Development of bean lines (*Phaseolus vulgaris* L.) resistant to BGYMV, BCMNV and bean weevil (*Acanthoselides obtectus* Say)

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The common bean weevil (*Acanthoscelides obtectus* Say) is a major seed storage pest (Kornegay and Cardona, 1991). BC_3F_3 lines from the cross 'Rojo*3/SMARC2///ICAPijao*2/G40199' were obtained from Dr. James Myers at Oregon State University (OSU). This population was expected to segregate for resistance to the bean weevil (Mobogo et al., 2009). Individual plants were selected for local adaptation from a nursery planted at Isabela, Puerto Rico in October, 2010.

A bioassay was developed to screen BC_3F_{3-4} bean lines for resistance to the bean weevil. Plastic cups (150 ml) containing 20 seed were infested with 20 adults of the bean weevil. Date of first emergence was noted and damage to the seed was measured at 35 days after infestation. The lines were evaluated in two trials conducted at Isabela, Puerto Rico during 2011.

Seed of both Andean and Middle American bean cultivars were severely damaged by the bean weevil (Table 1). Three light red kidney lines from the OSU population had useful levels of resistance. The date of first emergence of adults of the resistant lines was approximately three weeks later than the susceptible checks. Most of the seed of the resistant lines was undamaged at 90 days after infestation. Seed of resistant lines had ≥ 65% seed without holes. The only other line with a similar level of resistance was RAZ 25 which was developed at CIAT to possess the seed storage protein arcelin 1.

The bean weevil resistant line AO1012-29-3 was crossed with white, black, and red mottled cultivars that have commercial seed type and BGYMV and BCMNV resistance. F_2 populations and F_3 lines derived from these crosses were planted at Isabela, Puerto Rico in July 2011. Individual plants with local adaptation will be selected and screened in the greenhouse for reaction of the NL3 strain of BCMNV. Resistant lines will be screened for the presence of the *bgm-1* gene using the SR-2 and the *I* gene using the SW13 SCAR markers.

Table 1. Damage caused by bean weevil (*Acanthoselides obtectus*) in 20-seed samples of common bean lines of diverse origin.

Identification	Seed type	Total number of holes in the seed	Percent seed without holes	Percent seed weight lost
AO-1012-27-2	Red kidney	9.5	65.0	0.0
AO-1012-29-3	Red kidney	14.5	75.0	0.0
AO-1012-31-4	Red kidney	14.0	65.0	18.8
Badillo	Red kidney	129.0	0.0	45.0
INIAP Fanesquero	White kidney	122.0	0.0	25.0
RAZ 25	Red mottled	13.5	62.5	16.7
INIAP Portillo	Red morttled	180.5	0.0	37.5
INIAP Yungilla	Red mottled	132.5	0.0	37.5
INIAP Concepción	Red mottled	150.0	0.0	37.5
PR9745-232	Red mottled	125.5	0.0	35.8
Catarina	Cranberry	132.0	0.0	37.5
Calembe	Green	143.0	0.0	25.0
Canaria	Yellow	129.5	0.0	25.0
Verano	White	150.0	0.0	25.0
Morales	White	112.5	0.0	25.0
RAZ 75	Small red	23.5	35.0	16.7
INTA Precoz	Small red	120.5	0.0	37.5
DEHORO	Small red	128.0	0.0	33.3
Amadeus 77	Small red	122.5	0.0	33.3
Carrizalito	Small red	106.5	0.0	33.3
CENTA Pupil	Small red	110.0	0.0	25.0
RAZ 50	Black	79.5	10.0	16.7
Aifi Wuriti	Black	140.5	0.0	33.3
DPC 40	Black	103.5	0.0	40.0
ICA Pijao	Black	109.0	0.0	25.0
Mean		93.8	9.0	30.7
LSD(0.05)		18.0	8.9	12.6
CV(%)		9.7	50.1	20.7

REFERENCES

Kornegay J.L. and C. Cardona. 1991. Inheritance of resistance to *Acanthoscelides obtectus* in a wild common bean accession crossed to commercial bean cultivars. Euphytica 52:103-111

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