ABSTRACT
Partial white mold [WM, caused by Sclerotinia sclerotiorum (Lib.) de Bary] resistance is found in large-seeded Andean and small and medium-seeded Middle American dry and green bean (Phaseolus vulgaris L.) and in interspecific breeding lines (IBL) derived from P. coccineus and P. connatensis of the secondary gene pool. Resistance of individual genotype, irrespective of its evolutionary origin, is inadequate for combating WM in the USA. Furthermore, no effort has been made for pyramid resistance from Phaseolus species and introgressing high levels of pyramided WM resistance [PWMR] into cultivars. The goal of this research is to pyramid WM resistance from Phaseolus species of the primary and secondary gene pools and introgress the highest levels of the PWMR into pinto bean, the largest market class in the USA and North America. Subsequently, the effectiveness of PWMR across environments will be determined. These objectives support the Sclerotinia Initiative area of Crop Germplasm Resources and Genetics. White mold reaction of 11 common bean (A 195, CORN 501, CORN 601, G 122, ’ICA Bunsii’, L 192, MO 162, PC 50, VA 19, USPT-WM-1, and ‘Chase’) and eight IBL derived from P. coccineus and P. connatensis (VCW 54, VCW 55, VRW 32, 92BG-7, I9365-25, 0785-120-1, 0785-121-1, and 0785-220-1) was verified in two greenhouse environments in Idaho and Colorado (June 2008 to December 2010). The complementation test among five Andean dry bean (A 195, G 122, MO 162, PC 50, and VA 19) and three IBL derived from P. coccineus (VCW 54, 92BG-7, and 0785-220-1) was performed (June 2008 to May 2009). Four single-crosses among selected WM resistant parents of diverse evolutionary origins were made (June to September 2010), which were used to make three-way and double-crosses (October to December 2010). The latter will be used to make multiple-parent crosses (January to May, 2011). These crosses should allow simultaneous pyramidizing of high levels of WM resistance from across Phaseolus species of the primary and secondary gene pools and transfer into pinto bean. Also, 78 F1 families developed from two double-crosses, namely USPT-WM-1/CORNELL 601/USPT-CBB-192BG-7 and Chase/I9365-25/ABL 15/A 195 made for a doctoral dissertation, and over two thousand early generation progenies from additional crosses were screened in the greenhouse (June to December 2010). From the initial screenings it is encouraging to note that some of the recombinants exhibited higher levels of WM resistance than the individual parents. Also, some of these recombinants had pinto-like seed. However, because these are only in early segregating generations it will take several selection and progeny testing cycles to develop breeding lines uniform for WM resistance reaction and assess their true potential.

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RESULTS AND DISCUSSION:
☑ All 5 large-seeded Andean dry beans and their four F1 were resistant to WM, indicating that they probably carried similar resistance genes/QTL.
☑ The VCW 54 / 0785-220-1 F1 also was resistant, but in crosses with 92BG-7 both IBL exhibited a susceptible WM reaction. It is very likely that VCW 54 and 0785-220-1 have the same resistance genes/QTL, but both possess different genes/QTL from 92BG-7.

GOAL - to improve common bean resistance to white mold caused by Sclerotinia sclerotiorum.

OBJECTIVES - pyramid and introgress high levels of WM resistance into dry bean cultivars:
♦ Pyramid resistance from Phaseolus species of the primary and secondary gene pools,
♦ Introgress the highest levels of pyramided resistance (PWMR) into pinto beans, and
♦ Distribute the PWMR germplasm lines and cultivars to public and private clientele.

MATERIALS AND METHODS:
White mold reactions of large seeded Andean (A 195, CORN 501, CORN 601, G 122, L 192, MO 162, PC 50, VA 19) and small and medium seeded Middle American (‘ICA Bunsii’, USPT-WM-1, Chase) dry and green bean materials; and interspecific breeding lines (IBL) derived from secondary gene pool species (VCW 54, VCW 55, VRW 32, 92BG-7, I9365-25, 0785-121-1, 0785-220-1) were verified in greenhouse environments in Idaho and Colorado.

Five large seeded genotypes (A 195, G 122, MO 162, PC 50, VA 19) and three small seeded IBL (VCW 54, 92BG-7, 0785-220-1) derived from P. coccineus and one IBL (VRW 32) derived from P. connatensis were selected for the complementation study.

Approximately 50 seeds were produced for each single cross made with these white mold resistant parents. The parents and part of the seed from the F1, of eight single-crosses were evaluated for reactions to WM to determine complementation or lack thereof and produce the F2 seed during 2009.

REFERENCES

GAMETE SELECTION FOR SIMULTANEOUSLY PYRAMIDING AND INTROGRESSING WHITE MOLD RESISTANCE FROM PHASEOLUS SPECIES INTO PINTO BEAN
Shree P. Singh1 and Howard F. Schwartz2
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REFERENCES

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