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RESISTANCE SOURCES FOR RUST, ANGULAR LEAF SPOT, AND COMMON BACTERIAL BLIGHT IN COMMON BEAN FOR ECUADOR.

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Introduction

Common bean is the most important legume in the northern region in Ecuador. Almost 20,000 ha of bush beans are planted in monocrop while 50,000 ha of climbing beans are planted in association with maize every year in Carchi, Imbabura, and Pichincha provinces (III Censo Agropecuario, 2002). Crop production is affected mainly by bean rust, caused by *Uromyces appendiculatus*. However, in the recent years, angular leaf spot (ALS) caused by *Phaeoisariopsis griseola* and common bacterial blight (CBB) caused by *Xanthomonas campestris* pv. *phaseoli* have been recognized as an increasing problem in this region causing around 50% of yield losses. It was our objective to evaluate a bean nursery reported by the International Center for Tropical Agriculture CIAT as valuable sources of disease resistance to identify the best genotypes to incorporate in the bean breeding program.

Materials and methods.

Twelve bean genotypes with three controls (Table 1) were evaluated in Ecuador in five bean production locations during two cycles of production in 2005. The selected bean production locations (Santa Lucía, La Concepción, San Clemente, Tumbaco, and El Tambo) at altitudes between 1,400 and 2,400 masl provide ideal climatic conditions for the development of the diseases. The trials were naturally infected with the pathogens under study. Evaluations at flowering and pod fill were performed after the symptoms of the diseases appeared. The evaluations were conducted with the scale of evaluation of germplasm developed by CIAT (1991). Plants rated 1-3 were classified as resistant, 4-6 intermediate resistant, and 7-9 susceptible. Plants rated 1 did not show symptoms (immune) and those rated 9 were destroyed by the pathogen. The modal value instead of the mean was employed to avoid the effect of the outliers.

Results

The environmental conditions and the presence of the pathogens allowed the fast and homogeneous development of the diseases in the trials under evaluation. Disease development rates in controls `Bola Pallatanga´, for all the diseases, and the rates in `Cocacho´, for ALS and CBB, showed that there was high disease pressure to conduct reliable evaluations. The cultivar `Red Small Garden´ was extremely susceptible for rust in all the locations evaluated so all the plants died and no evaluations for other diseases were performed. Genotype VAX 2 showed the best levels of resistance to all the diseases in all the locations. CAL 143 and G916 were resistant to rust and ALS and intermediate resistant to CBB. Je.Ma was highly resistant to rust. VAX 6, VAX 4, MAR 2, and G2333 were resistant to ALS and CBB in all the locations but showed intermediate to susceptible reaction to rust. POA 10, BAT 477, and `Mexico 54´ were resistant to

ALS and showed intermediate reaction to rust and CBB. AND 277 showed good source of resistance to ALS, but was susceptible to rust and CBB (Table 1).

Table 1. Rust, Angular Leaf Spot (ALS), and Common Bacterial Blight (CBB) rates of 15 bean genotypes in Northern Valleys of Ecuador, 2005.

	Rust					ALS			CBB		
Genotype	Concepción	Santa Lucía	San Clemente	El Tambo	Tumbaco	Santa Lucía	Concepción	El Tambo	Santa Lucía	Concepción	Tambo
JE.MA	1*	1	1	1	1	4	4	5	4	4	4
CAL 143	2	2	2	3	3	2	2	2	5	4	4
G 916	2	2	2	2	2	3	1	2	5	4	4
VAX 2	1	2	1	2	2	2	2	2	2	3	2
VAX 6	6	3	2	5	6	2	2	1	3	3	1
VAX 4	5	3	1	4	6	3	3	2	2	3	2
MAR-2	5	3	3	2	2	2	3	2	3	3	2
G2333	5	5	1	3	3	3	3	2	3	3	3
POA 10	3	3	4	5	4	3	3	3	6	4	2
BAT 477	6	4	1	5	2	3	3	2	4	3	5
AND 277	4	3	7	7	6	3	2	2	7	5	5
Mexico 54	3	4	2	3	2	3	2	3	5	4	4
Red Small Garden (control)	7	8	8	9	7	.....	.....	.....	.....	.....	.....
Bola Pallatanga (control)	7	7	7	7	7	6	7	7	4	5	3
Cocacho (control)	1	3	2	2	2	7	7	8	7	7	8

* 1 – 9 scale evaluation.- 1 = resistance (Immune), 9 = death plant caused by the disease.

Conclusions

There were important sources of resistance for rust, ALS and CBB in the nursery evaluated. The genotypes with high and wide scope of resistance might be crossed with local cultivars to transfer the resistance. The genotype VAX 2 was the best source of resistance for all diseases, so this genotype is strongly recommended to be part of the breeding crossing program to develop genotypes with multiple resistance. Several backcrosses must be considered as well since the seed quality differs widely from the Andean seed type. Other resistant genotypes with Andean seed type such us Je.Ma, CAL 143, G 916, and AND 277 might be intercrossed to generate multiple resistant lines with commercial characteristics.

References

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