1. Identifying Information:

Project title:	Village Based Participatory Breeding in the Mountain Slopes of Yemen
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2. Achievements and Constraints:

In the three villages selected in the project area in the Northern Highlands (Hasn Azan, Bit Al-Wali and Al-Ashmor) and described in the 1999 reports, we planted the barley and the lentil lines selected during 1999. The number of barley lines was 19, 16 and 21 in Hasn Azan, Bit Al-Wali and Al-Ashmor, respectively. The total number of different lines was 26 out of the initial fifty. In the case of lentil, the number of lines was 23 in both Hasn Azan and Bit Al-Wali and 21 in Al-Ashmor. The total number of different lines was 34 out of the initial fifty. All trials were planted in two replications and each entry was planted in plots of 10 rows at 25 cm distance and 5m long.

Both men and women conducted selection, individually and in groups of various sizes in both the barley and the lentil trials. In the lentil trials, selection was conducted by 24 individual farmers (15 men and 9 women) and by four groups of men and 11 groups of women. The size of the groups varied from a minimum of two to a maximum of six persons. In total, 21 men and 32 women were involved in selection in the lentil trials in the three villages. In the barley trials, individual selection was conducted by 23 individual farmers (8 men and 15 women) and by four groups of men and five groups of women. In total, 19 men and 17 women were involved in selection in the barley trials. In Hasn Azan, where the crop was late due to a late planting, the time of selection coincided with the peak of women's activities in the household, and they were not able to do selection. Similarly, there was no selection at the Al Erra research station because of severe drought, and the breeder did the selection only in the three villages.

The data were analyzed by REML (using the software ASREML as described in the previous report). In the case of the new trials (described below), the environmentally standardized data were use to analyze genotype x environment interactions using clustering and ordination procedures (using the software GEBEI). Finally, farmers' and breeders' selections were compared using similarity analysis. This year we used the Euclidean distance as coefficient of similarity because this allows the use of the actual scores given by the participants. Both the farmers and the breeders scored all the entries in both replications, and therefore the average scores were used in the similarity analysis.

As anticipated in the previous report, the project was extended to the Central Highlands, a very different agro ecological environment from the terraced-agriculture of the Khulan Affar area. The trials were planted in two villages (Yarim and Balasan) and in the research station at Dhamar, where most of the research for the Central Highlands is conducted and where the headquarters of AREA are located.

The trials included a new set of entries (45 for lentil and 46 for barley) and were conducted in two replications and plot size of 4 rows at 25cm distance and 2m long.

Selection on station was conducted by the breeder only, while the breeder and the farmers, both men and women, conducted selection in the two villages. The total number of farmers involved was 21 (13 men and 8 women) in lentil and 20 (10 men and 10 women) in barley. A number of traits were measured in each plot and the data were analyzed using the methods described earlier.

In the Northern Highlands there were large yield increases (both in grain and biomass) in the two crops. Participatory-decentralized selection was much more efficient than

centralized-non participatory selection: the latter would have missed between 64-70% of the entries selected by the farmers. There were various patterns of similarity between the participants (men, women and breeder), but in general there was more similarity between farmers, regardless of gender, than between the farmers and the breeder. However, in some cases there were large differences also among the farmers. As a result of these differences there were entries that were selected either only by men or only by women.

In the Central Highlands there was a wide range of variation among the new lentil and barley lines with several out yielding the local checks in either biomass or grain yield. Genotype x Environment effects were lower than those observed last years. In lentil, there was a strong similarity between the selections of the male farmers in the two villages and some similarity between these and the breeder's selections, while women's selections were very different from those of the men and from those of the breeder. In the case of the barley trials, there was a clear location effect with all the selections in Balasan clustering together, and the usual higher similarity between men and women than between farmers and the breeder. In Yarmin, the similarity between men and women was even stronger, while the breeder's selections in Dhamar and Yarmin were the most dissimilar among all the participants.

In lentil, there were only two entries selected by the breeder and not selected by either the men or the women or both. Overall, there was a good agreement between selections by the breeder and farmers, irrespective of the gender. In barley and in both villages, there were some entries that were uniquely selected by women (nine in Balasan and three in Yarmin) or uniquely selected by men (seven in Balasan and four in Yarmin).

Farmers have definitively acquired additional knowledge from their participation in the PPB. First, they have learned about the existence of other varieties that can perform in their environment. They knew only about the existence of the three local varieties (Sagla, Shiha and Aswad) they use to grow on their land. They have also learned about the different management practices of barley and lentil. The future is promising as these farmers are very cooperative with the project, and benefits will be mutual.

All women who participated in the selection process are illiterate. They and their daughters never had a chance to go to school because they live in small villages with no school, and due to social reasons, they were not allowed to study in schools located in other villages. This made the communication with these women very difficult. However, the presence of women from the extension services during the discussion greatly facilitated the understanding. As women are all illiterate, they never had access to the PPB books of farmers. Some farmers are able to register their financial accountings, but nothing else. Illiteracy includes also women's ignorance of family planning; some women were married five years ago and have already four children. This implies a very high population growth rates. When a women is sick, men replace her by getting married to another one.

Our NARS counterparts in Yemen gave information about the importance of women's participation in the selection process to farmers. Then, women were asked directly by their husbands to participate in the selection process.

Women in the study areas of the PPB in Yemen have been raised by their families in such a way that men are favored in all life aspects, and should have the last word whenever differences in opinion arose between women and men. Women are not allowed to argue, however, few of them do, particularly when they have the entire responsibility of the farm.

As the selection process is a new initiative in those villages, it was perceived both by women and men more as an exam than as an individual assessment of new varieties that will be selected to be planted in their area. Therefore, before the selection process starts, they visit the experimental field together, and decide about the best varieties they want to select for their area. They have enough time to discuss all the characteristics together. Then at the time of the formal selection in the presence of scientists and extension agents, although women and men do the selection separately, they still select the varieties they have agreed upon earlier on. This does not mean that the selection was done in an improper way, but it shows that that there is a discussion going on between women and men about the selection of barley and lentil varieties on trials' fields. Furthermore, I understood from them that the message they were given was to select one variety for their area. This may be the reason why women and men selected the same variety. Women do complain that their husbands are the main decision-makers concerning agriculture, but implicitly they do agree that if they have some tiny margin of decision-making do not like a type of flour her husband buys to make bread, they ask them to return it to the shop and buy another one. They also have strong decision-making in animal feeding using all types of plants and plant residues. Women said that in case they disagree with

their husbands about a variety, it is always the opinion of the husbands that predominates, other wise, they will be blamed for a bad choice they may have done. Finally, women who manage the farm in absence of their husbands who come back home only at harvest time decide about the crops to plant.

The purpose of the project is understood by women as "a mean to select the best varieties of barley and lentil". Although women have participated in the PPB in Yemen, they have never heard about the performance of the different varieties in the different locations because they know only the two or three local varieties grown in Yemen. Men of these households have expressed their willingness to let their wives and daughters participate in field trips organized by the scientists and extension agents involved in the PPB project in order to learn about the performance of the different varieties in different agro-ecological conditions.

The main constraints were associated with the closure of the ICARDA office in Yemen and the consequent disruption of the communication channels used in the past.

3. Implication to the workplan:

The work plan for 2000 was successfully implemented and expanded to two additional villages. Although the project has been concluded, it is felt that because of the crop failure that occurred in the first cropping season, and because the participation by women has been larger than planned, one additional full cropping season would allow the following activities to be conducted:

A) Kohlan Afar Area: (Mountain Terraces- Original Project Area)

- Seed multiplication of the selected entries (January 2001– June 2001, on station).
- Assessment of grain quality characteristics related to human consumption and farmers' preferences.
- Seed distribution to the farmers in the three villages (June 2001) during a field day with the participation of the technical committee of AREA, ICARDA's scientists, extension staff and farmers' organizations.
- Farmers own testing of the selected entries (without scientists' participation) in the main rainy season (July-December 2001).
- Preparation of video film illustrating the different steps of P.B. approach in Mountain Terraces.
- A survey of the number and diversity of landraces grown by the farmers before and after the project.
- Comparison of the effectiveness of decentralized selection with the conventional centralized approach.
- a gender-analysis.
- assess the relationships between adoption rate and the income levels of participants and non-participants.
- monitor the institutionalization of a decentralized approach with AREA.

B) Dhamar Area: (Central Highlands)

- Conduct baseline study (using PRA methods and formal survey) of production, productivity, income levels and diversification and trends in the three communities.
- Develop a database of selection criteria (objective and subjective) used by farmers (men and women) and breeders.
- Seed production of entries selected during 2000 and organization of the 2001 trials.
- Plant the trials at farmers' sites and at Dhamar Research Station of the two crops.
- Selection will be conducted within the two crops by individual farmers and groups (men and women) of farmers in farmers' fields and in the research station by breeders. During selection we will record farmers' (men and women) and breeder's selection criteria at each stage of selection including reasons for selecting or discarding.
- Hold a review meeting with farmers' communities.

- Preparation of video illustrating the different steps of P.B. approach in inter-mountain plain.
- Field days will be conducted in the three villages and the research station.
- Analysis of the selection efficiency of the various participants based on the unique selections made by the different participants in 2000.
- Assess grain quality characteristics related to human consumption and farmers' preferences.
- a gender-analysis.
- assess the relationships between adoption rate and the income levels of participants and non-participants.
- monitor the institutionalization of a decentralized approach with AREA.

4. Communication and Dissemination of Information:

The project was part of the presentations made by S. Ceccarelli at the 8th International Barley Genetics Symposium, Adelaide, 22-27 October, 2000, at the III International Seminar "Uniting Science and Participation in Research" (Nairobi, November 6-9) and the PPB Small Grant Workshop (Nairobi, November 10-11).

5. Additional Comments:

The national coordinator visited ICARDA at the end of 2000 to analyze the data, to prepare the first draft of the report, and to design the trials for 2001.