Technical Workshop GGW for vegetation restoration

(Abuja - Nigeria, 19-21 January 2016)

- Date of start : April 2013
- Funding source : RBG, Kew

Report for Mali

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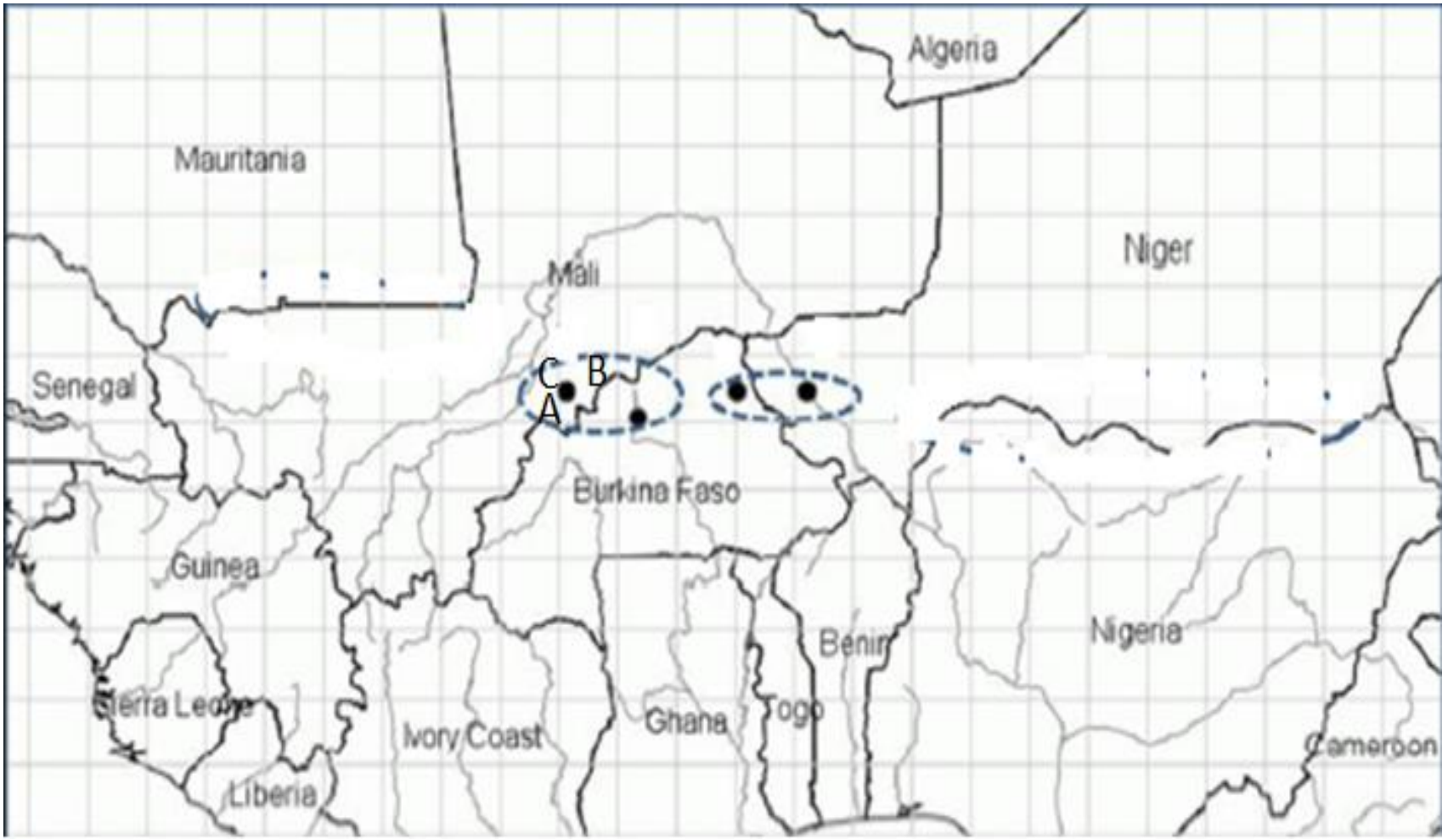
Context and Justification

The GGW initiative is a new approach for integrated development of arid and semi-arid zones, a global strategy for restoring and recolonizing degraded and disinheritated zones.

Upon the basis of the priorities of this programme, the pilot project Burkina Faso – Mali – Niger, GGW was initiated with the technical and financial assistance of the Kew Gardens.

The approach of this pilot project was based on the full implication of communities for sustainable use and management of natural resources.

Localization of intervention zones



A: Bankass
B: Koro
C: Bandiagara

Global Objective

To contribute fighting desert progress in the Sahel by restoring ecosystems, valorizing and managing sustainably natural resources

Specific Objectives

- **Collecting and conserving seeds and useful plants;**
- **Producing, distributing plants and seeds to communities ;**
- **Planting and maintaining parcels in the interest of the communities;**
- **Enriching and restoring degraded zones in village territories ;**
- **Undertaking research on species adapted to drought and on their conservation by communities ;**
- **Improving communities' income by valorizing the vegetal potential (fruit, fodder, wood, medicaments, etc.) ;**
- **Valorizing project's experience by training and informing communities**

Achievements and Results

1. Survey and selection of useful plants to communities

- **Inquiries were held in the departments of Koro and Bandiagara in the region of Mopti :10 persons (5 men and 5 women) from 5 cooperatives by district were interviewed,**
- **43 useful species for food, fodder, medicine, fertilization and for energy and craft wood production were listed,**
- **The top 10 species were: *Adansonia digitata, Tamarindus indica, Vitellaria paradoxa, Balanites aegyptiaca, Lannea microcarpa, Sclerocarya bierrea, Faidherbia albida, Ziziphus mauritiana, Parkia biglobosa, Detarium microcarpum***

2. Production of seedlings

- **Nine (9) private nurseries in the departments of Bankass and Koro**

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- **The Forests office at Bankass**

Produced : 66172 seedlings of 22 local species

3. Planting in agricultural exploitations

Year of plantation	Department	Village	Superficies planted (ha)	Number of plants
2013 (9 ha)	Bankass	Dimbal I	3	1200
		Bankass	3	1200
		Endé	3	1200
2014 (21 ha)	Bankass	Dimbal II	6	2400
		Daboye-Kanda	3	1200
		Soula-Kanda	3	1200
		Dianwely	3	1200
		Segué	3	1200
		Bagouro	3	1200
2015 (69 ha)	Bankass	Kouyentombo	1	100
		Daboye	4	400
		Dianwely	3	300
		Ogotena	3	300
		Yaroumé	1	100
		Endé	1	100
		Man Fody	1	100
		Dimbal	2	200
		Segué	3	600
	Koro	Koporo-Na	3	270
		Temegoro	2	200
		Temessagou	2	200
		Tinsagou	21	2120
		Bondo-Tena	16	1632
	Bandiagara	Eguela	3	1252
		Parou	2	934
		Garou	1	397

Survival rates and averages for assessed variables (variation coefficients between brackets)

Plantation 2013		Statistics for assessed variables		
Site	Species	Survival rate (%)	Mean diameter at the basis in cm (VC)	Mean height in cm (VC)
Bankass	*Faidherbia albida*	26	0,20 (45)	14,16 (56)
	Acacia nilotica	83	1,34 (37)	65,73 (34)
	Adansonia digitata	74	1,57 (28)	57,64 (21)
	Balanites aegyptiaca	65	0,21 (53)	26,26 (38)
	Bauhinia rufescens	74	1,03 (38)	48,64 (34)
	Bombax costatum	52	1,42 (27)	80,41 (41)
	Khaya senegalensis	78	1,10 (62)	44,66 (42)
Survival rates in % all species confounded		65		
Dimbal	*Faidherbia albida*	52	0,23 (61)	17,78 (48)
	Aca cia nilotica	58	0,85 (46)	38,63 (47)
	Adansonia digitata	93	1,56 (42)	56,00 (41)
	Balanites aegyptiaca	79	0,76 (60)	34,83 (42)
	Bauhinia rufescens	85	0,76 (41)	40,18 (32)
	Khaya senegalensis	76	0,86 (50)	36,00 (51)
	Lannea microcarpa	76	0,87 (71)	27,38 (76)
	Prosopis africana	37	0,5 (40)	34,65 (35)
	Sclerocarya bierrea	68	1,32 (60)	34,09 (50)
	Tamarindus indica	37	0,53 (35)	27,47 (37)
Survival rates in % all species confounded		66		
Endé	*Faidherbiaia albida*	65	0,88 (50)	38,60 (30)
	Aca cia nilotica	65	0,78 (50)	36,00 (62)
	Adansonia digitata	78	1,16 (37)	46,00 (44)
	Balanites aegyptiaca	61	0,21 (51)	18,28 (44)
	Bauhinia rufescens	100	0,85 (34)	41,82 (37)
	Prosopis africana	56	0,56 (60)	25,15 (40)
	Parkia biglobosa	56	0,71 (36)	32,07 (32)
	Sclerocarya bierrea	61	0,46 (64)	26,35 (38)

Behavior of planted species

The mean survival rate in parcels planted in 2013 was almost the same in the three sites (65 to 66%).
Replanting rates were : < 30% (Bankass), 33% (Dimbal), 65% (Endé)
Species like:

- ***Acacia nilotica, Adansonia digitata, Bauhinia rufescens, Balanites aegyptiaca* were the most adapted species regarding survival and growth.**
- ***Tamarindus indica, Prosopis africana, Faidherbia albida* were the less performing species in all sites**

Plantation realized in 2015 in agricultural exploitations in the department of Bandiagara

Species	Number of plants/site			Total of plants/species	Relative frequency (%)
	Eguela (4 ha)	Parou (3 ha)	Garou (1 ha)		
Adansonia digitata	400	300	100	800	30,97
Tamarindus indica	300	225	75	600	23,23
Faidherbia albida	124	29	60	213	8,25
Balanites aegyptiaca			60	60	2,32
Sclerocarya birrea	28	171	52	251	9,72
Parkia biglobosa	200	150	50	400	15,49
Khaya senegalensis	76	23		99	3,83
Combretum micranthum	124	36		160	6,19
Total/Site	1252	934	397	2583	100

Plantation realized in 2015 in agricultural exploitations in the department of Koro

Species	Number of plants/site					Total of plants/ species	Relative frequency (%)
	Bondo Tena (16 ha)	Koporo-Na (3 ha)	Temegoro (1 ha)	Temessagou (2 ha)	Tinsagou (21 ha)		
Adansonia digitata	998	100	100	100	1400	2698	61,01
Tamarindus indica					100	100	2,26
Faidherbia albida	20	50			260	330	7,46
Balanites aegyptiaca	150					150	3,39
Sclerocarya birrea	100					100	2,26
Parkia biglobosa					150	150	3,39
Khaya senegalensis	300					300	6,78
Ziziphus mauritiana	64	40	20	20	100	244	5,52
Lannea microcarpa					110	110	2,49
Acacia raddiana		80	80	80		240	5,43
Total/Site	1632	270	200	200	2120	4422	100

Behavior of planted species produced in plastic pots, 3 months after plantation (variation coefficients between brackets)

		Averages for assessed variables			
Sites	Species	Mean Diameter at basis in cm		Mean Height in cm	
Garou	*Balanites aegyptiaca*	0,36	(52)	36	(40)
	Parkia biglobosa	0,41	(40)	25	(22)
Eguela	*Parkia biglobosa*	0,31	(49)	13	(48)
	Tamarindus indica	0,22	(24)	10	(34)
Koporona	*Faidherbia albida*	0,18	(54)	14	(64)
	Acacia nilotica	0,20	(71)	28	(7)
Temessagou	*Adansonia digitata*	0,68	(55)	18	(44)

Revival rate of *Adansonia digitata* plants produced in plank, 3 months after planting

Villages	Name of collaborator farmer	Number of planted plants	Number of surviving plants	Number of dead plants	Revival rate (%)
Djanwely	Allaye kounidji Guindo	100	90	10	90
Djanwely	Amadou Allaye Guindo	100	96	4	96
Djanwely	Elhadji Bocar Guindo	100	95	5	95
Daboye	Seydou Yeougouen Guindo	100	65	35	65
Daboye	Soumaila Guindo	100	60	40	60
Daboye	Oumar Daouda Guindo	100	85	15	85
Ogotena	Allaye Alboury Guindo	100	40	60	40
Daboye	Boury Guindo	80	50	30	62,5
Dimbal	Gadri TESSOUGUE	100	62	38	62
Endé	Salif Guindo	100	75	25	75
Ktombo	Allaye Guindo	99	19	80	19
	Total	1079	737	342	Mean rate = 68

4. Restoring degraded lands by sowing herbaceous species

Name of collaborator farmer at Dimbal	Superficies covered by species (ha)			
	Cenchrus biflorus	*Eragrotis tremula*	*Alysicarpus ovafolius*	Total/farmer
Bonsara Tessougué	3,5	3	1	7,5
Samuel Tessougué	6,5	4	2,5	13
Jean Tessougué	-	1	1,5	2,5
Moïse Tessougué	2	2	-	4
Adama Tessougué	1,5	4	-	5,5
Madou Tessougué	2	1	-	3
Oumarou Tessougué	-	2	-	2
Total /Species	15,5	17	5	37,5 ha

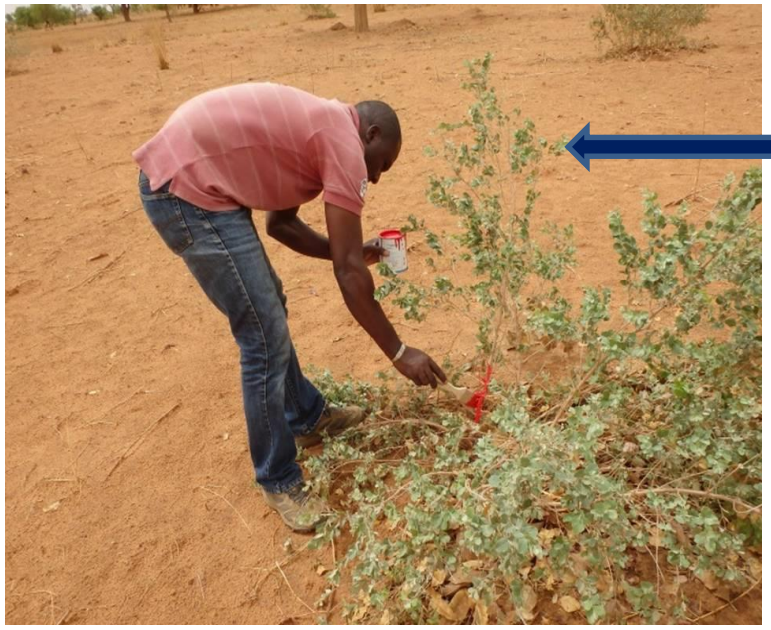
Species sowed at Ouenkoro (Sissa forest)	Superficies (ha)
Andropogon gayanus	10
Bracharia ramosa	10
Cymbopogon giganteus	1
Sylosanthes hamata	4
Total	25

Floristic diversity in parcels and specific contribution of sowed species assessed 4 months after sowing at Dimbal

Parcels sowed with *Alysicarpus ovafolius*			Parcels sowed with *Cenchrus imabbiflorus*			Parcel s sowed with *Eragrotis tremula*		
Species	Freq	SRC	Species	Freq	SRC	Species	Freq	SRC
Zornia glochidiata	121	0,526	*Zornia glochidiata*	155	0,410	*Zornia glochidiata*	155	0,462
Aristida sieberiana	19	0,082	*Sida cordifolia*	87	0,230	*Sida cordifolia*	87	0,259
Alysicarpus ovafolius	17	0,073	*Cenchrus*	29	0,076	*Cenchrus*	29	0,086
Sida cordifolia	7	0,030	*Eragrotis*	25	0,066	*Eragrotis*	25	0,074
Cenchrus biflorus	5	0,021	*Spermacoce verticillata*	16	0,042	*Spermacoce verticillata*	16	0,0477
Empty	61	0,265	*Merremia pinnata*	11	0,029	*Merremia pinnata*	11	0,0328
			Spermacoce chaetocephala	3	0,007	*Spermacoce chaetocephala*	3	0,008
			Empty	52	0,137	Empty	9	0,0268
Total	230		Total	378		Total	335	
Number of species	6		Number	7		Number	7	

5. Assisting natural regeneration

Sites	Parcel characteristics	Superficies (ha)
Dimbal I	Plantation	3
Endé I	Plantation	3
Ségué	Fallow	6,5
Endé II	Natural stand of *Acridocarpus monodii*	1,5
Yatabalu	Natural stand of *Acridocarpus monodii*	6
Total superficies (ha)		20



Shoots selection and elimination of non selected shoots

6. Harvesting herbaceous seeds

Species	Quantity of seeds harvested (Kg)
Andropogon gayanus	140
Andropogon pseudapricus	45
Pennisetum pedicelatum	15
Cymbopogon giganteus	19
Stylosanthes hamata	25
Zornia glochidiata	5
Alysicarpus ovafolius	3

Conclusions

- **Survey realized at Bandiagara and Koro departments allowed identifying 43 useful species to communities.**
- **The top 10 species were the same as those identified at Bankass**
- **Law survival rates were encountered for plantations done in 2013 and 2014 (replanting rate varied from 33 to 95%)**
- **The most adapted species were *Acacia nilotica, Adansonia digitata, Bauhinia rufescens, Balanites aegyptiaca***
- **Less performing species were *Tamarindus indica, Prosopis africana, Faidherbia albida* (SR < 30%)**
- **Watering at dry season reduces plants mortality**
- ***Adansonia digitata was the most appreciated and asked species by communities for plantatio*n**

Perspectives

- Continuing seeds harvesting and seedlings production
- Monitoring and maintaining restored parcels and plantations
- Training communities in plantation techniques and natural regeneration assisting
- Extended GGW activities to other communities
- Training women associations in transformation techniques and valorization of harvested products
- Continuing sol scarification and anti-erosive managements in degraded lands
- Enrichment of restored parcels by sowing and planting
- Restituting results to communities and technical partners
- Elaborating reports according to the planning

Constraints

Some constraints have been countered this campaign

<u>Technical constraints</u>:

-Late start of the rainy season causing the impossibility to reach the targeted objective(i.e. to finish planting by the end of July),

-Slow growth of local species yielding small seedlings not appreciated by farmers and difficult to survive,

- Parasite attacks observed on *Acacia nilotica.*

Plant of *Acacia nilotica* sowing necrosis due to parasites attack

Operational constraints:

-**Overlapping of agricultural and restoration activities (peasants giving priority to field works),**

- **Prices of seedlings proposed by private producers were found high (250 FCFA to 2500 FCFA)**

Problem of parcels security due to damages from persons and cattle

Succulent roots of *Adansonia digitata* appreciated by children which pull out plants after plantation

Thank you for your
pleasing attention