CGIAR

RESEARCH PROGRAM ON
Dryland Systems

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Crop, tree and animal breed diversification and improvement in Niger, West Africa

Food security and better livelihoods for rural dryland communities

2015 Annual report

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Introduction

Humans' food and nutritional security rest on crop, tree and animal breeds managed in agricultural systems. Their diversity and integrated management are key to achieve the dual purpose of food security and sustainability of agricultural systems. In the framework of the Dryland Systems CRP, surveys were conducted in Niger to identify options for crop, tree and animal breed diversification and improvement. This report presents key findings.

Material and methods

Research sites were those defined by the consortium of research centres involved in the Drylands CRP programme. In addition to Gourjia and Milli in Gazaoua district in Niger, a third site (Dan-Saga in Aguié district) was included, to add an ecological dimension to human's management of natural resources. Focus group discussions were carried out in the selected communities and data was gender disaggregated.

The study of farming systems in Maradi was based on the theoretical model of sustainable intensification that was developed in the framework of large literature survey carried out in the course of WAS DS activities in West Africa (Achigan-Dako *et al*. 2013)[1]. The robustness of options for sustainable intensification will depend on the level of integration given the resources available for farmers i.e. the basic resources (crop, tree, and livestock diversity) that producers have access to. An option is robust when all three resource components are well integrated; this can lead to a sustainable system whereby natural systems are reproduced for an optimum production (Fig. 1). In a situation where a farmer owns only one or two components, s/he should be brought to integrate the rest to reach a more sustainable intensification system.

Based on this model, three levels of crop-tree-livestock integration were defined as below and participants to the man and women FGDs were invited to evaluate the proportion of village households that they classify in each of these three categories.

- Low integration: Crop-tree: that we termed "passive integration"
- Medium integration: Crop-animal: "early active integration"
- High integration: Crop-tree-animal: "Advanced active integration"

The survey also assessed the development programmes that are operating or were recently active in those communities, together with their areas of interventions and duration in the villages.

[1] Achigan-Dako, G. Enoch, Sogbohossou O. Deedi, Segnon C. Alcade, N'Danikou Sognigbé, Sinsin A. Brice, Vodouhè S. Raymond, 2013. Agricultural ecological intensification options in the West African Sahel and Dry Savannas: current knowledge and possible scenario. Bioversity International, West and Central Office, Cotonou, Republic of Benin. pp 84.

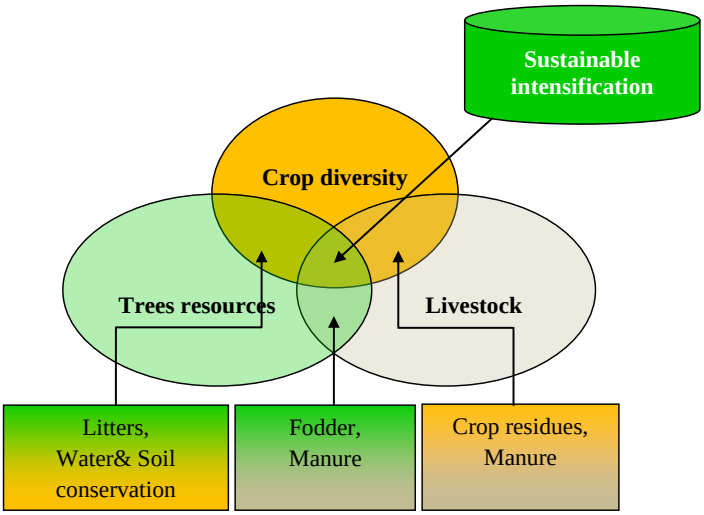

Figure 1. Theoretical model of optimal integration for sustainable intensification in Agriculture (Source: Achigan-Dako *et al*. 2013)

We calculated the species richness (r) as the actual count of different species managed at household or at community level. The level of crop, tree and animal breed integration in farming systems was assessed.

Results

Species diversity

Overall, Gourjia and Dan-Saga communities tend to manage higher species diversity, compared with Milli (Fig.2). This is more prominent for useful insects (for food, pollination, biological control, etc.), fish and other aquatic resources, and trees. Gender also has a bearing to the perceptions around useful biological diversity. Overall, men tended to give more attention to useful tree, insect, wild and semi-wild annual plant, and wild animal species.

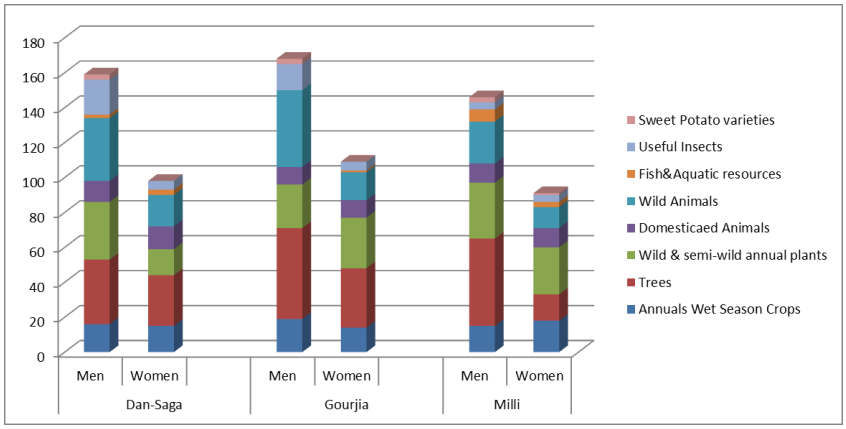

Figure 2. Specific diversity per type of resources

It was found that several crop, tree and wild annual plant species are used for multiple functions (as human food, fodder to feed animal, and soil enhance soil fertility). It is also shown that several crop species are also used in animal feeding (Fig.3). Several domesticated animals are used to fulfil several functions (Fig.4 and 5). It clearly appeared that the community of Milli listed higher diversity of multipurpose species, compared with other two communities. In fact, the

agricultural environment seemed more degraded in Milli. This could justify the higher diversity of knowledge of species used in soil fertility management.

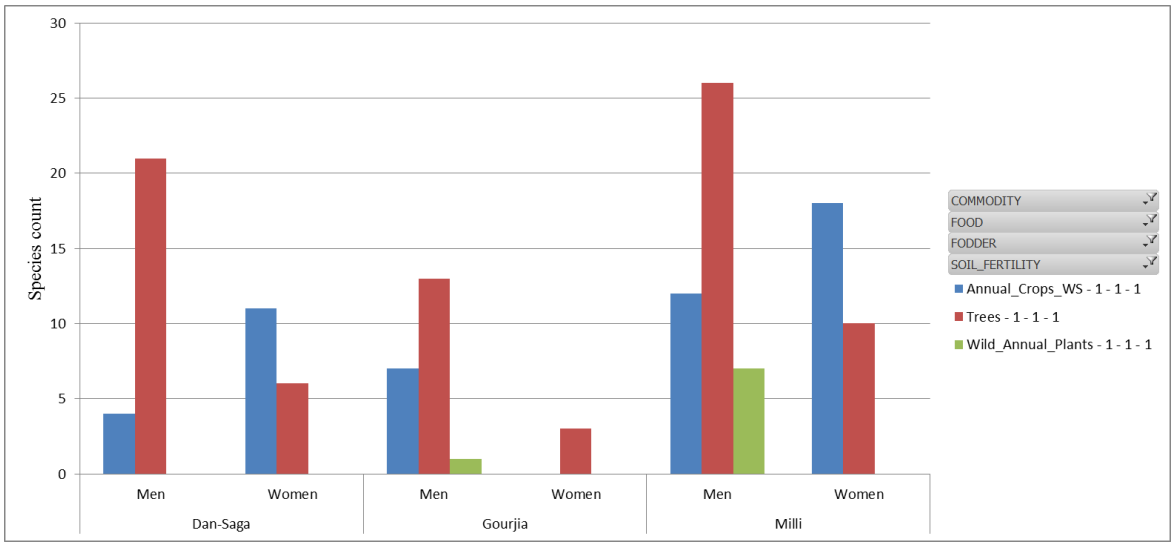

Figure 3. Diversity of species with multiple functions (human food, animal feed, and soil fertility management) per community and gender

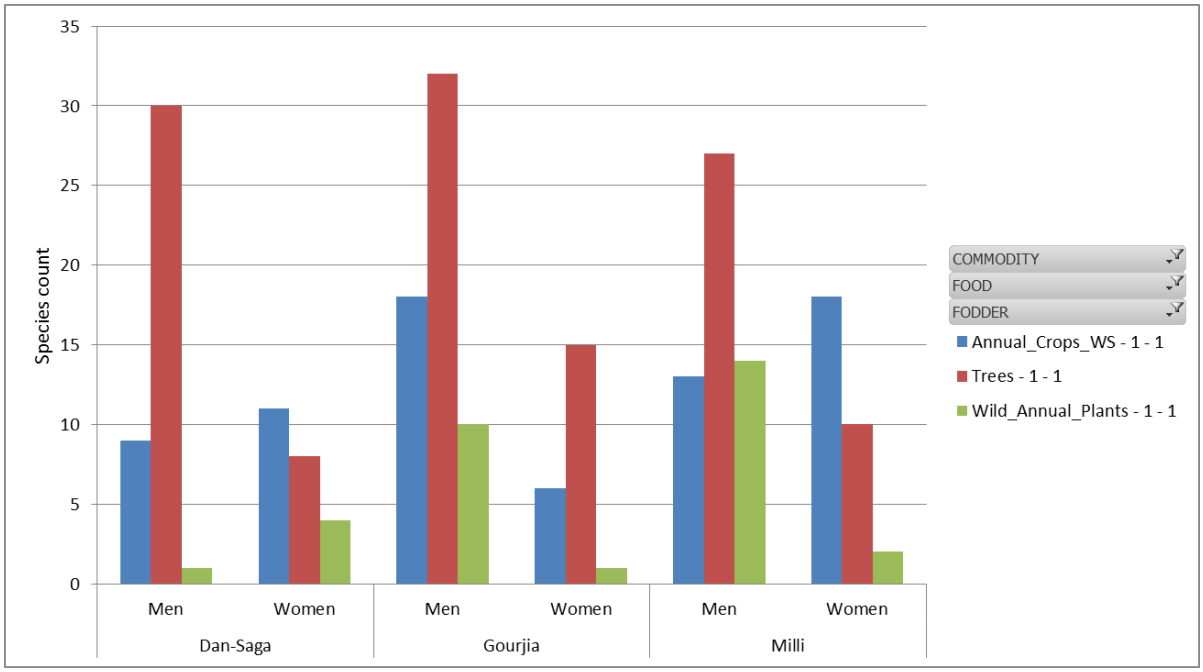

Figure 4. Diversity of species used for the dual purpose of human food and animal feed

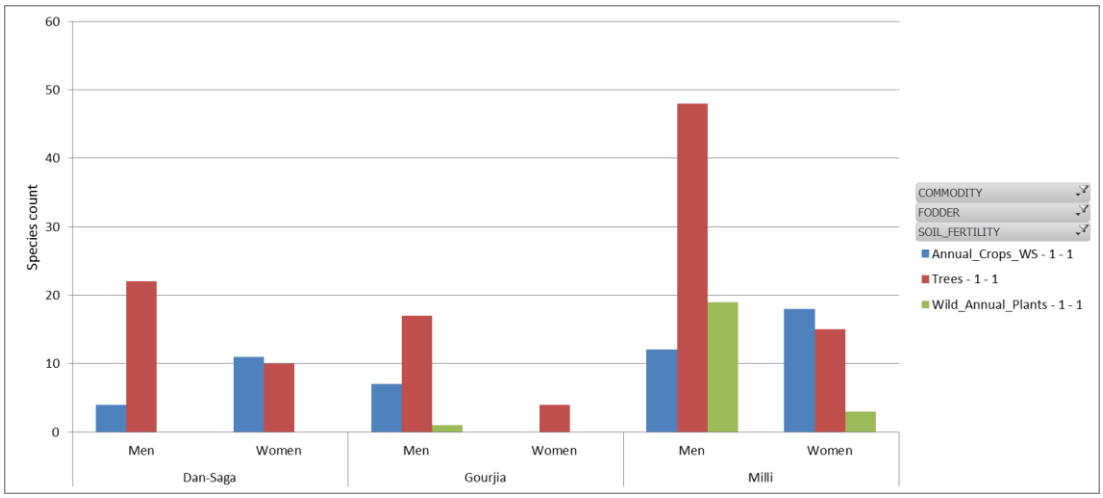

Figure 5. Diversity of species used for the dual purpose of animal feed and to improve soil fertility

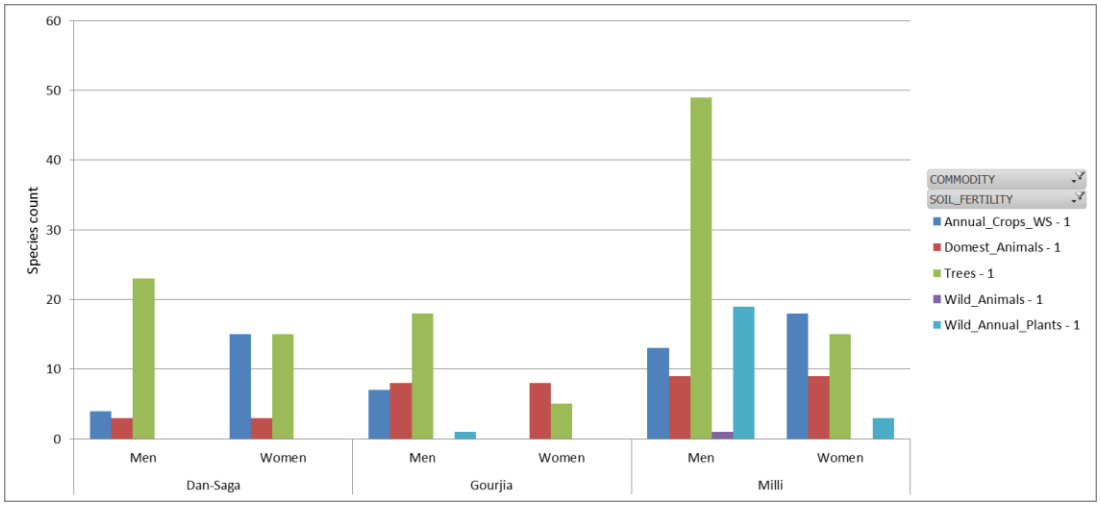

Figure 6. Diversity of plant and animal species used in soil fertility management in surveyed communities

Development programmes and state of natural resource management

Based on the survey of development programmes and their areas of intervention in the communities, Dan-Saga and Gourjia seemed to have benefited more development programmes compared with Milly (Table 1). For instance, Dan-Saga community members have benefited more training on farmer assisted natural regeneration management (FNR). This translates into more integrated crop, tree, and animal breed cultivation systems in Dan-Saga and Gourjia (Table 2).

Table 1. Number of development programmes mentioned by community members

Communities	Gender		Community total
	Men	Women	
Dan-Saga	15	5	19
Gourjia	13	8	19
Milli	6	5	6

Table 2. Degree of crop, tree, and animal breed integration in Maradi, percentage of households involved

		Level* of crop, tree, and animal breed integration			Total
Community	Gender	Low integration	Medium integration	High integration	
Dan-Saga	Men	40	40	20	100
	Women	95	2	3	100
Gourjia	Men	35	50	15	100
	Women	60	35	5	100
Milli	Men	70	20	10	100
	Women	80	15	5	100

*Intensities of crop-tree-livestock integration:

- Low integration: Crop-tree: that we termed « passive integration », most dominant
- Medium integration: Crop-animal: early « active integration », less common
- High integration: Crop-tree-animal: Advanced « active integration », less common

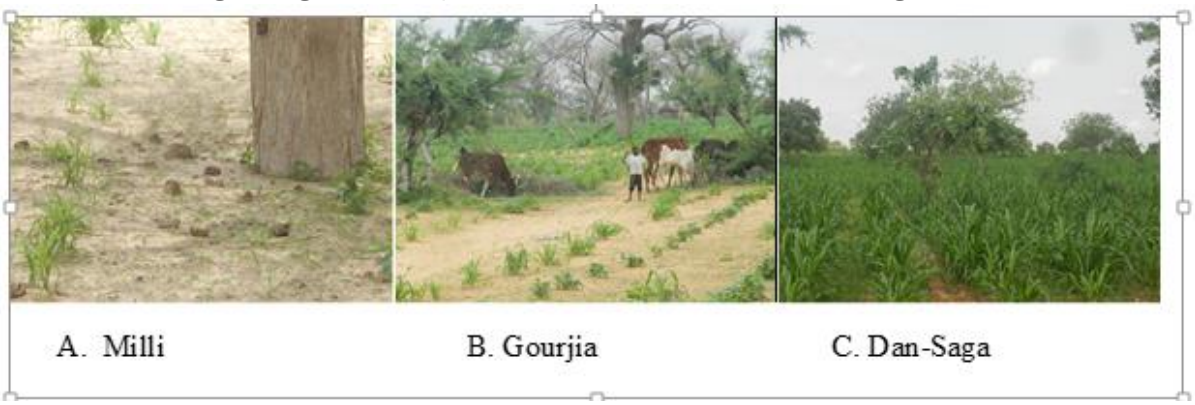

Plate 1. Different degrees of crop, tree and animal breed integration in Maradi

Conclusion

We assessed levels of crop, tree and animal breed integration in Maradi. Overall, the local biological diversity is managed to produce multiple functions. The most prominent functions fulfilled by crop, tree, and animal breeds were human food, animal feed and soil fertility improvement. We found higher levels of crop, tree, and livestock integration in Dan-Saga and Gourjia, compared with Milli, where natural resources are more degraded. More support is needed for this latter community to strengthen farmers' capacity in the management of agricultural systems in order to achieve sustainability goals.

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The CGIAR Research Program on Dryland Systems aims to improve the lives of 1.6 billion people and mitigate land and resource degradation in 3 billion hectares covering the world's dry areas.

Dryland Systems engages in integrated agricultural systems research to address key socioeconomic and biophysical constraints that affect food security, equitable and sustainable land and natural resource management, and the livelihoods of poor and marginalized dryland communities. The program unifies eight CGIAR Centers and uses unique partnership platforms to bind together scientific research results with the skills and capacities of national agricultural research systems (NARS), advanced research institutes (ARIs), non-governmental and civil society organizations, the private sector, and other actors to test and develop practical innovative solutions for rural dryland communities.

The program is led by the International Center for Agricultural Research in the Dry Areas (ICARDA), a member of the CGIAR Consortium. CGIAR is a global agriculture research partnership for a food secure future.

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