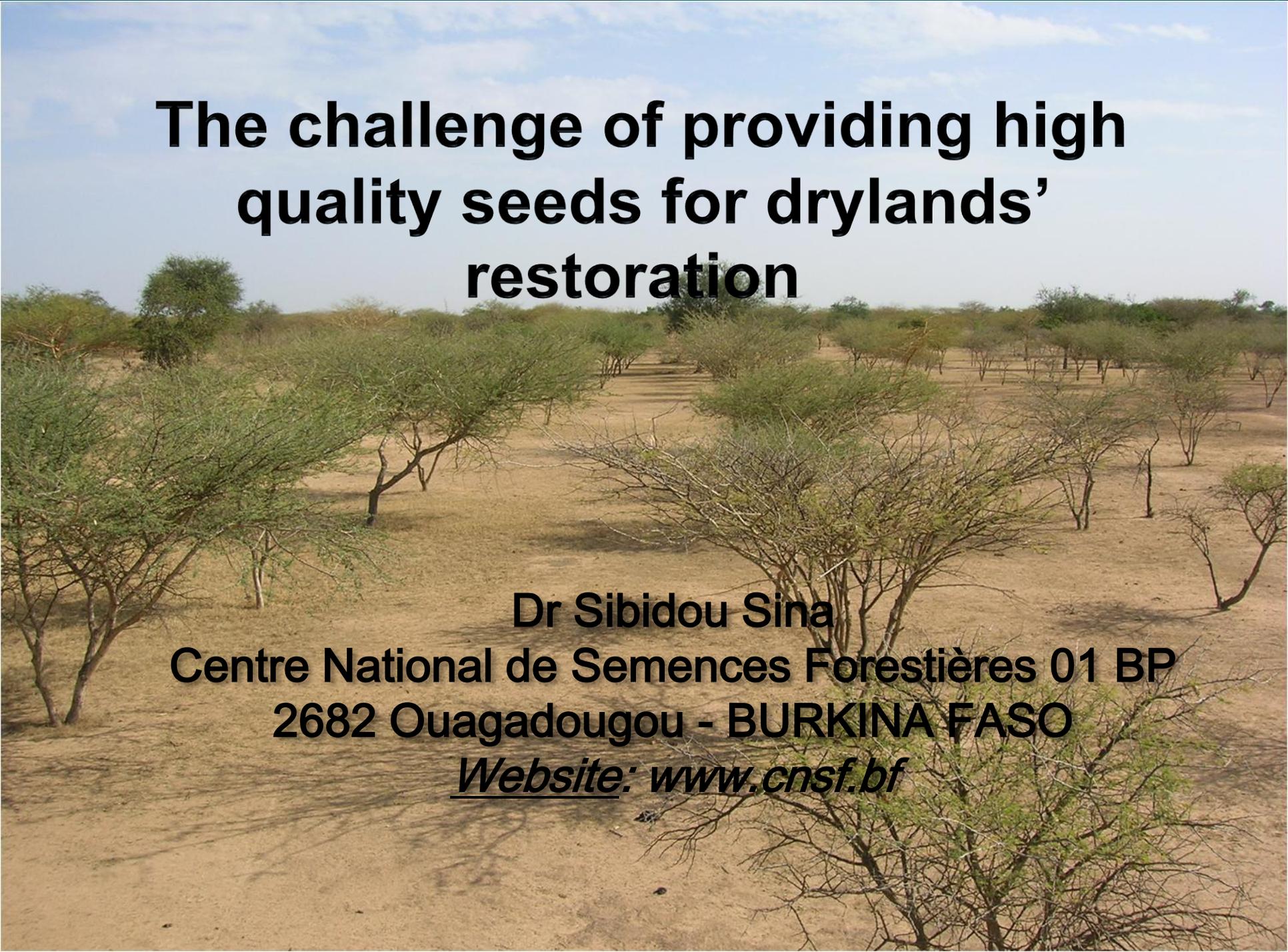


The challenge of providing high quality seeds for drylands' restoration



Dr Sibidou Sina
Centre National de Semences Forestières 01 BP
2682 Ouagadougou - BURKINA FASO
Website: www.cnsf.bf

OUTLINE OF THE PRESENTATION

1. INTRODUCTION
2. PRESENTATION OF THE NTSC
3. ACHIEVEMENTS
4. CONCLUSION AND PERSPECTIVES

INTRODUCTION 1

Burkina Faso is a Sahelian country. The population is estimated at 14 millions inhabitants with an annual growth of 3.1%.

The country is characterized by significant rainfall deficit and a fragile environment.

Burkina Faso economy is mainly based on agriculture and livestock breeding.

Forests cover a total area of 7 millions ha and the annual losses are estimated to more than 100.000 ha. This decline in forest areas is mainly due to deforestation associated with the expansion of farmlands.

INTRODUCTION 2

More than 80% of the population are farmers and about 97% of these people depend on forest resources for energy supply.

Like other countries in the Sahelian zone of Africa, Burkina Faso is facing the combined effects of natural and anthropogenic factors which are increasing pressures on the natural resources.

Major actions among which plantation programs are undertaken to deal with the encroaching desertification.

The success of reforestation programs requires the availability of seeds of adapted species, known provenances and a good understanding of the physiology of plant materials used.

PRESENTATION OF CNSF 1

Creation of CNSF: 1983, following the dramatic drought seasons of the years 70s.

Main goals :

- To support forestry programs by providing seeds of improved genetic and physiological quality
- To contribute with the National Center for Scientific and Technological Research (CNRST) in carrying out scientific research on forest species
- To build the capacity of farmers and other stakeholders involved in the reforestation program

Activities carried out:

- Tree seeds collection, handling and storage
- Research on silviculture, ecology, seed technology, genetic improvement of native species
- Seedlings production in nursery
- Training on seed harvesting, nursery techniques, and seed physiology

PRESENTATION OF CNSF 2

Since 1997, CNSF became an EPE, with financial and administrative autonomy and managed by a Director General under the control of a Board of Trustees

CNSF has the possibility to collaborate directly with partners through the world.

PRESENTATION OF CNSF 3

Organization

At the central level

The Technical Department has three divisions, subdivided into 7 programs

- Seed Production and Promotion Division covers two programs which are: Tree seed collection and tree stands management program and the seed distribution program.
- The Research Division includes three programs which are: conservation and genetic improvement program; the silviculture, ecology and taxonomy program and the seed technology program.
- The Training and Extension Division includes two programs which are: the training program and the extension, monitoring and documentation program.

PRESENTATION OF CNSF 4

At decentralized level

To improve its efficiency and to be close to the tree seed users at local level, CNSF has decentralized its activities through the establishment of regional representations named Antenne Régionale de Semences Forestières (ARSF) located in four different phytogeographical zones:

- The ARSF of the Sahel region, based at Dori;
- The ARSF of the North Central and Northern region, based at Kaya;
- The ARSF of the Eastern region, based at Fada N'Gourma;
- ARSF the Western and South-western region, based at Bobo Dioulasso.

Each regional office performs CNSF missions and technical programs.

Infrastructures and equipments

To carry out its activities, CNSF has **a laboratory** which includes the following sections:

- Seed Technology section;
- Seed Physiology section;
- Seed Conservation section;
- Seed Entomology section;
- In vitro culture section.

Two experimental nurseries are located in Ouagadougou and allow many researches to be carried out. Each of the four Regional Branches has also an experimental nursery.

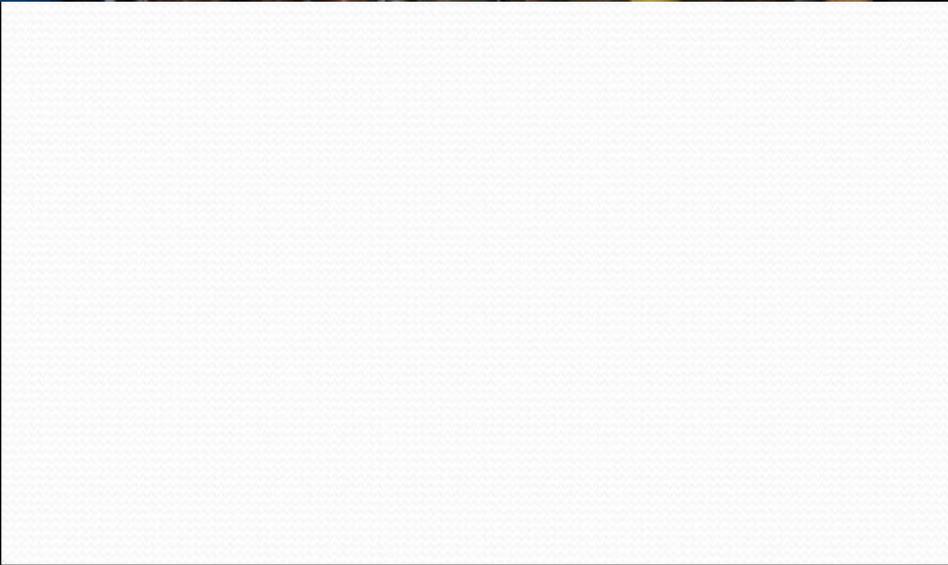
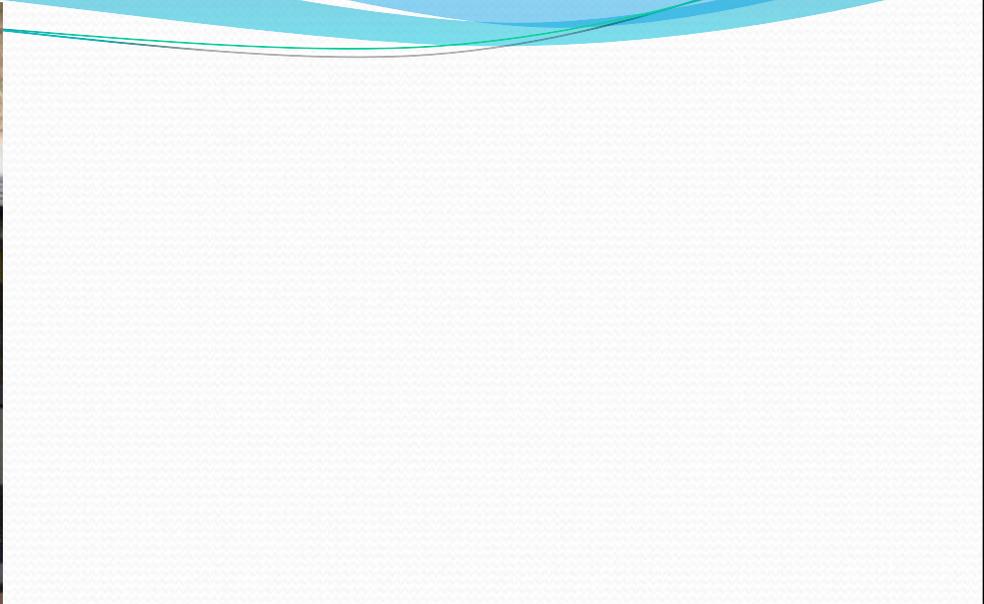
CNSF owns six **experimental stations** for field trials. Geographical dispersion of these experimental stations makes CNSF adapt research to local needs and monitor the behavior of forest species based on the different phytogeographical zones.

CNSF is currently one of the most well-known among African tree seed centers.

PRESENTATION OF CNSF 6



PRESENTATION OF CNSF 7



Partnership

National level

- the Universities
- the National Center for Scientific and Technological Research (CNRST), mainly The National Institution of Environment and Agricultural Research (INERA),
- National School of Forestry
- Development institutions and NGOs.

International level

Partners include many European universities and institutions (Wageningen, Copenhagen, Liège, Vienna, CIRAD, IRD, Wallonie Bruxelles, The Royal Botanic Gardens of Kew, Forest and Landscape of Denmark, GIZ, JICA...) and regional and international institutions as CILSS, FAO, Bioversity International, OECD, IUFRO, ISTA, IUCN, CIFOR, ICRAF...

Partnership

Regional and international Projects

- Improved Parklands in Africa project, sponsored by the EU
- Germplasm conservation and improvement of *Parkia biglobosa* for multipurpose use (Project TS3* CT92-0072), supported by the EU
- Plant Resources of Tropical Africa program (PROTA) ;
- People and Tree in Africa project
- Sahelian Fruit Tree project
- Millennium Seed Bank Partnership/RBG Kew
- Useful Plant Project/RBG Kew
- ADA Project on fruit trees in collaboration with Bioversity International, supported by the Austrian cooperation

Regional Workshops co-organized by CNSF

Many workshops on seeds harvesting and handling and forest genetic resources management organised with partners such as Bioversity International, CILSS, FAO, Forest and Landscape Denmark, IUFRO, IUCN, etc.

- IUFRO symposium on tree seeds: 23– 27 November 1992
- Regional workshop on the sustainable management of forest genetic resources in the sahelian zone (22-24 sept. 1998)
- Sahelian Fruit Trees Project Workshop with EU: 6 - 10 March 2006
- Regional workshop on the State of forest genetic resources in West Africa, with FAO, CILSS, Walloon Region, OCDE, July 2012

ACHIEVEMENTS 1

3.1. Seed production and distribution

- Average 6 tones of seeds of 100 species are yearly collected
- Average 4 tones of seeds are distributed in Burkina Faso, in Africa and in other countries : about 11 millions of seedlings are yearly produced by the different stakeholders
- About 500 000 seedlings are produced yearly in the CNSF experimental nursery to support reforestation programs for specific needs
- Seed bank is available with a regional vocation for commercial seeds and also for long term conservation purposes: **12 103,47 kg of seeds of 174 species, mainly native species**, are stored in 3 cold rooms at CNSF
- Data base of 500 seed stands located through the country are available

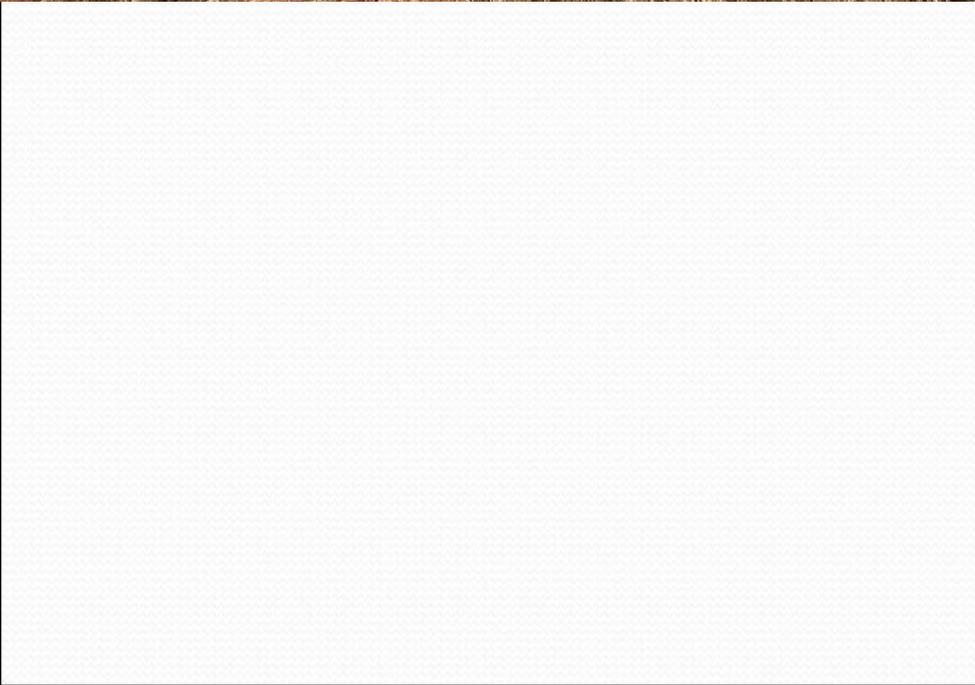
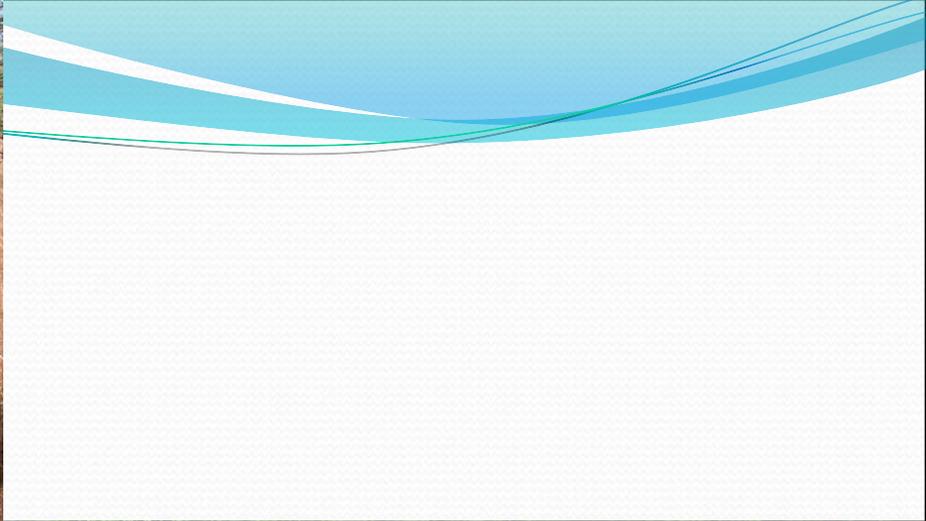
So far, more than 100 tones of seeds of 174 species have been collected by CNSF.

3.2. Herbarium management at CNSF

Since 2007, the MSB Partnership begun to capitalize on information about CNSF herbarium specimens collected in a database with the dual aim of safeguarding and facilitating access to such information. The herbarium specimens collecting sheets are registered in a BRAHMS database (Botanical Research and Herbarium Management System).

So far 123 botanical families of 1047 native species have been collected by CNSF. This is considered to represent about 80% of the Burkina flora .

The CNSF's herbarium has been registered in the Index Herbariorum in 2008 for its international standard and the number of specimens.





The quality of CNSF activities and seeds is recognized at international level. In 2008 it had been admitted in the OECD system for seeds and seedlings for international trade.

3.3. Research on FGR

Research on *Parkia biglobosa* (Jacq.) G.Don

- Morphological and genetic diversity of *Parkia*
- Germplasm collection in West and Central Africa
- Pollination study in to sites
- Genetic variation investigation in fruits, seeds and pulp
- Phenology study
- Socio-economic and cultural aspects
- Conservation and genetic improvement of *P. biglobosa*
- Study of Reproductive biology s of *Parkia biglobosa*
- study of long term storing and optimal germination of *Parkia biglobosa* seeds of
- 94 provenances from 12 countries
- Study genetic differentiation among provenances of *Parkia biglobosa* from the Sudano-Sahelian zone of West Africa in provenances trials (growth traits)
- Study of genetic differentiation among provenances in leaf morphology and using molecular markers (DNA sequencing)
- Establishment of breeding seed orchards of *Parkia biglobosa* (progeny/ provenances trials)
- Gene flow study within and between fragmented populations



ACHIEVEMENTS 4

Research on *Acacia senegal*

- Study of the species' distribution in Burkina Faso
- Study of international provenances trials in 2 different climatic zones
- Selection of plus trees for arabic gum production
- Establishment of breeding seed orchards of *Acacia senegal* using clones
- Comparative study of morphological traits (leaves, fruits, spines) of *Acacia senegal* and *Acacia laeta* and their hybrids
- Study of temporal variation (5 years) of gum production within and between natural population's stands in Burkina Faso.



ACHIEVEMENTS 5

3.3.3. Research on *Adansonia digitata*

- Selection of plus trees through the distribution area of the species in Burkina Faso
- Establishment of international provenances trial
- Vegetative propagation study of the species
- Study of genetic differentiation among provenances in leaf morphology



3.3.4. Research on shea tree (*Vitellaria paradoxa*)

- Selection of plus trees through the distribution area of the species in Burkina Faso
- Vegetative propagation study on the species
- Establishment of clonal breeding seed orchards
- Natural populations characterization (population structure, evaluation of fruit production)
- Study on growth traits of several progenies grown in different nursery conditions.



ACHIEVEMENTS 7

Approximately 200 ha of provenance trials and progeny of 25 species.

Vegetative propagation of native species

- Vegetative propagation (grafting, cutting and sukkering technics of *Acacia Senegal*, *Adansonia digitata*, *Balanites aegyptiaca*, *Bombax costatum*, *Detarium microcarpum*, *Khaya senegalensis*, *Vitellaria paradoxa*, *Lannea microcarpa*, *Parkia biglobosa*, *Saba senegalensis*, *Sclerocarya birrea*, *Tamarindus indica* et *Ziziphus mauritiana*
- Micro-propagation of *Parkia biglobosa*, *Vitellaria paradoxa* and *Adansonia digitata*

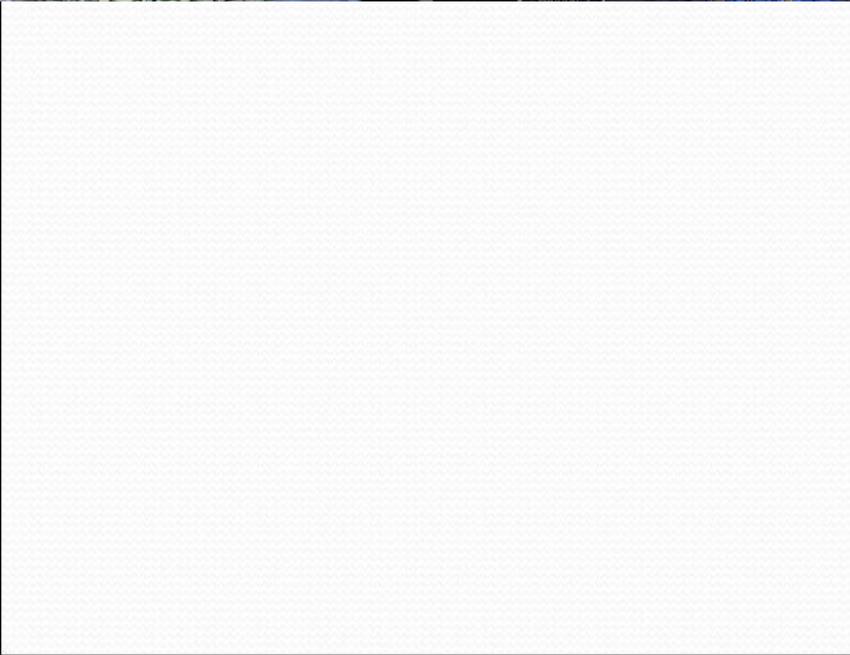


Training Program

CNSF carries out training sessions for the benefit of national and other partners. Over the past ten (10) years (between 2002 and 2012), CNSF has trained about two thousand and five hundred (2500) producers, growers, technicians and managers, the annual average is two hundred and fifty (250) trainees.

These trainings focused on the main following themes:

- Techniques for seedling production, planting, establishment and management of a nursery;
- Techniques for seed harvesting, handling and storage;
- Techniques of fruit trees grafting;
- Gum arabic production technology;
- Vegetative propagation of forest species;
- Restoration and protection of river banks



For the last 30 years, CNSF have been working to improve the genetic and physiological quality of tree and herbaceous seeds in order to support the reforestation programs in Burkina as well as in many other African countries, mainly those belonging to the Sahel region. The CNSF have also been sharing its knowledge and experience with these countries in order to help them build their own unit of seed production for their local needs (Mali, Niger, Senegal, Chad,....)

CONCLUSION AND PERSPECTIVES 2

- Establish and / or strengthen national seed centers and encourage good cooperation between them in order to improve access to quality seed
- Delineate provenance zones at national and regional levels to allow better matching of seed sources with plantation sites.
- Promote development of tree seed supply system at national and regional levels to meet the needs of development and research activities in taking advantage of the West African countries Convergence Plan on Forests.
- Promote research network on FGR related topics and encourage synergy between research programs and scientists within West Africa countries
- Enhance participation of local people in the management of FGR and utilization of quality seeds to guarantee the quality of the plantations.

Species collected 1

<i>Acacia ataxacantha</i>	<i>Guiera senegalensis</i>
<i>Acacia dudgeoni</i>	<i>Hannoa undulata</i>
<i>Acacia ehrenbergiana</i>	<i>Hibiscus panduriformis</i>
<i>Acacia erythrocalyx</i>	<i>Holarrhena floribunda</i>
<i>Acacia gourmaensis</i>	<i>Hymenocardia acida</i>
<i>Acacia hockii De Wild.</i>	<i>Hyperthelia dissoluta</i>
<i>Acacia laeta R. Br.ex Benth.</i>	<i>Hyptis spicigera</i>
<i>Acacia macrostachya</i>	<i>Indigofera arrecta</i>
<i>Acacia nilotica subsp adstringens</i>	<i>Indigofera tinctoria</i>
<i>Acacia nilotica subsp nilotica</i>	<i>Ischaemum rugosus</i>
<i>Acacia nilotica subsp tomentosa</i>	<i>Isoberlinia doka</i>
<i>Acacia polyacantha</i>	<i>Jatropha curcas</i>
<i>Acacia senegal</i>	<i>Khaya senegalensis</i>
<i>Acacia seyal</i>	<i>Kigelia africana</i>
<i>Acacia sieberiana</i>	<i>Lannea acida</i>
<i>Acacia tortilis</i>	<i>Lannea microcarpa</i>
<i>Adansonia digitata</i>	<i>Lannea velutina</i>
<i>Afraegle paniculata</i>	<i>Lawsonia inermis</i>
<i>Afzelia africana</i>	<i>Leptadenia hastata</i>
<i>Ageratum conyzoides</i>	<i>Leucaena leucocephala</i>

Species collected 2

<i>Albizia chevalieri</i> Harms	<i>Manilkara obovata</i>
<i>Albizia lebeck</i>	<i>Mimosa pigra</i>
<i>Alysicarpus glumaceus</i>	<i>Moringa oleifera</i> Lam.
<i>Alysicarpus ovalifolius</i>	<i>Olax subscorpioides</i>
<i>Alysicarpus rugosus</i>	<i>Oryza longistaminata</i>
<i>Anacardium occidentale.</i>	<i>Ozoroa insignis</i>
<i>Andropogon ascinodis</i>	<i>Panicum laetum</i>
<i>Andropogon gayanus</i>	<i>Panicum pansum</i>
<i>Andropogon pseudapricus</i>	<i>Panicum phragmitoides</i>
<i>Annona senegalensis</i>	<i>Parinari curatellifolia</i>
<i>Anogeissus leiocarpus</i>	<i>Parkia biglobosa</i>
<i>Azadirachta indica</i>	<i>Parkinsonia aculeata</i>
<i>Balanites aegyptiaca</i>	<i>Paspalum scrobiculatum</i>
<i>Bauhinia rufescens</i>	<i>Peltophorum ferrugineum</i>
<i>Bombax costatum</i>	<i>Pennisetum pedicellatum</i>
<i>Boswellia dalzielii</i>	<i>Pericopsis laxiflora</i>
<i>Brachiaria lata</i>	<i>Phragmites karka</i>
<i>Bridelia ferruginea</i>	<i>Piliostigma reticulatum</i>
<i>Bridelia scleroneura</i>	<i>Piliostigma thonningii</i>
<i>Burkea africana</i>	<i>Polycarpaea corymbosa</i>

Species collected 3

<i>Caesalpinia pulcherrima</i>	<i>Polycarpaea eriantha</i>
<i>Capparis sepiaria</i>	<i>Polycarpaea linearifolia</i>
<i>Cassia occidentalis</i>	<i>Polycarpaea tenuifolia</i>
<i>Cassia sieberiana</i>	<i>Prosopis africana</i>
<i>Cassia tora</i>	<i>Prosopis juliflora</i>
<i>Casuarina equisetifolia</i>	<i>Pseudocedrela kotschyi</i>
<i>Ceiba pentandra</i>	<i>Pterocarpus erinaceus</i>
<i>Cochlospermum planchonii</i>	<i>Pterocarpus lucens</i>
<i>Cochlospermum tinctorium</i>	<i>Ricinus communis</i>
<i>Combretum aculeatum</i>	<i>Saba senegalensis</i>
<i>Combretum collinum</i>	<i>Sarcocephalus latifolius</i>
<i>Combretum fragrans</i>	<i>Schizachyrium ruderale</i>
<i>Combretum glutinosum</i>	<i>Sclerocarya birrea</i>
<i>Combretum micranthum</i>	<i>Securidaca longepedunculata</i>
<i>Combretum molle</i>	<i>Senna alata</i>
<i>Combretum nigricans</i>	<i>Senna siamea</i>
<i>Cordia myxa</i>	<i>Sesbania sesban</i>
<i>Crataeva adansonii</i>	<i>Sorghastrum bipennatum</i>
<i>Crossopteryx febrifuga</i>	<i>Spondias monbin</i>
<i>Crotalaria retusa</i>	<i>Sporobolus pyramidalis</i>

Species collected 4

<i>Ctenium elegans</i> Kunth	<i>Sterculia setigera</i>
<i>Cymbopogon giganteus</i>	<i>Stereospermum kunthianum</i>
<i>Cymbopogon schoenanthus</i>	<i>Strychnos innocua</i>
<i>Dalbergia melanoxylon</i>	<i>Strychnos spinosa</i>
<i>Dalbergia sissoo</i> Roxb.	<i>Swartzia madagascariensis</i>
<i>Daniellia oliveri</i>	<i>Tamarindus indica</i>
<i>Delonix regia</i>	<i>Tectona grandis</i>
<i>Detarium microcarpum</i>	<i>Terminalia avicennioides</i>
<i>Detarium senegalense</i>	<i>Terminalia macroptera</i>
<i>Dialium guineense</i>	<i>Terminalia mantaly</i>
<i>Diospyros mespiliformis</i>	<i>Terminalia mollis</i> Laws.
<i>Echinochloa stagnina</i>	<i>Thevetia neriifolia</i>
<i>Eleusine indica.</i>	<i>Tricalysia okelensis</i>
<i>Elionurus elegans</i>	<i>Uapaca togoensis</i>
<i>Entada abyssinica</i>	<i>Uvaria chamae</i>
<i>Entada africana</i>	<i>Vetiveria nigriflora</i>
<i>Eragrostis tremulla</i>	<i>Vitellaria paradoxa</i>
<i>Erythrina senegalensis</i>	<i>Vitex chrysocarpa</i>
<i>Erythrophleum africanum</i>	<i>Vitex simplicifolia</i>
<i>Eucalyptus camaldulensis</i>	<i>Waltheria indica</i>

Species collected 5

<i>Faidherbia albida</i>	<i>Xeroderris stuhlmannii</i>
<i>Ficus sur</i> Forssk	<i>Ximenia americana</i>
<i>Flacourtia indica</i>	<i>Zanthoxylum zanthoxyloides</i>
<i>Flueggea virosa</i>	<i>Ziziphus abyssinica</i>
<i>Gmelina arborea</i>	<i>Ziziphus mauritiana</i>
<i>Grewia bicolor</i>	<i>Ziziphus mucronata</i>
<i>Grewia cissoides</i>	
<i>Grewia lasiodiscus</i>	



THANK YOU