

The impact of diversity field forums: improving farmer management of millet and sorghum in Mali

IMPACT ASSESSMENT BRIEF NUMBER 5

Bioversity International's series of Impact Assessment Briefs aims to inform readers about the major results of evaluations carried out by the centre. The Briefs summarize conclusions and methods of more formal papers published in peer-reviewed journals.

Malian farmers have been growing millet and sorghum for millennia. These crops are still the main staples of subsistence farmers in an agricultural sector that is almost entirely rainfed (i.e. farmers do not have access to irrigation).

National average yields for both crops are low at less than 1 tonne per hectare. These low yields are often attributed in part to low adoption rates for improved seed; no more than 10% of the country's cereals area is planted with improved seed. Low adoption rates have in turn been blamed on the poor performance of the formal seed system. The formal seed sectors for sorghum and millet continue to be largely state-run, with some participation by registered farmer cooperatives in multiplying seed. So far, commercialization of farmer-produced seed has failed.

Farmers need to have access to a wide range of well-adapted varieties to cope with the varying rainfall and soil conditions in the

region. Growing a diversity of varieties also helps farmers reduce the risk of crop losses from biotic stresses (pests and diseases) and abiotic stresses (such as drought, salinity or flooding).

Early attempts to breed improved sorghum and millet generally had disappointing results, largely because they were based on materials imported from elsewhere, particularly India, that were not well adapted to local conditions.

Recent breeding efforts have focused on participatory plant breeding—involving farmers in defining the objectives of the breeding programme through to testing and selecting improved materials. This helps ensure that the varieties developed meet local conditions and demands and raises the likelihood that they will be adopted. This, coupled with decentralized seed production, may help reduce the time lag between development and adoption of improved varieties and encourage their spread to more remote areas.

This brief summarizes an evaluation of the impact of one such participatory research effort known as diversity field forums (DFFs). DFFs bear some similarities to farmer field schools—an approach to improving crop management practices that involves teaching groups of farmers how to solve problems, set priorities and conduct research through facilitated, hands-on sessions in fields allocated by the farming community. The Forums aim to strengthen the capacity of farmers to understand, analyse and manage their own plant genetic resources by creating a physical space that facilitates the exchange of ideas among farmers, extension agents and researchers and encourages farmers to experiment with different varieties and production approaches.

The project, *Empowering Sahelian Farmers to Leverage their Crop Diversity Assets for Enhanced Livelihood Strategies*, was funded by the International Fund for Agricultural Development (IFAD) from 2005, coordinated by Bioversity International and implemented by a combina-



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tion of local, national and international organizations. Villagers designed and conducted the field trials, with technical support from project staff, on land that they had set aside for the purpose. Farmers studied both modern varieties and landraces.

The project sites

The DFFs were conducted at two villages to the north-east of the capital, Bamako. Boumboro is in the Sahelo-Sudanian zone (annual rainfall of 450–600 mm); Bambara and Bobo are the major ethnic groups in this site. The landscape is a mosaic of cultivated woodland savannah. Petaka is in the Sahelian agroclimatic zone (annual rainfall of 200–400 mm). The major ethnic groups in this region are Dogon, Peulh and Sonrhaï. The area is characterized by a series of rocky plateaus and outcroppings interspersed with sandy plains, forest cover, cultivated areas and pasture.

These villages were selected because they were both within dry savannah areas in an area served by an IFAD investment programme and differed in their access to markets and services. Boumboro has a higher density of large, weekly markets and other types of physical infrastructure than does Petaka.

These factors generate an obvious, but unavoidable, placement bias that limits the extent to which findings from this study can be generalized. The findings therefore shed light on the potential of the DFF approach, but should not be seen as a comprehensive evaluation.

Evaluating project impacts

The impact analysis employed interviews with all participating farmers as well as statistical sampling of 150 farmers per village, representing both ‘treatment’ and ‘control’ groups. Farmers who participated in DFFs constituted the treatment group and a roughly equal number of non-participating farmers constituted the control group.

The analysis aimed to account for selection bias—that is, to avoid mistaking pre-existing differences between treatment and control groups for differences caused by participation in the project. Selection bias is an issue because, when participation is voluntary, factors that influence the likelihood of participation might also affect the outcome of participation. For example, farmers with more income, assets and access to information may be more likely to decide to participate in a project but would also likely attain higher yields whether or not they participated.

Of the two test villages, Boumboro has the longest and most extensive history of project activities. Surrounding villages have thus been influenced by the project through farmer visits to diversity fields cultivated by participants and farmer-to-farmer exchanges of information and seed. Therefore, some farmers from nearby villages who had been invited to observe DFFs conducted by farmers in Boumboro were included in the treatment group (but were not considered to be participants). In the Petaka site, all farmers in the treatment group are from Petaka itself because DFF ac-

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tivities were much more recent and had not involved other villages.

Data on households, farms, seed management, yields, market participation and social capital—the extent to which farm households engage in local associations—were collected in 2006. Additional yield data and data on variety attributes—unique production and consumption attributes supplied by crop varieties—were collected in 2007, when household demographic information was also reconfirmed.

Sample attrition and missing responses on some variables led to an operational sample size for the analysis of 131 farmers (62 treatment; 69 control) at Boumboro and 149 (56 treatment; 93 control) at Petaka site.

Since the goal of the project is to strengthen the management of crop genetic resources, impact indicators were defined relative to such resources. Better management of sorghum and millet varieties is expected to enhance yields and contribute to more diverse crop genetic stocks held in farming communities. Therefore, indicators used were:

- expected yields of millet and sorghum in the presence and absence of drought;
- two-year average yields based on farmer recall; and
- the total count of the unique production and consumption attributes of the millet and sorghum varieties held in stock at the time of the survey.

Relative deprivation—an indicator of the standing of participants relative to others—was also determined using these variables.

How effective are diversity field forums?

Several factors made it more likely that a farm household would include a DFF participant. These included:

- Being located at the Boumboro site. This was expected given the higher rates of participation and longer project involvement at this site.
- Greater relative wealth in terms of farm physical capital, defined as the total value of livestock and material assets.
- Greater specialization in millet than in sorghum. This may reflect the fact that millet was grown more widely than sorghum at both sites, or that fewer improved millet varieties have been released at either site relative to sorghum, so farmers may be more active in searching for new materials and means of improving their existing materials.
- Greater social capital, i.e. farm households that engage more actively in local associations.

DFF participants sold or purchased sorghum or millet in a larger number of markets than did non-participants, and

were more likely to possess more social and farm physical capital than non-participants. Participation had a positive impact on expected sorghum and millet yields, recalled millet yields and the stock of variety attributes. Farmers in treatment villages were better off in terms of expected yields and attribute stocks than those in control villages, clearly demonstrating the benefits arising from the DFFs.

The impacts of the DFFs were greatest in Boumboro, where local field staff have been continuously engaged with farmers for a much longer period of time than in Petaka. However, inequality in holdings of millet and sorghum genetic resources appears to be greater in Boumboro than in Petaka. The pervasive harshness of the environment around Petaka and the greater degree of self-reliance of farmers there result in them stocking a wider range of varieties to meet their wide-ranging consumption and production needs.

Key policy lessons

Two key policy points emerge from the assessment of the impact of the DFFs. First, long-term commitment to fostering local leadership and capacity is likely to be a key factor in realizing benefits from this type of extension approach. The local leader in the Boumboro site was trained both on site and abroad and has since established his own non-governmental organization working in surrounding communities. Second, for precisely this reason, it will be difficult to scale up this approach from one village to many without coordinated support from national public institutions and donors.

Although farmer selection bias associated with participation was taken into account in the analysis of the results, the findings of this study cannot be generalized to other communities unless these conform to the same criteria used to select sites. A more comprehensive evaluation, which would require the application of additional analytical approaches over a longer time period and in multiple locations, is not yet justified by the amount of funds invested in DFFs nationwide. As more participatory research efforts are undertaken in Mali, however, these evaluations will be crucial.

Perceptions of Bioversity's role

National and international partners in the project were surveyed using semi-structured questionnaires to determine Bioversity's role in the coordination and implementation of the project's activities. Out of 18 people contacted, 11 (61%) responded. The questionnaire consisted of five open questions relating to two major topics:

1. Partners' perceptions of Bioversity's role in:
 - a) Implementation of project activities
 - b) Management capacity and work quality
2. Partners' perception of the what might have happened in the absence of Bioversity
 - c) Could the project have been implemented without Bioversity's involvement?
 - d) Could other actors have played the same role?
 - e) To what extent might the project have influenced

“It will be difficult to scale up this approach ... without coordinated support from national public institutions and donors”

Sahelian farmers' capacities to manage their crop genetic resources without Bioversity's input?

Perspectives emerging from each informant were compared to each other and also contextualized in relation to the position held by each informant in order to weight the a reliability of the answer.

Results

There was a generally positive perception both of Bioversity's role and its capacity to coordinate the project.

Partners' perceptions of Bioversity's role

The key informants saw Bioversity as having played a central role in coordinating the implementation of several activities throughout the project's life. The informants emphasized the important role of Bioversity in coordinating and facilitating discussions among partners. Bioversity was seen as being able to develop consensus among a multitude of actors at different levels and to coordinate their work in order to implement the project activities and achieve the project's goals within the short time framework and budget constraints faced by the project.

Partners emphasized the value of technical and scientific support given by Bioversity, especially in some key areas relating to genetic conservation. Partners recognized Bioversity's efficiency in circulating research outcomes and considered the organization a driving force and source of scientific knowledge. Many informants highlighted Bioversity's ability to keep track of all the project activities and changes in them and to address problems and difficulties partners encountered. Local partners in particular appreciated the presence of Bioversity in the field. This had two key results. On the one hand, farmers gained trust and confidence in the project, having the possibility to pose questions and concerns directly to officers of the implementing agency. On the other hand, Bioversity's presence in the field gave partners the opportunity to regularly brainstorm and solve bottle necks during the evolution of the project, adjusting strategies and indicators as necessary.

Overall, all the partners were well satisfied with the role played by Bioversity and the quality of its work, often stressing that the organization demonstrated how to put scientific theory into practice, that it demonstrated commitment to the objectives of the project, and that its accurate, careful and flexible management helped bring together the many different partners and enable them to cooperate effectively. Nevertheless, some concerns emerged regarding delays in

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For further information please contact
Bioversity Impact Assessment Specialist
Dr Elisabetta Gotor (e.gotor@cgiar.org)

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receipt of project funds. Some partners noted that these had a negative impact on project implementation.

Communication was also an area of concern. One partner stressed the need of more communication among partners of all project components, highlighting the need for meetings to ensure knowledge sharing.

Partners' perception of what might have happened in the absence of Bioversity

Assessing what might have happened without the participation of Bioversity in the project was a complex task. The large number of partners involved in the project and the diversity of their roles made it difficult to isolate individual contributions.

Respondents indicated that the project may have been implemented in some form without the participation of Bioversity. Some respondents suggested that the Food and Agriculture Organization of the United Nations (FAO) or other organization might have played a similar role. However, most recognised that, although other actors could have played the same role in the project (administrative management, funds management, research and project follow-up), Bioversity was probably the preferred partner because of its experience, competences and focus on genetic resources. Four partners were convinced that no other actor could have played the same role of Bioversity because of the organization's international credibility and the quality of its research, results and work. They suggested that none of the national research organizations could have played the same role and that without Bioversity's coordination it would have been impossible for so many local and national partners to work together.

In a more general view the project made both farmers and local authorities more aware of the need to manage genetic resources. In particular, diversity seed fairs, by creating a physical space to meet other farmers, promoted exchange of experience and information among farmers and stimulated them to look for new varieties. Diversity field forums offered opportunities for cooperation between researchers and farmers, and allowed farmers to get to know the technical characteristics of crops and new varieties, helping them to adapt them to their environment.

An informant affirmed that the main difficulty farmers faced in managing their genetic resources was lack of funds,

and not lack of knowledge, whereas the project aimed at enhancing their knowledge. Nevertheless, most informants seemed to agree that the project succeeded in enhancing the capacity of farmers to manage their diversity assets.

The project also strengthened social cohesion in targeted villages, particularly by improving the status of women and their agricultural production.

Conclusions

In conclusion, the project was based on the cooperation of various actors, from the very local level to the international level, each one with their own competencies and specific role in the project. Bioversity successfully coordinated the project, making possible this multi-level and sometimes difficult cooperation between partners in order to achieve project's objectives. The scientific knowledge and technical support provided by Bioversity to its partners and to Sahelian farmers seems to have had a very positive effect, improving farmers' traditional crop management by providing them knowledge and a better understanding of their crop diversity assets. Furthermore, some practices and experiences such as diversity field forums and diversity seed fairs have shown their utility and their potential in outscaling project impacts to other villages and farmers.

The project thus seems to have succeeded in increasing farmers' productivity, introducing new varieties and increasing exchange of information and experience between farmers.

Bioversity International
Via dei Tre Denari, 472/a,
00057 Maccarese, Rome, Italy
Tel.: (39) 0661181
bioversity@cgiar.org
www.bioversityinternational.org

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