

UNDERSTANDING FARMER- MANAGED NATURAL REGENERATION (FMNR)

PARTICIPANT HANDBOOK



May 2020

FOREWORD

This participant's booklet was developed by Catholic Relief Services (CRS) Mali as part of the Reversing Land Degradation in Africa by Scaling-up Evergreen Agriculture (Regreening Africa) project.

This European Union funded project aims to restore 1 million hectares of degraded lands in 8 African countries, including Mali. Using locally appropriate techniques including Farmer-Managed Natural Regeneration (FMNR), tree planting and other forms of agroforestry, the project will positively improve resilience of 160.000 households in Koutiala, Yorosso, Tominian and San.

In Mali, the project is being implemented by a consortium of NGOs including Oxfam, Sahel Eco, World Vision and CRS, under the leadership of World Agroforestry (ICRAF).

This participants' booklet was developed in response to the demand for training from lead producers in Koutiala cercle, who also double up as village animators

and trainers. The trainees were previously trained on FMNR techniques by CRS and ICRAF staff.

The images in this document are taken from practical demonstration sessions and is based on experiences from other programs.

This booklet is subject to constant revisions according to changing contexts and emerging needs of producers. To this end, it will be made available to each consortium member to:

- Follow-up to ensure lead producers are conversant with the practice
- Monitor the evolving learning needs of producers on FMNR
- Monitor and evaluate dissemination of the booklet in interventions areas
- Integrate new insights that arise as subsequent trainings and follow-ups take place. these will inform revision of the booklet to adapt it to the changing contexts



WHAT IS FMNR?



FMNR is the deliberate selection, protection and management of trees and shrubs from felled tree stumps and sprouting root systems in crop fields. Direct seeding or planting can also be used to enhance biodiversity.

WHY PRACTICE FMNR?

- It increases wood cover;
- Conserves biological diversity;
- Improves soil fertility;
- Reduces soil erosion;
- Mitigates the effects of climate change by promoting carbon storage and reduces the portion of heat reflected from the soil;
- Combats desertification;
- Diversifies agro-sylvo-pastoral production.

WHAT ARE THE ADVANTAGES OF FMNR?

- Sustainable soil conservation;
- Conservation of endangered woody species;
- Soil fertility;
- Increases agricultural production (millet, sorghum, e.t.c.);
- Increases availability of fodder for animals;



- Increases access to harvested products (shea and Nere fruits, firewood, e.t.c.);
- Creates natural habitats for birds and animals thus promoting biodiversity restoration;
- Promotes tree diversity and as a result improves honey production through the return of bees;
- Increases food and nutrition security;

- Improves quality of life: less wind and dust, more shade;
- Development of meeting places or public spaces
- Reduces rural and land tenure conflicts

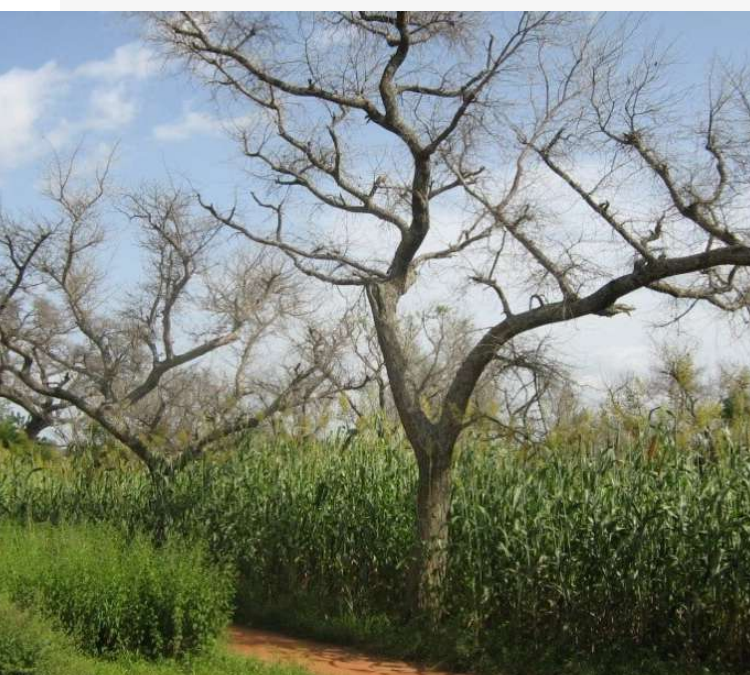
Some of the benefits of wood include:



Collecting fruit from a Sahel shrub. Photo: BA Bationo



Goat grazing on leaves of Sahel shrubs. Photo: BA Bationo



Nitrogen and organic matter input by *Faidherbia albida*. Photo: BA Bationo



Collected firewood from trees and shrubs. Photo: BA Bationo



WHAT DO YOU NEED TO KNOW FOR THE REALIZATION OF FMNR?

I. Know the local context

- What are the most sought-after wood species? For what uses?
- Where are these species found? (In fallow land or crop fields?)
- What are the species regeneration techniques (planting, direct seeding or natural regeneration)?
- Are there FMNR species that are prohibited? For what reasons? What must be done to get these trees?

II. Outline the objectives

- Which species are of interest to me?
- Do these species grow naturally in my field?
- If not, what actions can I take to produce them (planting or sowing)?
- Is the desired area suitable for FMNR? If not, what are the constraints? What concrete actions can be carried out to be successful?

III. Achievement of FMNR

- It is important to follow the following six steps:



1. Examine your field and identify the number of tree species



2. Identify the species to regenerate



3. Select 2 or 3 good stems and eliminate the rest



4. Trim the side branches on the lower half of the selected stems

5. Mark the selected stems with coloured cloth (identifiable from afar)



6. Work with the whole community to agree on rules that will protect the selected trees in the field and respect everyone's rights. Raise awareness at all levels (men, women, community leaders, youth) on the common benefits and involvement of all

TECHNICAL STANDARDS

Technical standards vary:

It is simply advisable to obtain a density that does not interfere with the crops. In general, an ideal density of 100 to 400 trees/ha in the field is required depending on the woody species and their phenology and the choice of growers:

- For species with giant port like *Prosopis africana*, *Vitellaria paradoxa*, e.t.c.: 25 trees per hectare with a spacing of 20 m x 20 m;
- For medium-sized species such as *Balanites aegyptiaca*, *Faidherbia albida*: 100 plants per hectare at 10m x 10m spacing;
- For bushy species like Combretaceae: 400 ft per hectare at 5m x 5m spacing).



THE ADVANTAGES OF TREES FOR AGRICULTURAL PRODUCTION

Trees increase crop yields by:

- Improving water infiltration, providing the associated annual crops (cereals and legumes) with more water for longer periods of time;
- Improving water conditions by bringing water to the surface and making it more accessible to crops;
- Improving soil fertility through litter from foliar and root biomass;
- Maintaining diversity by providing habitats for agricultural predators and pests;
- Protecting against wind and sun;
- Mitigating temperature and climate by providing shade that in return increases crop production, especially in very hot environments, such as the Sahel;
- Improving nutrition and food security for humans and livestock.

SOME PRACTICES THAT PROMOTE FMNR

Producers can take advantage of plots with existing water and soil conservation structures, including earthen bunds, stone barriers, grass strips, e.t.c.). Such environments encourage natural regeneration for many forest species.



Stone bunds. Photo: BA Bationo



Fruit seeds consumed in households by humans or animals can be found in organic manure. These seeds, mainly from agroforestry species, can then germinate deliberately in the fields as a result of the application of manure (e.g. baobab and balanites). The producer can also take the opportunity to add desired seeds, which will promote biodiversity.



Manure put around Balanites seedlings. Photo: BA Bationo

Certain shrubs or bushes play a facilitating role: the clumps of *Piliostigma reticulatum* (niama) are islands of fertility and 'refugees' for certain demanding tree species such as Nere. The grower can sow seeds in these clumps.



Nere plant. Photo: BA Bationo

Knowing how to exploit the ability of species to propagate vegetatively is key and this can be achieved through layering on the ground or suckering.



Marcottage of *Guiera senegalensis*



Suckering of *Faidherbia albida*

SOME TECHNIQUES FOR MANAGING TREES IN THE FIELD

The effectiveness of FMNR largely depends on tree management: pruning from the bottom to the top of the plant to reduce the crown when it becomes troublesome for production activities.



Pruning or maintenance cutting is also recommended from the lower branches. These techniques promote the rapid growth of FMNR trees and the exploitation of crop fields.



How to manage trimmers: collect pruned branches and heap them up as shown in the image below. These can be used as firewood, or as hedges for seeds sowed directly or young plants.



Use pruners for the protection of young FMNR plants or planted trees.



LIST OF SUITABLE TREE SPECIES FOR FMNR PRACTICES IN THE SAHEL REGION

Nom scientifique	Nom commun	Nom bambara	Nom bomu
Acacia senegal	Acacia senegal	patugu	
Faidherbia albida	Acacia albida	balanzan	viñinun
Acacia laeta	Acacia laeta	donkari	
Acacia macrostachya	Acacia macrostachya	sofara ngoni	hinbwi uwe'uwe
Acacia nilotica	Acacia nilotica	buwana	anboro
Acacia raddiana	Acacia raddiana	bakifin	Acacia raddiana
Acacia seyal	Acacia seyal	zaje	hinbwi fonu
Acacia sieberiana	Aubépine	baki	hinbwiru
Adansonia digitata	Baobab	sira	iñan
Anacardium occidentale	Anacardier	sOmD	Anacardium occidentale
Annona senegalensis	Pomme-cannelle	mande susun	han dède vaa
Anogeius Leocarpus	Anogéus Léocarpus	ngalama	éminu
Antiaris africana	Antiaris africana	Kalabana	Antiaris africana
Azadirachta indica	neem	sayi jirini	niimu
Balanites aegyptea	Balanites	zεγεε	boliyo
Bauhinia rufescens	Bauhinia rufescens	sifile jirini	Bauhinia rufescens
Bombax costatum	kapokier rouge	bumu	do'oro
Borassus aethiopium	Borassus Ethioipium	sebe	oro
Boscia senegalensis	Boscia senegalensis	bere	Boscia senegalensis
Calotropis Procera	Calotropis Procéra	fogofogo	pupu
Carica papaya	papayer	manje	manyé
Cassia sieberiana	Cassia sieberiana	sinjan	εn'εnbiru
Ceiba petandra	Fromager	banan	caa
Celtis integrifolia	Celtis integrifolia	ngamiya	amaya
Citrus limon	Citronnier	lemuru	leleburu
Citrus sinensis	Orange	lemuruba	leleburuba



Nom scientifique	Nom commun	Nom bambara	Nom bomu
Cordila Pinata	Cordila Pinata	dugura	sama vaa
Dalbergia melanoxylon	Dalbergia melanoxylon	jɛnɛkala jiri	yiri'ure
Daniellia oliveri	Daniellia oliveri	sanani	o'ome
Delonix regia	Flamboyant	Flamboyant	Flamboyant
Detarium microcartum	Detarium Microcartum	ntabakunba	O'o
Diospyros mespiliformis	Diospyrus mespiliformis	sunsun	boro'inwe
Entada africana	Entada africana	sama nɛrɛ	sama duwi
Pterocarpus erinaceus	Erinaceus Térocarpus	ngoni	Yɛ'o
Eucalyptus tereticornis	Eucalyptus	matoloton jiri	Eucalyptus
Euphorbia balsamifera	Euphorbia balsamifera	bagani	ba'a yenuso
Ficus gnaphalocarpa	Figuier	toro	co'onu
Ficus platyphylla	Ficus platyphylla	Ngaba bilen	woro
Ficus Théofilia	Ficus Théofilia	zɛrɛninjɛ	sasibu'a
Gardenia erubescens	Gardenia erubescens	mbure	cun
Guiera senegalensis	Guiera senegalensis	ngunjɛ	suncɛwe
Khaya senegalensis	Caïcédra	jala	penu
Lanea acida	Lanea acida	koni peku	l'o
Lannea microcarpa	raisinier sauvage	Mpeku	ɲinun
Lawsonia inermis	Henné	jabi	Yabi
Leuceana Leucocephala	Leucéna Leucocéphala		
Maerua angoulensis	Maerua angoulensis	kokari jirini	tovenun
Mangifera indica	Manguier	mangoro	manworo
Mitragyna inermis	Mitragyna inermis	jun	sasaho
Moringa oleifera	Moringa	basi jirini	masayiri
Parinari Macrophylla	Parinari Macrophylla	woo	Parinari Macrophylla
Parkia Biglobosa	Parkia Biglobosa	nere	duwi



Nom scientifique	Nom commun	Nom bambara	Nom bomu
<i>Pseudocedrela kotschii</i>	<i>Pseudocedrela kotschii</i>	lombo	<i>Pseudocedrela kotschii</i>
<i>Psidium guajava</i>	Goyavier	buyagi	buya'i
<i>Pterocarpus lucens</i>	<i>Pterocarpus lucens</i>	ngalajiri	duba'ara
<i>Detarium senegalensis</i>	<i>Ditarium Senegalensis</i>	Bodo	
<i>Saba senegalensis</i>	lianes	saba	ɲanun
<i>Sclerocarya birrea</i>	<i>Sclerocarya birrea</i>	ngunan	unle
<i>securidaca longipedunculata</i>	<i>securidaca longipedunculata</i>	jiro	sa'a
<i>Sterculia Sétigéra</i>	<i>Sterculia Sétigéra</i>	kungo sia	bocuwa
<i>Stereospermum Kunthianum</i>	<i>Stereospermum Kunthianum</i>	soɲugu	co vanlo
<i>Tamarindus indica</i>	Tamarin	ntomi	muɲun
<i>Terminalia avicenioides</i>	<i>Terminalia avicenioides</i>	wɔɔ	huwanu
<i>Vitellaria paradoxa</i>	karité	sii	vaa
<i>Vitex doniana</i>	<i>Vitex doniana</i>	koronifin	orobiru
<i>Ximenia americana</i>	<i>Ximenia americana</i>	Ndonge	cocoŋaawe
<i>Ziziphus mauritania</i>	<i>Ziziphus mauritiana</i>	ntomɔ	toobwo





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