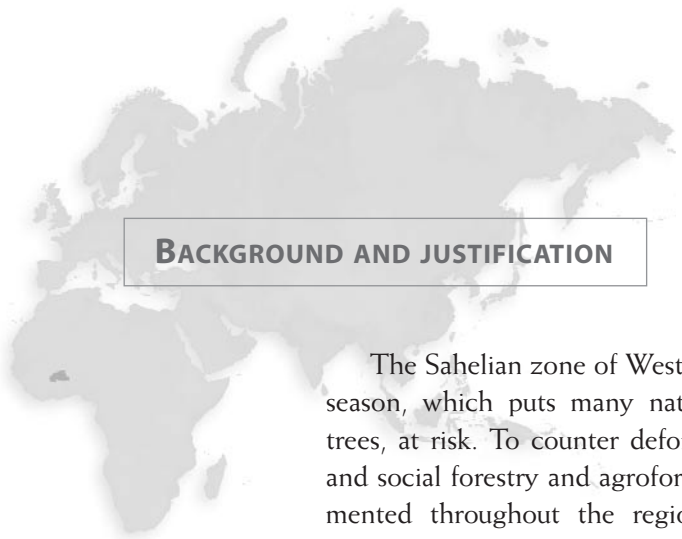
8 Nurseries for forest trees: Burkina Faso



Background and justification

The Sahelian zone of West Africa suffers from a short rainy season, which puts many natural resources, including forest trees, at risk. To counter deforestation, large-scale plantations and social forestry and agroforestry initiatives are being implemented throughout the region. Such programmes help to restore degraded ecosystems, prevent the loss of biodiversity and contribute to poverty alleviation. As rainfall is unreliable, the saplings and young trees grown for these initiatives need to be raised in protected tree nurseries. To optimize the production of saplings in these nurseries, the *Centre national de semences forestières* (CNSF, or National Tree Seed Centre) of Burkina Faso has developed a research programme focusing on species from the area's arid and semi-arid zones.

Since the 1980s, most nurseries have been raising saplings in plastic bags, but this practice has two main drawbacks: the bags are expensive for the rural farmers who are producing young trees and, as they are not biodegradable, they add to environmental pollution. CNSF set out to develop alternative containers that are cheaper and that can be manufactured from local materials following traditional local methods. These experiments resulted in the production of an earthenware container. CNSF then went on to perfect its design and to establish the

best ways of producing and using it. The Centre has also worked on identifying a suitable growth medium and the development of pest control measures.

Description

The earthenware containers, produced on an iron press, are 25 centimetres high and 8 centimetres in diameter. They are made from a mix of eight parts clay, seven parts manure, three parts sand and one part millet husks—a mixture based on the traditional way of manufacturing house bricks. Rural people, therefore, found the procedure acceptable and straightforward and the resulting containers are inexpensive to produce. Young plants grow in the earthenware containers in a propagation medium made up of three parts forest soil, one part sand and one part manure.

The seeds of 13 tree species and cuttings from an additional four species were then collected from both natural and plantation forests throughout Burkina Faso. Seeds were treated with sulphuric acid prior to sowing (except for the case of *Eucalyptus camaldulensis*) in order to break seed dormancy and ensure that germination was homogenous. Cuttings were soaked in a fungicide solution and inserted vertically into the containers. Great care was then taken to supply optimum amounts of water and to control the temperature and humidity.

Experiments were carried out over an eight-month period to test and compare the performance of the earthenware containers against the plastic bags in tree propagation and production. In particular, tests set out to:

- assess the earthenware containers' resistance to daily watering and erosion from rainfall;
- evaluate the germination rates and stem and root growth of seedlings and cuttings; and
- assess and control pest outbreaks.

It was found that earthenware containers that are not in use lose between 30 and 50 per cent of their length as a result of daily watering and rainfall erosion. However, from January to June, when the containers are in use, this shrinkage rate is reduced to about 14 per cent. In practice, the young trees are ready for planting in June, before the containers become badly degraded in July and August.

Germination rates varied from 58 to 90 per cent in plastic bags and from 45 to 98 per cent in earthenware containers, average rates being 88 and 73 per cent, respectively. Lower germination rates may be the result of poor watering practices and lower water retention by the earthenware pots compared to the plastic bags. Total emergence at germination took seven days in plastic bags and 12 days in earthenware containers and, after four months, saplings of two *Acacia* species were almost twice as tall when grown in plastic bags compared to earthenware containers.

The kind of container used had no effect on pest numbers and, in general, there were no serious outbreaks. Throughout the trial period, various treatments against pests were tested and found to be effective. Caterpillars were controlled by applying ash or water in which the leaves or seeds of the neem tree (*Azadirachta indica*) had been soaked. Smoke from burning *Guiera senegalensis* (Combretaceae) was also found to be effective, especially against crickets. Sucking and biting insects were controlled by applying the juice of tobacco twigs, tobacco leaves or even water in which cigarette ends had been soaked. Applying sand or ash to seedbeds before sowing proved effective against termites, and *Thevetia neriifolia* (Apocynaceae) nuts were a good rat poison. Some synthetic insecticides were also used.

Lessons learned

Earthenware containers are better adapted to producing the seedlings of tree species that reach their best growth for planting after four to six months in the nursery. Large plastic bags are still needed for plants that must stay in nurseries for longer than six or seven months, but no research has yet been carried out on large-sized earthenware containers.

Earthenware containers that are in use until July (the best season for planting in arid and semi-arid West Africa because it coincides with the rainy season) can be smeared with the residue of shea butter derived from the West African shea or karite tree (*Butyrospermum partii*, Sapotaceae), which reduces watering and rainfall erosion.

Nursery workers also learned to take care when watering small seeds, such as those of *Eucalyptus camaldulensis* and *Carica papaya*, which could otherwise be easily washed away.

More generally, the project showed the benefits of combining local traditional knowledge with the findings and experience of scientists and development personnel. By introducing a simple, low-cost technology based on local people's existing practices, CNSF was able to ensure that its project was effective and valuable in terms of both improving the environment and bettering the lives of poor rural communities.

Impact

Although the use of earthenware containers at forest tree nurseries is not without problems, in most cases, the economic and ecological advantages outweigh the disadvantages. Because poor farmers can produce the containers themselves, they are able to increase their own incomes by propagating plants for sale and by training others in the technology. Thus, they are able to participate in the fight against desertification, in the preservation and promotion of local biodiversity (both indigenous and exotic) and in the restoration of degraded ecosystems.

In these ways, the use of earthenware containers is contributing to poverty alleviation in the tropical arid and semi-arid zones of West Africa.

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