

## Small Grant Report

### 1. Identifying information:

Project Title: Scaling up participatory plant breeding: sustainable seed delivery systems for meeting farmers' needs for diversity and varietal change over time

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### 2. Achievements and constraints:

- Analysis of sorghum seed system in two contrasting villages

Detailed analyses of seeds available at household level were carried out in two villages located in similar agro-ecological zones, but differing levels of crop intensification. The village Wobougou is located in an area of cotton cultivation, where fertilizers and animal drawn farm machinery are easily available to farmers. The village Gonsolo is located in an area outside the direct influence of the cotton development company, and thus less animal traction, and fertilizers are less available to farmers. In both villages we found that each household is producing its own sorghum seed, and no household reported deficiencies. The quality of the seed has been analyzed only for Gonsolo village, and the results showed that the germination percentage of the samples was on average 85.0%, and thus well within the range of quality seed of sorghum. Some differences between the samples could be observed, and could be partially linked to the conditions during seed storage.

Some important differences between the two villages were observed. In Gonsolo almost exclusively seed grain was produced from panicles selected prior to general harvest, usually by older, experienced men. In Wobougou in contrast seed was selected from the threshed grain, by 85% of households. In total in Gonsolo we found 22 varieties of sorghum in cultivation, whereas in Wobougou only 10 different varieties were cultivated. This also translated into a lower number of varieties cultivated per household in Wobougou (Table 1).

**Table 1: Comparison of number of sorghum varieties for which households produced and maintained seed in two villages situated in zones with similar agro-ecologies, but different levels of crop intensification and marketing**

| Number of varieties per household | % of households in Wobougou , (intensified zone) | % of households in Gonsolo, traditional farming practices |
|-----------------------------------|--|---|
| 1                                 | 71.0   | 29.4  |
| 2                                 | 26.0   | 49.0  |
| 3                                 | 3.0  | 9.8   |
| 4 and more                        | 0.0  | 11.8  |

- Variety comparisons carried out with farmers using four different approaches across key sorghum growing areas in Mali

Variety comparisons were carried out in collaboration with farmers using four different types of collaborative arrangements. In all cases farmers compared one replication of 3-5 different varieties with a local variety of their choice. In all cases farmers chose the field for conducting the trial, and farmers carried out the bulk of the field work for the trial. The four collaborative arrangements were the following:

- a. Varieties chosen by researcher, trials managed to great extent by a student resident in the village, the student ensured timeliness of field operations, and helped with some of the field work, the student carried out the bulk of the trial evaluations, measuring pre-determined traits. Farmers evaluated trials in an informal manner. The researcher visited the villages once per season; 5 villages in different agro-ecological zones.
- b. Varieties chosen by researcher after preliminary evaluation by farmers; trials sown by farmers who were chosen to represent the local village level farmers' association; the farmers received assistance from extension agents for the layout, and the actual sowing of the seed; extension agents noted dates of field operations, and explained elements of the instructions for the management of the trial; grain yield, and occasionally plant height and flowering date were observed by farmers in collaboration with the extension agent; farmers had copies of the field note books, and instructions written in the local language; farmers evaluated their own plots during visits of the researcher before and after harvest, using their own criteria, and ranking the varieties for some key traits. Grain quality evaluations were carried out during a special visit, using taste panels from each of the villages where trials were conducted in this manner. 10 different villages in 4 different agro-ecological zones.
- c. Varieties chosen by researchers, with consultation with some farmers, and with NGO extension workers. NGO extension workers received seed and a field book with instructions on options for conducting the trials. NGO workers implemented the trials in villages where they conduct agricultural programs. Some results were returned to researchers for analyses. A total of 6 NGO's implemented trials in a total of 26 villages.
- d. Sets of 4 test varieties were demonstrated at an agricultural fair, organized by the newly elected community government. Representatives of village level farmer organizations could choose to conduct a trial in their village. Farmers conducted trials, and evaluated them on their own. Trial sets were given to 19 village associations.

Reports from the trials of type a. - b. have been prepared, and are being analysed in more detail. As expected the reports focus on those traits and varietal differences that were stated in the initial objectives of the trials. The results from type a. trials focus on quantitative data measured during the testing period , e.g. Table 2.

Table 2: Grain yield of trials conducted by farmers with varieties of intermediate growth duration in three villages in the northern part of the cotton growing zone of Mali, in 2002

| VARIETY         | SITES       |                 |            |
|-----------------|-------------|-----------------|------------|
|                 | FANA (t/ha) | KOUTIALA (t/ha) | SAN (t/ha) |
| LOCALE          | 1,812 B     | 0,990 A         | 1,483      |
| Fambe (control) | 1,384 AB    | 1,546 B         | 2,075      |
| MIKSOR86-30-45  | 0,998 A     | 1,138 A         | 1,183      |
| CMI06           | 1,325 A     | 1,737 B         | 2,533      |
| Tieble          | -           | 1,176 A         | -          |
| CV              | 28,1%       | 15,4%           | 50,3%      |
| LSD             | 0,4654      | 0,2479          | NS         |

The reports indicated that demands for seeds were expressed by farmers, but this was not described in detail.

The type b. trials focused largely on farmer evaluations, taking into consideration that farmers are very keen on productivity comparisons. An example of grain yield results from three villages in similar agro-ecological zones is presented in Table 3. The figures indicate that yield superiority of the tested varieties is highly dependent on the specific conditions in each village and year. Farmers indicated that in addition to these differences, also farmers' fertility management, sowing dates, and trial management did affect the relative performance of specific varieties. Table 4 further indicates that farmers' varietal choice is further influenced by other considerations.

**Table 3: Grain yield of varieties tested by farmers in three villages in the northern cotton growing zone of Mali, expressed in percent of local variety grain yield mean per village**

| Village/Region       | Year | Local Kg/ha | Mara kano | Tieble | Flama | Ngolo fing | Fambe |
|----------------------|------|-------------|-----------|--------|-------|------------|-------|
| Dakoumani /Bla       | 2000 | 2057        | 127       | 111    | 86    | 98         | 100   |
|                      | 2001 | 549         | 102       | 80     | 116   | 90         | 105   |
| Pizangasso /Bla      | 2000 | 2135        | 151       | 132    | 114   | 127        | 129   |
|                      | 2001 | 833         | 83        | 41     | 79    | 70         | 72    |
| Konsequela /Koutiala | 2000 | 2188        | 79        | 95     | 97    | 99         | 73    |
|                      | 2001 | 1154        | -         | 66     | 90    | 85         | 99    |

**Table 4: Rankings of test varieties after harvest, by the farmers who conducted the trails in 2001 in the village of Dakoumani, assisted by World Vision extension agents. (the more points, the higher the rank, points depicted as hearts indicate that the farmer has kept seed from this variety, points depicted as # indicate that this variety was rejected)**

| Farmer, Year  |      | Locale     | Flama      | Fambe          | Ngolofing     | Tieblé     | Marak anio |
|---------------|------|------------|------------|----------------|---------------|------------|------------|
| Sekou Dao     | 2000 | •••<br>••• | ♥          | ♥♥<br>♥♥<br>♥♥ | ♥♥            | ♥♥<br>♥♥   | ♥♥♥        |
|               | 2001 | •••<br>••• | ♥♥♥        | ♥              | ♥♥<br>♥♥      | ♥♥♥<br>♥♥♥ | ♥♥         |
| Mory Mallé    | 2000 | •••<br>••• | •          | ••             | ♥♥<br>♥<br>♥♥ | •••        | ••<br>••   |
|               | 2001 | •••<br>••• | ♥♥♥<br>♥♥♥ | ••<br>••       | •••           | ••         | •          |
| O. Mallé      | 2001 | ••<br>••   | ♥♥♥<br>♥♥♥ | ••<br>••       | #             | •••        | ••         |
| Ousmane Kollo | 2001 | •••        | ♥♥♥<br>♥♥♥ | ♥♥<br>♥<br>♥♥  | ••<br>••      | ••         | #          |
| Soloblé Mallé | 2001 | ••         | ♥♥<br>♥♥   | ••<br>••       | ♥♥♥<br>♥♥♥    | •••        | •          |
| S. Tangara    | 2001 | ••<br>••   | ♥♥<br>♥♥   | ♥♥♥<br>♥♥♥     | ••            | ♥♥♥        | #          |
| Total         | 2000 | 12         | 2          | 7              | 7             | 7          | 7          |
|               | 2001 | 27         | 29         | 25             | 20            | 19         | 8          |
|               | Sum  | 39         | 31         | 32             | 27            | 26         | 15         |

- Seed production activities

In Gonsolo village different types of sorghum varieties had been tested by farmers since 1999. Farmers were keen to start larger scale seed production of two selected sorghum varieties to allow more widespread distribution of the seeds. The seed production plots were planned as an activity of the village association. However, many households were not satisfied with the management of the funds provided for this seed production, and thus the responsibility for the project was transferred to the village association of young farmers, that represents more households, and conducts various activities that benefit the whole village.

The CMDT seed production unit multiplied seed of four test varieties, to commence their activities for large-scale demonstrations in the coming year.

- **Farmers' evaluate progeny trials on-station**

Farmers from several villages conducting trials participated in three different visits to on-station experiments. Two of the visits involved farmers who have contributed to trials for 2-3 years. The IR major objective for the visit was to see

new breeding material and choose material for testing on their farms. The third field day included farmer representatives from many villages in which ICRISAT, or some of its partners are working. Farmers gained an overview of materials, and indicated choices for possible testing.

- Farmers' select in random mating population

During the first two visits farmers selected individual plants in a population of a very new plant type. They selected individual plants for further generation advance, and learned about the diverse populations, and generating new variability. A few farmers expressed interest in growing a similar selection plot on their farm.

3. Implications to workplan:

- Major conclusions from seed system analyses in two villages need to be verified by further analysis of key issues in villages with similar conditions.
- The project partners need to agree on the details to assess the effects of the different types of collaborative arrangements for conducting variety trials in Mali on aspects of early adoption of new varieties.
- More discussions with farmers in different zones are required to identify priority activities for further seed and variety development activities. The meeting with farmers from 4 villages has resulted in planning for more specific testing, initiation of more widespread diffusion of results among farmers, and also to initiate farmer researcher collaboration in the early stages of variety development, to overcome the weaknesses of the varieties tested to date.

4. Communication and Dissemination of Information:

- Seed conferences at Point Sud

The project had planned regular discussions on seed related topics with a wider audience of development oriented persons, on topics relevant to the project. Due to my personal difficulties this could not happen, and was thus organized as a one-day event (29 March 2002) with 5 presentations by the different project partners. The participation was excellent and included representation from farmer organizations, NGO's, researchers, and extension agents.

- Dioila meeting

During the season 2002 we had made contact with an NGO who was involved in a program assisting farmers with marketing of their sorghum grain. Key to this activity was the formation of village level cereal producer associations. These associations had formed a union. We held a meeting on 2 March 2002 with representatives from the union council to present the project, and discuss options for future collaboration.

- Bla meeting

Farmers who had conducted trials in the vicinity of Bla were invited to discuss the results of the past two years of variety testing on 3 April 2002, and develop options for future activities.

5. Additional Comments:

Detailed reports from individual project partners are available, and more are in preparation.