



**Global Theme on Agroecosystems**

**Report no. 22**

# **USAID TARGET Project on Fertilizer Micro-Dosing for Small Farmer Prosperity in the Sahel**

**Training workshop  
on  
large-scale transfer (scaling-up) of  
fertilizer micro-dosing technology**



**International Crops Research Institute for the Semi-Arid Tropics**

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### **Abstract**

The USAID TARGET project on fertilizer micro-dosing for small farmer prosperity in the Sahel was launched in July 2002 in three countries in West Africa, namely Burkina Faso, Mali and Niger. The goal of project funded by USAID is to double the crop production and increase the farm incomes through the uptake of fertilizer micro-dosing and better farmer-based cooperative organizations. In all the three countries where this technology is being promoted, yields of sorghum and millet increased two fold in most cases. Farmers have reported increased incomes using this technology. To achieve the overall objective of the project, proven fertilizer micro-dosing technologies together with the “*warrantage*” or inventory credit system should be transferred to a large number of end users in areas targeted by the project. It is therefore essential to build the capacity of project partners. It is in this context that a workshop entitled “large-scale transfer of fertilizer micro-dosing technologies” was organized in Ouahigouya, Burkina Faso, from 20 to 24 January 2004. The training workshop provided the participants with tools that will enable them develop action plans for scaling up existing gains. A total of 19 participants from the National Agricultural Research Systems, NGOs, IFDC and ICRISAT attended the workshop.

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**Fertilizer Micro-Dosing for**  
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*Training Workshop on*  
**Large-Scale Transfer (Scaling-Up) of**  
**Fertilizer Micro-Dosing Technology**  
20–24 January 2004  
Ouahigouya, Burkina Faso



**ICRISAT**

**International Crops Research Institute for the Semi-Arid Tropics**

**2006**

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## Preface

Poverty among small-scale resource-poor farmers in the semi-arid tropics of West and Central Africa remains one of the most intransigent development problems. Despite improvements in government policies and major development efforts during the decades of the eighties and nineties, little change has occurred in agricultural practices among small-scale farmers.

Now, there is a real hope, even in the Sahel, the driest area of West Africa for agriculture. The fertilizer micro-dosing technology is based on the application of small quantities of fertilizers in the hills of plants (ie, sorghum and millet), thereby enhancing fertilizer use efficiency and improving yields. Through the Warrantage system or inventory credit schemes, a link is established between the credit and cereal grain markets.

To make inputs accessible to farmers, sustainable farmer-based enterprises and cooperative organizations are developed, storage facilities and inputs shops (boutiques d' intrants) are built. These cooperative enterprises provide access to micro-credit and inputs, as well as better access to output markets. Farmers also use the credit they obtain to carry out activities that generate income for them during the dry season.

The project was initiated in July 2002 in Burkina Faso, Mali and Niger. The goal is to double the crop production and increase the farm incomes by 50% through the uptake of fertilizer micro-dosing, and better farmer-based cooperative organizations. The specific objectives are to (1) demonstrate and enhance adoption of the fertilizer micro-dosing technology to improve productivity; (2) strengthen sustainable community-based farmers' organizations in the targeted regions to provide access to credit and inputs and output markets; (3) assist in human resource development through technical training; and (4) promote policy and investment options that ensure optimal use of natural resources at the landscape scale.

In all the three countries, where this technology is being promoted, yields of sorghum and millet increased twofold in most cases. Farmers claimed to have generated greater incomes using this technology.

This workshop entitled "large-scale transfer of fertilizer micro-dosing technologies" was organized in Ouahigouya, Burkina Faso, from 20 to 23 January 2004, with the objective of providing participants with tools that will enable them develop action plans to scale up existing gains. It was in this context that the project coordinator, Dr Ramadjita Tabo, ICRISAT, Niamey, requested IFDC-Africa to assist in thinking, together with partners, about the ways and means of disseminating the gains on a large scale.

A total of 19 participants from the national agricultural research systems, NGOs, IFDC and ICRISAT attended the workshop (list of participants is attached).

### **Dr Ramadjita Tabo**

Principal Scientist (Agronomy) and Project Coordinator  
USAID TARGET Project on Fertilizer Micro-Dosing in the Sahel

## List of Acronyms

ADRK:	Association pour le Développement de la Région de Kaya, Burkina Faso
CASE:	Competitive Agribusiness System and Enterprise
CIAT:	Centre International d'Agriculture Tropicale
GIFS:	Gestion intégrée de la fertilité des sols
FNGN:	Fédération Nationale des Groupements Naam, Burkina Faso
ICRISAT:	International Crops Research Institute for the Semi-Arid Tropics
IER:	Institut d'Economie Rurale, Mali
IFDC-Afrique:	Un Centre International pour la Fertilité des Sols et le Développement Agricole – Division Afrique
INERA:	Institut de l'Environnement et de Recherches Agricoles du Burkina Faso
INRAN:	Institut National de Recherche Agronomique du Niger
FO:	Farmers' Organization
DFS:	Decentralized financial system
TSBF-CIAT:	Tropical Soil Biology and Fertility Institute
USAID:	United States Agency for International Development



## 1. Introduction

The USAID-funded TARGET project on fertilizer micro-dosing was launched in 2002 in three Sahelian countries, namely, Burkina Faso, Mali and Niger. This project is managed by ICRISAT and implemented in collaboration with national agricultural research institutions, non-governmental organizations (NGOs), farmers' associations and other international research and development institutions such as IFDC-Africa and TSBF-CIAT. The overall objective of the project is "to strengthen farmers' community organizations so as to facilitate their access to microcredit, inputs, improved technologies and to increase farmers' knowledge and significantly improve the adoption of technologies as well as the well-being of communities."

Activities implemented since the inception of the project in these three countries include mainly demonstration trials of the fertilizer micro-dosing technology for improving millet and sorghum productivity and the testing of the Warrantage or inventory credit system with a view to facilitating producers' access to credit and inputs. In addition, other equally important activities were carried out, including building the capacity of various stakeholders.

To achieve the objective, proven fertilizer micro-dosing technologies together with the Warrantage system should be transferred to a large number of end users in areas targeted by the project. It is therefore essential to build the capacity of project partners. To that effect, the project coordinator, Dr Ramadjita Tabo, ICRISAT, Niamey, requested IFDC-Africa to assist in thinking, together with partners, about the ways and means of disseminating the gains on a large scale. This workshop entitled "large-scale transfer of fertilizer micro-dosing technologies" has provided the participants with tools that will enable them develop action plans to scale up existing gains.

## 2. Objective and expected outputs

### *Objective*

Based on the analysis of institutional and economic framework of the area targeted by the fertilizer micro-dosing project, develop new lines of action promoting a large-scale adoption of the fertilizer micro-dosing technology.

### *Expected outputs*

At the end of the training workshop, the participants will

- learn about adult learning cycle and will integrate these principles into the participatory development of technologies;
- learn about various tools of economic analysis and use them;
- analyze the role that financial systems (credit and savings – warrantage in particular) can play in the promotion of the large-scale adoption of technologies;
- learn about the major concepts related to institutional development and use some tools for analyzing the institutional context;
- analyze the interaction between the fertilizer micro-dosing project and economic and institutional factors, including collaboration frameworks; and
- identify opportunities to scale up fertilizer micro-dosing technologies.

### 3. Organization of the training session

#### *Administrative and material aspect*

The administrative and logistic aspects of the training session included the following: getting authorizations, invitation of participants and payment of their per diem, transportation and accommodation, hiring of conference room, and preparation of the working material. Most of these activities were carried out by the coordination unit of the USAID TARGET project at ICRISAT, Niamey, and INERA, Burkina Faso.

#### *Conceptual aspects of the training and its implementation*

The training was designed and implemented by IFDC-Africa's *Access to Input* program team (A Maatman and A Konlambigue, with the support of N Lawson). Each participant was provided with a folder containing the details of training program, its objectives and the expected outputs. Hard copies of the material on various training topics were handed out to the participants during the training.

The training consisted of eight sequences. Through presentations and discussions, the participants learnt about the key concepts so as to outline the country action plans for scaling up fertilizer micro-dosing technologies. The design of the program was flexible and adaptable to the needs of the participants. At the end of the workshop, most of the presentations made as well as the documents were copied onto the CDs and distributed to the participants.

### 4. Methodology and content of the training

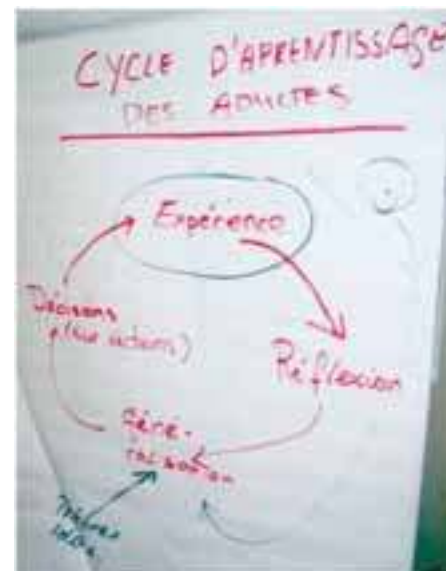
The training was based on a participatory and interactive approach, with resource persons from IFDC-Africa acting as facilitators. The facilitators encouraged exchanges between the participants. Methods used to promote greater exchange between the participants included brainstorming, working group sessions and presentation of results during plenary session. Working groups consisted of the participants from the same country so as to enhance exchange between the NGOs and the research institutions.

#### *Sequence 1: Adult learning cycle – learning by experience*

An introductory sequence was aimed at explaining the training methodology based on four stages of adult learning cycle:

- Experience
- Thinking
- Generalization
- Decision (on actions to be implemented)

Adult learning – in a natural “environment” (therefore not in a classroom) – is based on experience and begins with experience. According to Kolb (1976, *Learning Style Inventory*, Technical Manual, Boston, McBer, USA), the thinking (and discussion) stage, which is a spontaneous phase, focuses on experience. During this stage, emotions and direct exchange



*Adult learning cycle.*

play a key role. At the stage of generalization, some major lessons are drawn from experience, emotions and thinking, and compared with the rules and ideas that underpin experience. This phase should lead to a new interpretation of the rules of the game and dominant ideas so as to influence decision-making relating to future actions – maybe in the form of small tests.

Being conducted in a conference room, the training can neither reproduce activities of the fertilizer micro-dosing project nor the experience and the thinking about these activities in the field. However, the training used the learning-through-experience cycle by simply emphasizing on the experience gained by the participants in implementing project activities. It began with these “presentations”.

First, the feelings and initial ideas of participants on the presentations of their own experience were collected.

Then, the participants were asked – sometimes through presentations made by facilitators – to highlight some major ideas which may inspire new actions that would eventually increase the “spreading” effect of the fertilizer micro-dosing technology.

At the end of each day, the participants reviewed individual log books, the broad lines of the work done during the day, their center of interest and what they might use in the fertilizer micro-dosing project.

The example of “demonstration plots” was chosen to explain the training cycle during the first sequence. The demonstration plot tool is the key fertilizer micro-dosing technologies dissemination strategy in the framework of the project. The experiences related to “demonstration plots” – how they were implemented? who is involved and what are the results achieved in terms of dissemination? – were discussed. The project plays a pro-active role at three stages: (1) definition of technical options according to the pilot zone (according to the idea of fertilizer micro-dosing technology), (2) trial of these options in a few locations, and (3) multiplication of demonstration plots. Project partners largely prefer the third stage as a means of dissemination. However, the discussions revealed other important stages before reaching adoption (or adaptation) of fertilizer micro-dosing technologies: (1) The producer tests the technology himself/herself – by purchasing all the inputs – and by adapting it to his/her resources and objectives. (2) Adoption on a large scale at farm level by replacing part of his or her “current” practices with new fertilizer micro-dosing strategies.

By giving the example of learning plots and other forms of extension, including extension methods which put a greater emphasis on producers’ innovative capacity (ie, more emphasis on principles than on the compliance with one or two clearly defined technical options), we initiated the generalization phase. This phase enabled the



*Working group session during the workshop, Burkina team.*



*Implementation of demonstration plots.*

participants to (1) observe, from a different angle, the extension principles governing the fertilizer micro-dosing project, and (2) assess both the strengths (for example, many producers took part in the implementation of demonstration plots) and the weaknesses (little attention was paid to the learning process of producers and their capacity to understand and assess the relevance of these technologies for their farm; little attention was paid to the farmers who were “not demonstrators” – how producers could be better involved in this innovation process?; focus on “individual” producers and social aspects was lacking – how to promote a learning process in the community as a whole, etc.). This sequence – and above all the example chosen – would not only promote the understanding of the concept of adult learning cycle and training formats, but also provides some key elements and orientation for the other sequences.

**Sequence 2: Status report**

The objective of this sequence is to review the status of the project, the activities carried out and the outputs. It mainly consisted of group work involving participants from the same country (Burkina Faso, Mali and Niger). The results of these groups were presented and discussed during a plenary session. The results included two main project activities, namely demonstration of technologies and testing of the Warrantage system.

The status report revealed that Niger was at a very advanced stage regarding the testing of the Warrantage system compared to Burkina, which was still in its early stages. Testing of the system was also well advanced in Mali. This review exercise also enabled the participants to highlight some of the problems which development agents were facing. The adoption of the technology was not very clear as the adopters may only be producers who were involved in demonstrations. On the other hand, there was still a weak linkage between the implementation of the fertilizer micro-dosing technology and the Warrantage system. The participants also noted a low level of collaboration between the NGOs and national agricultural research institutes.



*Presentation during the plenary, Mali team.*

ETIENNE LIEU: MILIT

1. Climat: Sahelien Soudano-Guinéen (400-1200mm)  
Sols Sables et Argiles avec 1/3 Intermédiaire  
Araucariacées, Marchés locaux, Intercultures  
Magasin d'Intrants, CRIP

2. Démonstration micro-dose, Combustion et épandage, Stockage et transport, maillage agricole, AGR, Formations, Intermédiaire, Info et Sensibilisation, Visites d'échange d'expérience

3. Formation P.C. et Encadrement des producteurs  
Démarche: 300x200m, 100x200m, 50x200m  
Date: 10/10/07, 20/10/07, 27/10/07  
Séances: 8 séances de 2 heures de formation

4. Variables de démonstration  
traitements: T0, T1, T2, T3, T4, T5, T6, T7, T8, T9, T10  
Visites d'échange d'expérience et formation

	MIL	Sorgho	MIL	Sorgho
WT <sub>0</sub>	950	703	30200	774
T <sub>1</sub>	1506	1107	T <sub>1</sub>	1367
T <sub>2</sub>	1337	1112	T <sub>2</sub>	1115
WT <sub>0</sub>	750	978	WARRANTAGE	
T <sub>1</sub>	1500	1207	stock (kg)	
T <sub>2</sub>	1050	1544	WT = 50253	
			SO200 = 40713	
			II B = 16564	

5.  $I_2 > I_1 > I_0$ : Economie agricole, Sécurité alimentaire, Disponibilité des intrants, Disponibilité des services, Disponibilité des équipements, Disponibilité des connaissances

*Status report by the Mali Group.*

### *Sequence 3: Scaling-Up*

The objective of this sequence is to have a deeper understanding of the concepts related to scaling-up. To this end, the participants first made an inventory of the driving forces for the scaling-up of micro-dose technologies and the Warrantage system, using maps. These driving forces were then grouped into five categories (see Table 1).

**Table 1. Inventory of driving forces for the scaling up of micro-dose technologies.**

Participatory approach	Capacity building of stakeholders	Appropriate and profitable technologies	Accessibility to credit and inputs	Others
More participation and involvement of producers	Strengthening of credit systems	Apply fertilizers in seed holes at emergence stage to reduce risks	Availability of inputs	Production for marketing
Participation of actors stakeholders	Train DFS in warrantage system	Very high profits	Facilitate producers' access to credit with financial systems (Warrantage)	Set an example by doing oneself
Awakening of producers because of micro-dose technology and Warrantage	Technical training	Profitable technology	Warrantage system is good for micro-dose producers	Political and economic environment
Increasing awareness	Build capacity to supply fertilizers	Reduction of labor	Establish contact between FO and DFS	Meet demand
Guided visit	Diversify fertilizer supply sources (inputs shops)	Money (profit)	Access to micro credit	Organize workshop bringing different partners together to reflect on the issue
Ensure monitoring	Build capacity of organizations	Cost of fertilizers		
Periodic visits	Build the capacity of FO	Technique for putting the microdose in seedholes		
Make resources available to government services to monitor FOs	Rely on FOs	Adaptability of the technology		
	Organization	Low cost Technology easy to understand		

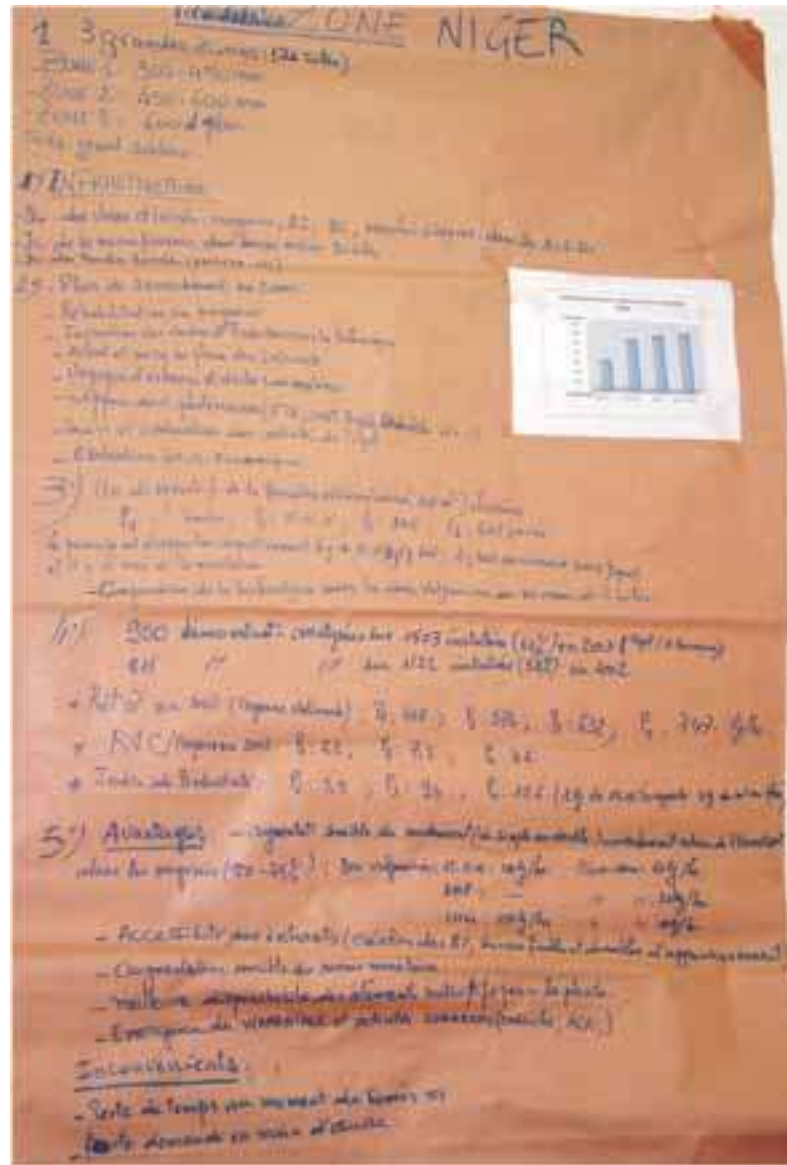
Following this inventory, a presentation on the CASE approach for the large-scale dissemination of GIFS technologies—key elements of scaling-up – was made. Basic concepts and some experiences of the GIFS project were shared with the participants. The presentation was followed by discussions, which were focused on the type of scaling-up, and comments. The participants pointed out that only a spatial scaling-up, which consisted of increasing coverage using the same type of actors, was being carried out. Vertical scaling-up, which was aimed at institutional development (linkages between producer organizations, trader associations and political leaders), was not yet effective, but it was necessary to put an emphasis on this aspect in future actions.

**Sequence 4: Economic analysis**

Economic profitability of a technology is one of the factors which determines its adoption by producers. One cannot scale up a technology which is not economically profitable. This is the reason why it is necessary to carry out an economic analysis to assess the efficiency of production factors used. The objective of this sequence was to introduce participants to a few analytical tools which can be used for full-scale trials. To achieve this objective, the participants first presented their experience with economic methods and analytical tools including

- determination of marginal cost,
- determination of net gain,
- partial gain,
- marginal gain,
- value/cost ratio (RVC) and
- partial budget method.

Subsequently, a presentation on the “Economic analysis tools used for full-scale trials” was made. The objective of this presentation is to use examples showing when and how methods such as partial budgeting, balanced analysis and cost and benefit analysis may be used (see Table 2).



*Status report by the Niger group.*

**Table 2. Economic analysis methods.**

Methods	Economic indicators
Partial budgeting	Net benefit TRM
Balanced analysis	Cut-off rate of return
Cost/benefit analysis	Value/cost ratio (RVC)

This presentation was followed by a lot of discussions (questions and answers). The participants then went back to their groups to carry out a practical exercise, that is to evaluate the profitability of technologies. Based on information gathered during the status report, each group was asked to try and prepare an operating account to determine the profitability of the capital invested and of the family labor. The results of the group work were presented during the plenary session and followed by discussions to clarify some concepts such as opportunity cost of family labor and capital.

The results indicated that family labor was more utilized than capital and that this had a negative impact on profitability. The micro-dose technology required more labor than technologies disseminated in the area. The participants concluded that research must also focus on the reduction of working time, especially during the sowing period. The participants, particularly those coming from the NGOs, expressed the need to diversify technological options through the introduction of other crops that are more profitable. This sequence lasted longer than planned because of the group work. This had implications on the rest of the program.

### ***Sequence 5: Financial systems***

This sequence gave the participants the opportunity to discuss the operation of the financial system (*warrantage*) tested to facilitate producers' access to inputs. To this end, they first made an inventory on a chart. On one side, they listed the advantages of the systems, and on the other, the constraints which may hinder the development of this system and therefore its large-scale dissemination.

A presentation on systems for funding agriculture was given to share new ideas concerning opportunities to overcome constraints which were put into different categories. The presentation reviewed possible interventions in rural area regarding funding, mechanisms for securing credit and conditions of their implementation.

A brainstorming exercise enabled the participants to exchange and identify potential solutions (see Table 3).

**Table 3. Summary of constraints to the development of warrantage systems and possible solutions.**

Constraints	Solutions
Lack of capital - For DFS to grant loans - For supervising bodies to provide guaranties	- Support DFS to sourcing funds with commercial banks and to negotiate good interest rates - Sensitize people to mobilize savings - Negotiate with DFS to value stocks of products (depreciation of the value of the product)
Interference of the government through the dumping of imported commodity the market	- Diversification of products to be stored - Seek information to anticipate the de-stocking of products - Negotiate with the government for the purchase of products covered by the warrantage system
Lack of infrastructure at village level	- Establishment of secondary warehouses in new villages - Sensitize FOs to the construction of warehouses - Seek support from other projects providing assistance for the establishment of community infrastructure
Problem related to the organization of FO	- Training of FOs in warehouse management - Training of FOs in management bodies and their roles - Training of FOs in the keeping of management documents

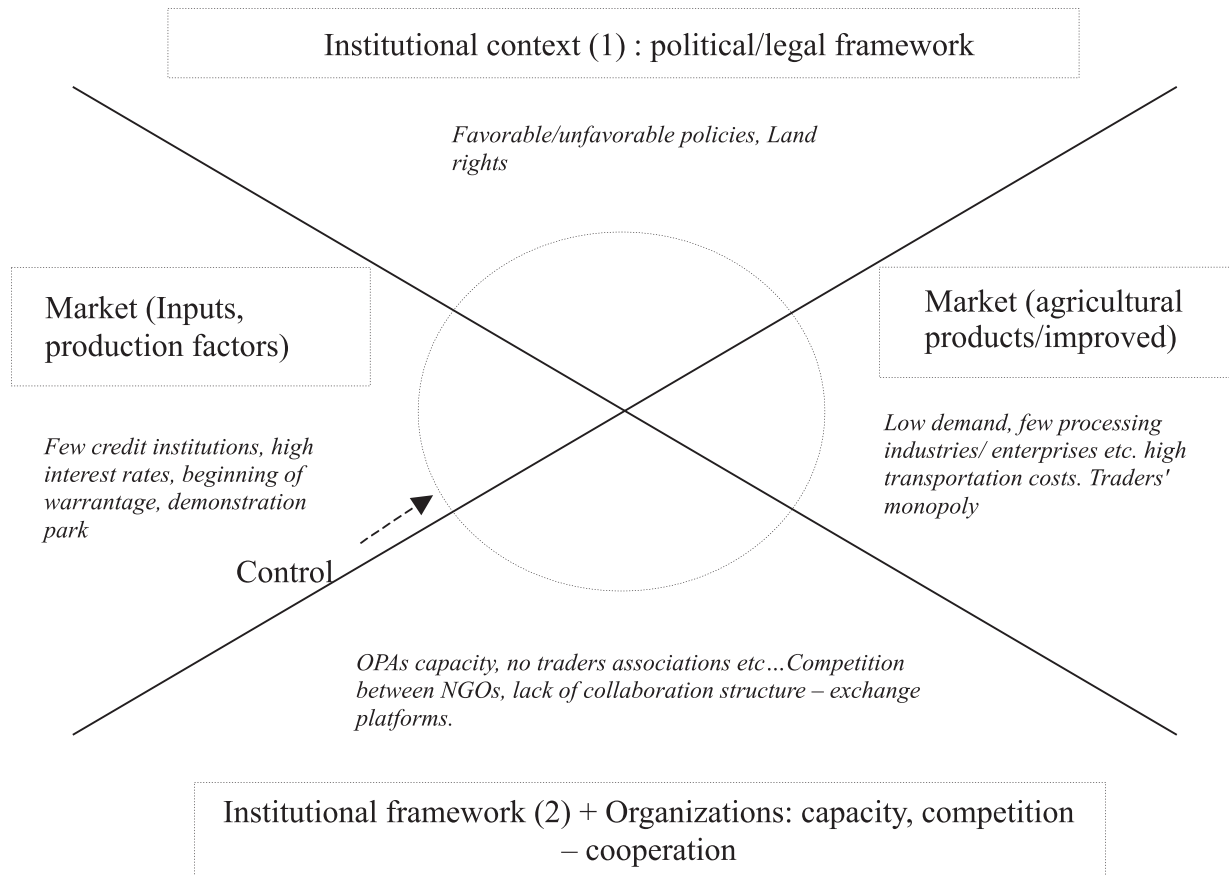
***Sequence 6 (and 7): Scan of the project environment***

Following the delay experienced in sequence 4, the program was re-adjusted to combine sequences 6 and 7. The objective was to identify potentialities as well as institutional, economic and agroecological constraints to the large-scale development of micro-dose technologies. This scan exercise was conducted in small groups. Each group was asked to make an inventory of factors influencing the micro-dose project:

- At institutional level: political framework, regulations and socio-cultural aspects. Capacity of organizations, including research & development systems, networks, platforms and collaboration, information exchange.
- At market level: credit supply, inputs and transportation, product demand, processing.

This inventory included both positive and negative factors, which were put down on cards of different colors. These factors were then placed on the scan (see graphic on the next page) according to their degree of influence.





*Diagram of environmental scan  
(adapted from Management For Development Foundation 'Course on ID and OS').*

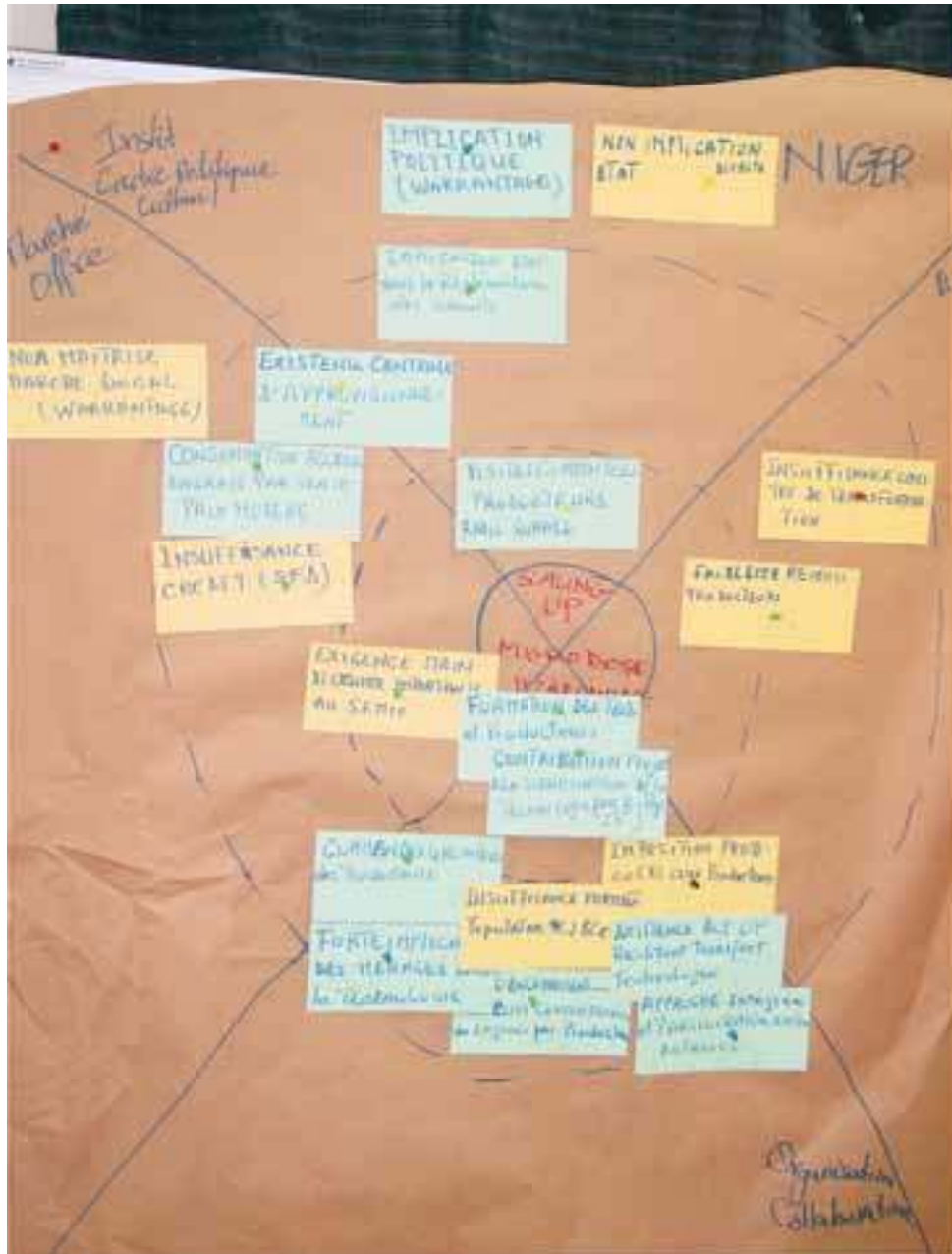
The presentation of the environmental scan was an opportunity to discuss and place each factor in the right place on the scan.

### **Status report by the Mali Group**

Following the scan exercise, each group, with the help of project coordination unit, had a clear idea of factors that were likely to be influenced as well as their limitations. The participants then followed a presentation of the logical framework of the GIFS project. This presentation emphasized the interdependence of research-action and extension cycles. During this presentation, the participants also discussed the paramount role played by institutional collaboration in the achievement of the project objectives. The objective of this presentation was to guide the participants through the outline of action plans, which is the final stage of the workshop.

### **Sequence 8: Finalization of the broad lines of action plans**

Based on the previous sequences, some broad ideas were selected with a view to improve the learning approach. An economic analysis was conducted to determine the profitability of the micro-dose technology and possible solutions aimed at overcoming constraints to the development of warrantage were identified. The institutional and organizational context was also analyzed using the environmental scan to identify the factors that can be influenced as well as their limitations. Based on these results, each group outlined a realistic action plan for their country.



*Environmental scan by the Niger group.*

Thus, the idea was first to develop an action plan for the next six months following the official end of the project (should the project be extended for another six months) or for the next twelve months following the end of the project (should the project be extended for another twelve months). Secondly, the participants had to develop future plans with key actions to be carried out in the event of the funding of a second phase of the project (up to three years). This plan covers research-action (micro-dosing technology and warrantage system) and extension. At the end of the group work, each country made a presentation on the main directions and new perspectives. These presentations were followed by discussions aimed at improving their content.

## Action Plan of Burkina Faso

	When?	Actions (What?)	Who?
Micro-dose	6 months	<ul style="list-style-type: none"> <li>Publicize results on visual aids: <i>Information sheet, posters, slides</i></li> <li>Feedback of results + workshop for scaling-up of technologies by grassroots producers</li> <li>Participatory training of FOs to enable them become Economic Interest Group (EIG)</li> <li>Establishment of strong umbrella organizations</li> </ul>	<ul style="list-style-type: none"> <li>Research, NGOs</li> <li>NGOs, research</li> <li>NGOs /FOs</li> <li>ONGs /FOs</li> </ul>
		<ul style="list-style-type: none"> <li>Micro-dose demonstrations: <i>reduction of the number of producers vs larger surface areas for economic monitoring; alternative measures to reduce the use of labor</i></li> <li>Guided tours involving opinion leaders: <i>good relays for technology transfer at grassroots level</i></li> <li>Socioeconomic data collection</li> </ul>	<ul style="list-style-type: none"> <li>Research/FO/NGOs</li> <li>NGOs/FO/ research</li> <li>NGOs/FOs research</li> </ul>
	Prospects 3 years	<ul style="list-style-type: none"> <li>Introduction of improved seeds</li> <li>Elaboration of a national scaling-up project using a participatory approach, reinforcement of partnership with all the actors</li> <li>Establishment of inputs shops</li> <li>Continuation of the training of Economic Interest Group (EIG)</li> </ul>	<ul style="list-style-type: none"> <li>Research, NGOs</li> <li>Research, NGOs/FOs all the partners</li> <li>NGOs/OPs</li> <li>Resultats of consultation with all the actors</li> </ul>
Warrantage or inventory credit systems	6 months	<ul style="list-style-type: none"> <li>Information workshop for OPs and DFS per area and establishment of a board of directors for warrantage</li> <li>Work with the federations of strong umbrella FOs to supply of good quality inputs</li> <li>Training of warehouse stocks managers (management committee)</li> <li>Finishing off warrantage infrastructure</li> <li>Training of FOs in management and trade</li> </ul>	<ul style="list-style-type: none"> <li>NGOs/FOs/research</li> <li>NGOs/FOs</li> <li>NGOs/FOs</li> <li>Project/ NGO/FO Partners</li> </ul>
		12 months	<ul style="list-style-type: none"> <li>Continuation of previous actions (above)</li> <li>Training of FOs, DFS, Banks, suppliers, participatory approach for the reinforcement of partnership</li> </ul>
	Prospects 3 years		

**Action Plan of Niger**

	When?	Actions (What?)	Who?
Action-research	6–12 months	<ul style="list-style-type: none"> <li>• Analysis of results of the two years</li> <li>• Alternative measures for labor reduction</li> <li>• Continuation of technical training and supervision of technicians</li> <li>• On-station diagnostic studies on micro-dose</li> </ul>	Research Research Research Research
	Prospects (3 years)	<ul style="list-style-type: none"> <li>• Exhaustive diagnostic of sites</li> <li>• Mechanization of the technology (development of other tools)</li> <li>• Socioeconomic evaluation of technology and impact</li> <li>• Promotion of Tahoua Rock Phosphate using the technology</li> </ul>	Research
Extension	6–12 months	<ul style="list-style-type: none"> <li>• Training of producers and equipment</li> <li>• Diversify microdose dissemination methods (pilot fields)</li> <li>• Dissemination of the technology (Media, Forum, workshop)</li> <li>• Combine with launching of the campaign. Topic: Micro-dose and input shops</li> <li>• Establish an exchange framework between input suppliers and producers to sustain input supply</li> <li>• Continuation of institutional support</li> </ul>	- USAID TARGET project/ Extension - Extension - USAID TARGET project - Ministry /Project - USAID TARGET project - Target project
	Prospects (3 years)	<ul style="list-style-type: none"> <li>• Development of synergy between various actors</li> <li>• Continuation of technology promotion</li> <li>• Ownership by services</li> </ul>	USAID TARGET project
Policy	Prospects (3 years)	<ul style="list-style-type: none"> <li>• Involvement in regulation – Facilitation of supply of producers</li> <li>• Constant mediatization of actions</li> </ul>	Relevant ministry

## Action Plan of Mali

	When?	Actions (What?)	Who?
Action			
– Research	6–12 months	<ol style="list-style-type: none"> <li>1. 2003 data analysis</li> <li>2. Socio-economic surveys <ul style="list-style-type: none"> <li>• Development of questionnaires</li> <li>• Data collection</li> <li>• Analysis of results</li> </ul> </li> <li>3. Participatory testing (demonstration, adaptation trials, adoption)</li> </ol>	NGOs Research
	Prospects (3 years)	Participatory testing (Demonstration, adaptation trials, adoption)	Research + FOs + NGOs
Vulgarisation	6–12 months	<ol style="list-style-type: none"> <li>1. Feedback of results <ul style="list-style-type: none"> <li>• Internal</li> <li>• External at village level</li> </ul> </li> <li>2. FOs institutional capacity building <ul style="list-style-type: none"> <li>• Monitoring of warrantage activities</li> <li>• Establishment of management bodies</li> <li>• Continuation of intermediation between FOs/input suppliers</li> <li>• Continuation of FOs/DFS</li> </ul> </li> <li>3. Support to the establishment of infrastructure <ul style="list-style-type: none"> <li>• Input shops</li> <li>• Storage warehouses</li> </ul> </li> <li>4. Media activities <ul style="list-style-type: none"> <li>• Information and sentization of people to warrantage</li> </ul> </li> </ol>	- NGOs - OP, NGO's research, elected representatives - NGOs - NGOs + others competencies - FOs + NGOs - FOs + NGOs - FOs + NGOs - FOs + NGOs NGOs
	Prospects (3 years)	<ol style="list-style-type: none"> <li>1. Sourcing of funds <ul style="list-style-type: none"> <li>• Sensitization to mobilization of local savings</li> <li>• Establishment of FOs management bodies</li> <li>• Look for other partners</li> <li>• Continuation of negotiation with DFS</li> </ul> </li> <li>2. Relationships with government institutions <ul style="list-style-type: none"> <li>• Development of cereal information system on warrantage</li> </ul> </li> <li>3. Development of infrastructure <ul style="list-style-type: none"> <li>• Support to the construction of secondary warehouses</li> <li>• Support to the construction of input shops</li> </ul> </li> <li>4. Organization of FOs <ul style="list-style-type: none"> <li>• Support to FO's federation</li> <li>• Training of FOs on community life</li> <li>• Intermediation between suppliers/FOs</li> </ul> </li> </ol>	FOs + NGOs + other institutions NGOs + Research FOs + NGOs FOs + NGOs + Other institutions

## 5. Evaluation

For the evaluation of the workshop, the participants were given two cards each on which they had to write what they liked. They were also given two other cards of different colors on which they were asked to write down what they did not like. The cards were then placed on a chart (see results of the evaluation attached). According to these results, the participants really appreciated the training, particularly the participatory methodology which involved a lot of group work and discussions. The participants also hailed the quality of presentations, which were followed by discussions to exchange ideas. On the other hand, they did not like the schedule which they found too tight and some discussions which were often lengthy.

## Appendixes





***Appendix 1: Agenda of the training workshop on the USAID TARGET project: large-scale transfer of fertilizer micro-dosing technology, Ouahigouya, Burkina Faso, 20–23 January 2004***

**Tuesday, 20 January 2004**

9.00–9.30	Welcome address and opening of the workshop (Taonda Sibiry Jean-Baptiste, INERA, Burkina Faso)
9.30–10.30	Introduction to the workshop (A Maatman, IFDC) Presentation of USAID TARGET Project (R Tabo, ICRISAT)
11.00–12.00	Sequence 1: Learning by experience (A Maatman, IFDC)
14.30–17.00	Sequence 2: Status report (1): description of target regions/Micro-dose technology (Trials, results)
17.00–17.30	IFDC film

**Wednesday, 21 January 2004**

8.00–9.00	Sequence 3: ‘Scaling-up’ (Introduction) – Introduction to CASE Approach – Competitive Agricultural Systems and Enterprises’ (A Maatman)
9.00–12.00	Sequence 4: Economic analysis – Presentation on economic evaluation of agricultural technologies (A Konlambigue, IFDC)
14.30–17.30	Sequence 5: Financial systems – Presentation on financial systems and technological innovation (A. Konlambigue)

**Thursday, 22 January 2004**

8.00–12.00	Sequence 6: Status report (2): Organization of project and institutional context.
14.30–17.30	Sequence 7: (F)Actors involved in Scaling-Up – Presentation on the logical framework of GIFS project (A Maatman)

**Friday, 23 January 2004**

8.00–10.30	Sequence 8: Action Plan
11.00–11.30	Evaluation
11.30–12.00	Closing of workshop

***Appendix 2: Participant's expectations and concerns***

Expectations	Concerns
Convince other partners to continue – extension of the project	Endless discussions
Extension of the project for three to five years	Long speech on the results
Analysis of the prospects of the project	Too much work
Identification of strengths and weaknesses of the project	Time factor limiting
Develop a clear action plan to continue the project	I am afraid that there will not be enough time
Strengthen gains of the project and implement action plan	Real practical problems may not be highlighted
Clear definition of country action plan	Do not leave proposed action plans on the shelf
Produce a concise report on the future prospects of the promotion of this technology – what remains to be done	Do not delay the implementation of plan
Ideas that help continue activities even after the end of the project	Workshop ended without any new ideas on the next phase of the microdose project
Outline of evaluation of project impacts at regional level	Closing of project for lack of arguments
Clarification of partnership between various actors	Closing of TARGET project
Integration of partners role	Use a language that is understandable by all
I hope other technologies similar to microdose will be discovered	How to capitalize on 2003 result
Extend microdose technology to other crops (groundnuts-cowpea-tiger nuts)	
Find a mechanism for a large-scale dissemination of microdose technology combined with warrantage system	
Development of new prospects and methods for transferring microdose technologies	
Development of strategies for promoting microdose technology	
Learn from others' experience in the area of technology transfer	
Conditions of microdose technology adoption	
Acquire a good knowledge of how to select sites	
Knowledge of how to conduct an economic evaluation of microdose technique	
Conduct an accurate economic analysis of the method	
Take advantage of other countries' experience	
Increase my knowledge and exchange experience regarding socio-economic analyses with the other participants	
Thorough knowledge of the institutional framework of USAID project	

*Appendix 3: List of participants*

Name and Surname	Country	Organization	Email/Phone
Annou Garba Mallam	Niger	INRAN	garbaam@intnet.ne
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***Appendix 4: Evaluation of the workshop***

What I liked	What I did not like
Knowledge of economic analyses	Lack of information on evaluation indicators before this workshop
Important role of participatory approach	Too much work
Adult learning cycle	Not enough time to deepen discussions
New knowledge	Complexity of economic analysis tools
Participatory methods	Lack of field visit
Value all ideas put forward	Lack of support
Exchange of experience	Short time
Economic analysis approach	Quality of some documents
Economic analysis	Schedule was too tight
IFDC experiences	Discussions were often protracted
Constructive exchanges during plenary sessions and during group work	Sessions were lengthy (> 2 hours)
Good organization	Sometimes people give more importance to assumptions than to realities.
Action plan	Workshop is very short (4 days)
Group work	Overall action plan not developed
Good learning method	Discussions often not necessary
Group work	
Participatory method	
Adult learning	
Documentation	
Regular attendance and availability of all participants	
Constructive exchanges between partners	
Outline an action plan	
Agenda completed	
Good pedagogy – achievement of defined objectives	
Good capacity to make up for gaps and delays	
Dialogue	
Participatory aspect	
Logical framework for developing synergy among actors	
Topic discussed	
Good facilitation	
Objective of workshop achieved	
Real involvement of participants	
Scaling-up of microdose and Warrantage	
Approach and content	
Methodology and pedagogy	
Interactive pedagogy	
Gain in the area of economy	

***Appendix 5: Courtesy visit to the chairman of FNGN***

During the workshop, Drs Ramadjita Tabo, Arno Maatman and Jean-Baptiste Taonda Sibiry paid a courtesy visit to Mr Bernard Lédéa OUEDRAOGO (see picture below), Chairman of the National Federation of Naam Associations (FNGN).





## About ICRISAT



The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) is a nonprofit, non-political organization that does innovative agricultural research and capacity building for sustainable development with a wide array of partners across the globe. ICRISAT's mission is to help empower 600 million poor people to overcome hunger, poverty and a degraded environment in the dry tropics through better agriculture. ICRISAT belongs to the Alliance of Future Harvest Centers of the Consultative Group on International Agricultural Research (CGIAR).

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