

## Fertilizer micro-dosing and warrantage credit system for small-scale farmers in the Sahel

GENERAL INFORMATION	
<i>Sources of information of the practice</i>	Fertilizer micro-dosing for the prosperity of small-scale farmers in the Sahel Final Report. International Crops Research Institute for the Semi-Arid Tropics (ICRISAT)
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<i>Useful links</i>	ICRISAT <a href="http://www.icrisat.org/gt-aes/ResearchBreifs3.htm">http://www.icrisat.org/gt-aes/ResearchBreifs3.htm</a>
INFORMATION ABOUT THE PROGRAMME OR PROJECT PROMOTING THE PRACTICE (IF APPLICABLE)	
<i>Programme or project</i>	Fertilizer micro-dosing for the prosperity of small-scale farmers in the Sahel
<i>Time frame</i>	June 2002 – December 2004
<i>Donor</i>	United States Agency for International Development (USAID)
<i>Implementer of the programme or project</i>	<p><u>Research Institutes</u>: ICRISAT, National Agricultural Research Extension System (NARES); Institut de l' Environnement et de Recherches Agricoles du Burkina Faso (INERA); Institut d' Economie Rurale (IER), Mali; Institut National de Recherche Agronomique du Niger (INRAN) and other International Agricultural Research centres (IARCs); Tropical Soil Biology and Fertility Institute of CIAT (TSBF-CIAT); International Fertilizer Development Centre (IFDC)</p> <p><u>IGOs</u>: Project Intrans, Food and Agriculture Organization of the United Nations (FAO) (training workshop on warrantage credit system)</p> <p><u>NGOs</u>: NGOs from the three project countries, including Federation Nationale des Groupements Naam (FNGN), Association pour le Developpement de la Region de Kaya, Hunger Project in Burkina Faso; Association pour le developpement des Activites de Production et de Formation (ADAF/Galle), Sasakawa Global 2000 (SG 2000, and Winrock International in Mali; Projet Intrans United Nations Food and Agriculture Organization (FAO) with a network of various NGOs in Niger</p>
LOCATION OF THE PRACTICE	
<i>Region</i>	Africa
<i>Country</i>	Burkina Faso, Mali and Niger
<i>Province, Districts, Villages</i>	<p><u>Burkina Faso</u>: Central Plateau</p> <p><u>Mali</u>: Segou, Koulikoro and Mopti</p> <p><u>Niger</u>: Niamey, Tillabery and Maradi</p>
<i>Climatic zone</i>	Semi-Arid
<i>Other descriptive information</i>	Sudano-Sahelian zone
INFORMATION ABOUT THE PRACTICE	
<i>Practice category</i>	Managing natural resources sustainably
<i>Practice type</i>	Technology for improving farm productivity sustainably
<i>Sector</i>	Crop production system management
<i>Institutions fostering the practice</i>	<u>Research Institutes</u> : ICRISAT and its NARES partners in Burkina Faso, Mali and Niger and other IARCs
<i>Beneficiaries of the practice</i>	12, 650 farm households in the three project countries, NGOs, Agricultural research institutions
<i>Users of the practice</i>	As above

<i>Natural resource used or accessed (if applicable)</i>	Land, soil, water, inputs (seeds of promising varieties, fertilizers)
<b>BRIEF DESCRIPTION OF THE PRACTICE</b>	
<i>Background/problem statement</i>	<p>The semi-arid Sahelian zone of West Africa is one of the poorest regions on earth with one of the lowest human development indices. The climate is extremely harsh, with an annual rainfall ranging from 350 to 800 mm per year. Inter-annual variability in the amount and the distribution of rainfall translates into sizeable year-to-year fluctuations in millet and sorghum yields. Millet and sorghum are the predominant cereal crops and staple foods for the rural population in West Africa. Increased food needs in the region, driven by considerable population growth, have put more pressure on the fragile land system. For instance, the region witnesses a general decline in the use of fallowing as a means of replenishing soil fertility and an increase in the use of marginal land and consequent land degradation.</p> <p>The main objectives of the USAID TARGET project were to (1) increase and stabilize production, farm household incomes and food security and (2) help farmers better manage the natural resource base through the uptake of fertilizer micro-dosing technology and better farmer-based cooperatives in the Sudano-Sahelian zones of Burkina Faso, Mali and Niger. The fertilizer micro-dose technology is based on the application of small quantities of fertilizers in the hills of plants thereby enhancing fertilizer use efficiency and improving yields while minimizing input cost.</p> <p>Recognising that liquidity constraints often prevent farmers from intensifying their production system, the project also initiated, with the help of Projet Intrants, United Nations Food and Agriculture Organization (FAO), the warrantage credit system to remove barriers to the adoption of soil fertility restoration. This credit system aims to assist the villagers set up farmer organizations, fertilizer shops and storage facilities, and to grant them access to cash credit. This enables farmers to purchase external inputs such as fertilizers and to store crops to get higher prices during periods when the market supply begins to decline.</p>
<i>Approach followed</i>	<p>The USAID TARGET project draws on the successful experiences development model used by the Project Intrants FAO used in the villages of Niger. The model promotes a system of credit adapted to the socio-economic conditions of the rural areas. It links the requirement for guaranteed credit to the necessity of adding value to the agricultural products while organizing producers for the supply of inputs.</p> <p>The first activity undertaken was the selection of project study sites. These sites were carefully selected using specific criteria (i.e. rainfall level, type of soil, access to inputs) set by the project partners in each country. Areas within the Sudano-Sahelian zone with rainfall between 500 and 800mm per year were chosen. The selected zones were characterized by predominately sandy soils with a low inherent fertility. Villages in the selected areas were able to link with markets, had saving-credit associations, and had a comparative advantage in the production of millet and sorghum for local, national and or regional markets.</p> <p>During the 2002 and 2003 cropping seasons, the project established 2530 demonstration plots of the fertilizer micro-dosing technology in the three project countries. Field agents (agriculture engineers and advisors, chiefs of agricultural districts and extension) and several farmer leaders were trained to conduct demonstrations following mapped out guidelines. The project's research and extension partners (i.e NARES, IARCs and NGOs) selected the demonstration plots in consultation with farmers, trained farmers, and provided technical backstopping through an open and participatory process. The farmers managed the trials by carrying out all the field operations from land preparation to sowing, weeding and harvesting. Visits were organized around the plots to promote the flow of information and knowledge between researchers and farmers. The demonstration trials were carried out in Burkina Faso and Mali on millet and sorghum crops, and on millet in Niger.</p>

The choice of millet and sorghum varieties used on the demonstration plots was left to the farmers. The fertilizers (formulation type of the compound fertilizer) used in the demonstration plots differed from one country to another, depending on the availability of the different formulations on the local markets. The dosage of fertilizer applied to the planting hill in the demonstration fields depended on its composition and the planting density. Participatory evaluations of the technology were performed.

The promotion of the fertilizer micro-dosing technology is closely tied to the availability, accessibility of fertilizers, and especially to the financial resources available to the producers for their purchases. Therefore, farmer-based cooperatives or producers associations were established and village savings-credit associations were promoted to provide farmers access to micro-credit.

Rather than selling their grain into a glutted market for low prices at harvest time, in the inventory credit or warrantage system, farmers (or producer organizations) stock their produce at harvest in the store of the farmers association and are issued cash loans. These loans enable them to buy meet immediate family cash needs, participate in collective fertilizer (and other input) purchases and carry out their income-generating activities during the off-season. The grain is then sold together four or five months after harvest time when prices are high, enabling farmers to pay back the loan including interest.

Buying inputs in a consolidated order from all the farmer groups enables cooperative members to purchase inputs at a lower price and of good quality at the beginning of the production cycle. The establishment of an inventory credit scheme also allows households to smoothen consumption patterns, thus reducing consumption risks. The warrantage system was popularized in the target areas with the assistance of farmer organizations, United Nations Food and Agriculture Organization (FAO), commercial banks, NGOs and donors. In all the three countries, approximately 60 farmer organizations were involved in the warrantage system over the two-year period of the project.

Farmer Field Schools (FFS) were established in 2004 to familiarise farmers with the fertilizer micro-dosing technology, increase their knowledge base on natural resource management, and thereby widely disseminate the new technology in targeted areas. The FFS were used to train, as interns, selected farmers in the targeted areas and from neighbouring villages on various agricultural subjects. These farmer trainees, who formed farmer research groups, served as extension agents and field technicians during farmer field days. The schools on millet and sorghum were established near heavy-trafficked areas of the targeted zones in Burkina Faso to showcase fields with and without the micro-dose technology.

The project used various training tools to build and strengthen the knowledge of farmers, partners, and scientists in order to make the project activities more sustainable. These included FFS, farmer field days, handbooks, manuals, workshops, exchange visits and field trips. Farmers were trained on the concept of warrantage, the micro-dose technology, and the management of village funds, warehouses, and input shops. Project partners were trained in the areas of participatory research techniques to disseminate technology on a wide scale and on data collection methods.

Periodic follow-up trips were conducted at the national and regional levels by field technicians to supervise project activities, collect data, communicate and to bring technical support and advice to farmers. During the 2002 and 2003 cropping seasons, agronomic and socio-economic data were gathered from demonstration trial sites in selected countries. Data on warrantage activities (i.e. funds loaned, loan repayment rates) were also collected by the members of producer associations and by various actors involved in the sale or storage of inputs. The agro-economic performance of the micro-dose technology was assessed using data collected on the demonstration sites, which were analysed with the GENSTAT software.

	<p>To strengthen the capacities of the partners involved in the project, a workshop was held to examine linkages between the micro-dose project and economic and institutional context, and to identify opportunities to up-scale the adoption of the fertilizer by micro-dose technology in the region.</p>
<i>Innovative elements</i>	<p>As the project was a multi level and a multi-institutional one, informal and formal alliances were created with various institutions and individuals to enable the project make necessary impacts on its beneficiaries. The alliances on each selected site comprised several key players including the mass media, private sector, business people, marketers, stockists, farmers' organizations, civil society, and research and development organizations. These alliances were informal, unless a specific task was allocated to any of them. The alliances with the farmer field schools and farmer research groups, religious centres, local administration, local level institutions, and local information centres were more formal as they involved direct information exchange centres.</p> <p>The formation of farmer research groups who were trained to conduct Farmers Field Schools (FFS) was innovative. Representative groups of farmers were selected with the project research team. These farmer research groups (FRG) provided the basis for detailed household case studies and tested the micro-dosing technology. During the growing season, field days were held in selected farms and all the farmers from the particular community (including the FRG) assisted in the evaluation of the different technologies.</p>
<i>Impacts on natural resource base</i>	<p><u>Actual</u>: Soil erosion was significantly reduced and soil fertility and water use were enhanced.</p>
<i>Impacts on livelihood of the practice users</i>	<p><u>Actual</u>: Results of the demonstration trials showed that sorghum and millet yields were 44 to 120% higher when using the fertilizer micro-dosing than with the earlier recommended dosage and farmers practices. The income of farmers using fertilizer micro-dosing and inventory credit system (warrantage) increased by 52 to 134%.</p> <p>Farmers' access to credit and inputs was greatly improved through the warrantage system. Moreover, farmers who were involved in warrantage activities used the credit to undertake income generating activities and purchase fertilizer and seeds of improved varieties for the next cropping cycle.</p>
<i>Other impacts</i>	<p><u>Actual</u>: Public awareness of the micro-dosing technology was heightened through the media.</p> <p>The organizational capacities of farmer organizations were strengthened.</p> <p>A network, with the collaboration of the NGO partners, linking farmer organizations, credit institutions, and the private sector actors (i.e. fertilizer suppliers) of the sub-region was established.</p> <p><u>Expected</u>: Increased dissemination of micro-dose technology and the warrantage credit scheme in the region.</p>
<i>General success factors</i>	<ul style="list-style-type: none"> <li>• The project adopted an open and participatory approach</li> <li>• The project activities were implemented using a network of partners from the NARES, NGOs farmers and farmers groups and other International Agricultural Research Centres.</li> <li>• Various training tools were used, such as FFS, handbooks and manuals, workshops and field trips to strengthen and build human capacity in the targeted areas.</li> </ul>
<i>Technology success factors</i>	<p>Address farmer needs, priorities and management Increase farm production and/or stabilizes it</p>

<i>Institutional success factors</i>	Farmer's capacity for adoption of the technology Institutional support and outreach Ownership by end users
<i>Problems remaining to be resolved</i>	<ul style="list-style-type: none"> <li>• The FFS activity should be pursued in all participating countries to ensure that these technologies (fertilizer micro-dosing and the warrantage system) are widely disseminated and adopted by the end users. A proposal for additional funds from the USAID is being prepared for capitalising on the gains obtained from the USAID TARGET project.</li> <li>• There is a need to design and promote a mechanized, low cost tool/equipment that can be used for sowing and applying fertilizer at the same time, thereby reducing labour use and costs.</li> <li>• Policy and institutional issues to improve access to credit by farmers cooperatives still need to be addressed.</li> <li>• More support in the development of infrastructure (warehouses/stores for grains and inputs, etc) is needed.</li> <li>• In order to sustain input supply, there an exchange framework between input suppliers and producers should be established</li> <li>• Additional training of producers in the inventory credit system (warrantage) is still needed.</li> </ul>
<i>Keywords</i>	Access to credit, Access to resources, Agricultural development, Agriculture, Capacity building, Crops, Cooperatives, Farmers associations, Income generation, Participatory approaches, Semiarid zones, Soil fertility, Technology transfer, Training