TECHNICAL REPORT OF YEAR 4th OF THE INIAP-EISELEN FOUNDATION PROJECT
Cereals Program, Santa Catalina Experimental Station, INIAP, Quito, Ecuador

Miguel Rivadeneira, Luis Ponce, Segundo Abad, Carlos Monar, Elena Villacrés.
National Institute of Agricultural and Livestock Research, Iniap. Av Eloy Alfaro and Amazonas, MAG Building, 4th floor.

Project code: 15/2003

Project title

Participatory evaluation of advanced barley lines for release as new varieties that are tolerant to rusts, in seven barley growing areas of the ecuadorian highlands.

Period of report: November 2006, October 2007

Summary

The fourth year of the Project was devoted to varietal diffusion as well as the confirmation of JAZMIN/CARDO//TOCTE, both in its "general worth" acceptance by the farmers as well as the incidence of foliar diseases, in all the seven barley growing areas participating in the Project.

Semi-commercial plots of approximately ½ ha of JAZMIN/CARDO and 1/3 of a ha of Cañicapa per community, were planted at the beginning of the cropping season in each location. Provisions were timely taken in order to handle normal operations as organization of farmers at each site, planting, crop evaluation, and those at the end of the season, as harvest, drying of the kernel, seed disinfection and distribution among farmers and seed growers, identified by the farmers themselves.

Cañicapa was again the farmers preference, mainly for its high yield and larger kernel than JAZMIN/CARDO, but however the decision was taken, regarding to seed distribution, that the peasants that received Cañicapa this year will get JAZMIN/CARDO next season, and viceversa, procedure which ensures the proposed steady diffusion of the varieties in the area of influence of the Project.

But not everything is lost for JAZMIN/CARDO, since for its acceptable performance in Bolivar province, it will probably be released as the new barley variety for that region of the country.

Weather conditions were better this season than last one; however the rains made a comeback close to harvest time, causing problems for cutting and threshing of the kernel, as well as negatively affecting to the quality of the grain.

1. Objectives

To deliver new improved barley varieties for the small-scale farmers of the highlands of Ecuador.

To utilize the method of Participatory Investigation (PI) in the selection of advanced barley lines.

To identify efficient barley genotypes under a minimum use of inputs.

To increase biodiversity (new varieties, new genes) in farmers' fields, accompanied by the diffusion of commercial varieties at the same locations participating in the Project, as well as other peasant communities that not participate in it, but are recognized for its tradition of growing barley on their fields.

To stimulate women participation in germplasm evaluation activities, as well as in taking the final decision of adopting or discarding a variety.

To contribute to alleviate the poverty of small-scale and/or subsistence farmers of the higher parts of the Andes in Ecuador.

2. Activities

The main activities performed on the fields o small-scale (subsistence) farmers this year of the Project are the following:

2.1 Planting of the seed increase plots

According to the results of last season, for this fourth year of the Project it was planned the planting of the so called, "semi-commercial size plots" of approximately ½ hectare of JAZMIN/CARDO and 1/3 of a hectare of Cañicapa per community, were planted at the beginning of the planting season in each one; the sowing was performed either at "communitary lands", same which belong to the communities, or in other cases in small patches of land that belong to several farmers each, until the planned area is completed at any particular location.

At the same time, evaluation was also done of other plots of some commercial varieties that in the previous years intervened in the "Variety Diffusion Plan" and are already in the farmers' fields.

The agricultural practices are the ones that small-farmers traditionally use; however seeding rate was the same as last season, 120 kg/ha, which is less than the one they normally use (180 kg/ha). The severity (S) of rusts diseases was registered both in the leaf as well as in the head, by means of the 0-100 scale (Peterson et al., 1948) when the kernel was in the early dough stage; scald (*Rhynchosporium secalis*), fusarium head blight (FHB) and some other unidentified leaf spots and blotches were recorded using a 0 –9 scale.

Planting activities began on September 27th, on the location of Cumbijín-Cotopaxi, continuing up to January the 15th in San José-Cangahua, Pichincha. The "semi-commercial plots" were planted in the seven barley growing peasant communities of the ecuadorian highlands, that are participating in the Project (Table 1).

Regarding to weather conditions it can be said that they were somewhat drier than last season, since precipitations were rather normal at the onset and along the cropping cycle, but however, it became rainy just a month before harvest time, which is normally the start of the dry epoch in the highlands, deed which delayed this operation (harvest) and that took its toll on the quality of the grain which became stained and discoloured.

In spite of the wet environmental conditions, the incidence of foliar diseases and other blemishes were not so severe as it was in 2006; the levels of yellow as well as leaf rust did not go beyond those registered in previous years.

Table 1. Location, name, altitude and soil type of the different peasant communities participating in the Project, cycle 2007.

Province	County and/or Parish	Community	Altitude m.a.s.l.	Soil type
Pichincha	Cajas	Santa Monica	3120	Loamy-sand
Pichincha	Cangahua	San José	3300	Loamy-sand
Cotopaxi	Pujilí	Maca	3430	Loamy-sand
Cotopaxi	Salcedo	Cumbijín	3300	Loamy
Chimborazo	Guano	Sanjapamba	3300	Loamy-sand
Chimborazo	Colta	Rumiloma	3500	Loamy-sand
Bolívar	Guanujo	Illangama	3300	Andean-black

2.2 Participatory evaluation and selection

The participatory methodologies utilized by the breeding programs, decentralize the investigation and have the direct intervention of the small-scale (subsistence) farmers, during the generation and selection of the technology (Cecarelli, S. 1994).

This is the opportunity farmers have to choose a genotype according to their preferences and needs. On this phase, the evaluations were also performed at two growth stages of the crop, that is, at the early dough stage, evaluations that allow the farmers to have a feel of the genotype, as well as observe the incidence of the main barley diseases, some characteristics of the plant and its agronomic potential, according to their own criteria, and the final one at harvest time, where they can select the material by its kernel type and yield, besides other characteristics they deem are important for them.

The first evaluation (at early dough stage) was performed according to what was planned in the different locations; however the one at harvest time had to be delayed at some places, due to the fact that it was still rainy there even though the kernel was ripe but wet. Farmers were able to perform their germplasm evaluations using the same criteria they already used on previous years.

2.3 Increase of seed at Santa Catalina experimental fields

Besides the seed being increased in farmers fields, 1/3 of a ha of each genotype were also planted at fields of Santa Catalina Experimental Station, seed which will be used to distribute among the participating farmers.

2.4 Dissemination of barley varieties

For this season it was decided to deliver seed of several of the varieties under the "barley varieties diffusion plan", not just at the seven places where the Project is intervening, but in some other ones also, same which are recognized for their barley growing tradition.

Plots of different sizes, according to the availability of seed and land, were planted in Bolívar-El Carbón, Cotopaxi-Ninín Cachipata, La Cocha Vaquería and in Yanaturo; the last three communities in collaboration with PRONALEG, the Leguminous Program of INIAP.

2.5 Distribution of seed among farmers

The distribution of seed to the farmers of the different communities was organized well in advance, so they were aware of the proceedings as well as the fate of the rendered seed. Therefore, some seed was directly distributed to individual farmers whereas in other communities, half of the seed was aimed for planting at their communal plots and the remaining half individually planted at their own small patches of land at home.

With this purpose, meetings at each peasant community were held in order to explain their members the mechanics of seed distribution and to arrange all the logistics needed, so that all the process was an orderly one. Arrangements were also made so that the owner of the plot can keep half the seed production, consensus being reached among the peasants regarding that JAZMIN/CARDO be the seed for the plot owner and the seed of Cañicapa be for distribution to the farmers, with the exception of Sanjapamba where the seed of JAZMIN/CARDO was also distributed among them.

After harvest, activities like threshing and cleaning were followed by seed disinfection, activity this last one that compels farmers to sow the seed, otherwise the risk is high that some of them use it as food instead of seed.

It must be mentioned that due to the persistent rainy conditions at harvest time registered in Cumbijín and San José Cangahua, in common agreement with the peasants and their leaders, it was decided to leave them to perform this operation and that all the resulting seed be planted in their communitary fields next season.

In Annex 1 are included some photos that register some of the mentioned activities in several of the locations of the Project.

3. Results

3.1 Participatory evaluation of the two genotypes

Invariably, in all the locations under test, I-Cañicapa was the preferred variety by the farmers, and that obeys to the fact that this cultivar excels to JAZMIN/CARDO in several important agronomic variables, mainly grain yield and kernel size. Therefore most of the peasants wanted Cañicapa's seed; however an agreement was reached among them, such that those who receive Cañicapa this season, will have JAZMIN next one, and viceversa. Anyway they are aware that JAZMIN is a good genotype also, but however competing with Cañicapa is a mismatch for any cultivar at this moment in Ecuador. In this way, one of the objectives of the Project, diversify the farmer's portfolio of varieties (and addition of new genes) in their fields, is accomplished.

However, the performance of JAZMIN in the province of Bolívar made the farmers choose to this genotype, and after some further tests and seed increases, the decision can be taken as for the release of JAZMIN as the new barley variety for that region.

3.2 Seed increase at Santa Catalina experimental fields

The seed produced in Santa Catalina was a double purpose one, since part of it was distributed at the different locations and the remainder as a reserve for planting at Santa Catalina in 2009 as well as in Bolívar province.

3.3 Distribution of seed at the different participating communities

Table 2 contains data regarding to the number of farmers beneficiaries of seed delivery, as well as the amount of seed each one received at each community, with the exception of the locations of the province of Bolívar, where the decision was taken of one more year of seed increase, before distribution was done.

In Annex 2 are included the actual lists of beneficiaries of seed delivery at each community, as well as their names and their respective signatures.

Table 2 . Amount of seed provided to farmers and peasant communities participating in the Project, cycle 2007.

Peasant Community	Number of beneficiaries	Amount of seed	Total amount of seed each community received (quintals, qq)	Variety	Compromises for 2008
Santa Mónica – Pichincha	9	1.7 quintals each farmer	15	Cañicapa 03	Each farmer will return 1 or 2 quintals next year.
San José- Pichincha	20		7	Cañicapa and Jazmín	Community leaders in charge of seed distribution
Maca Atápulo – Cotopaxi	17	6 quintals for communal planting and each farmer 0.4 quintals	12	Cañicapa 03	Two ha to be planted in communal fields. The remainder seed for distribution among farmers.
Cumbijín- Cotopaxi	18		15	Cañicapa and Jazmín	Community leaders in charge of seed distribution
Cuatro Esquinas – Chimborazo	15	0.5 quintals each farmer	7	Cañicapa 03	Community leaders in charge of seed distribution
Sanjapamba – Chimborazo	116	8 quintals to the community managers	8	Cañicapa 03	All this seed for planting in communal fields.
		5 kilograms each farmer	24	Jazmin/Cardo/ /Tocte	All beneficiaries will plant the seed at their own fields.
Rumiloma - Chimborazo	---	1 quintal each farmer	7	Cañicapa 03	Each farmer will return the same amount of seed next year.
Total of distributed seed (quintals)			**73**		
Sowing area expected for 2008 (hectares)			**24.3**		

As long as budget permits, some activities will be performed in 2008 as a follow up and verification of the seed plantings assumed as a compromise by the farmers.

3.4 Dissemination of barley varieties

After the Participatory evaluations performed by farmers in conjunction with the Pronaleg technical personnel, the peasants prioritized to the following varieties in the different communities: Shyri 2000, Pacha, Cañicapa and Rita Pelada in Ninin Cachipata; Canari, Quilotoa, Shyri 2000 and Atahualpa at La Cocha Vaquería; Shyri 2000, Pacha, Cañicapa, Canari y Rita Pelada at Yanaturo; Quilotoa, Cañicapa and Atahualpa at El Carbón.

Desirable is also that we can be able to continue with this process in these and other peasant communities in the coming years.

Literature cited

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Peterson, R.F., A.B. Campbell, and A.E. Hannah. 1948. A diagramatic scale of estimating rust intensity on leaves and stems of cereals. Can. J. Res. 26: 496-500.