Sources of Resistance to Sclerotinia White Mold in Lentils

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Introduction

White mold of peas, chickpeas and lentils, caused by *Sclerotinia sclerotiorum*, is an economically important disease. Serious yield losses may result from this disease under conducive conditions. Even under dry weather conditions during the 2003 growing season, severe white mold developed on lentils in some areas in the Eastern Washington (Fig. 1). The most economical means to control white mold is through planting of resistant cultivars. However, no information is available about resistance to white mold in grain legumes. This study is aimed at identifying resistance sources to white mold in commercial cultivars and germplasm lines of lentils.

Materials and Methods

Twelve commercial cultivars and advanced breeding lines of lentils were tested in the field and also in the greenhouse. About 500 germplasm line of lentils are being screened in the greenhouse. The strain WM-A1 collected from a processing plant in 2002 was used for greenhouse study, and a mixture of four strains or natural inocula were used in inoculating field plots.

Field plots were set up at the Spillman Experimental Farm of the Washington State University, Pullman, and the Peterson Farm near Prosser, Washington in 2002 and 2003. Field plots were also set up in Corvallis, Oregon in 2003. Disease ratings were based on percent of infected plants.

For greenhouse screening, seeds were germinated in potting soil in 6-inch diameter pots. Two-week old seedlings were inoculated with colonized oat kernels using either one or two kernels per plant by placing the kernels into the soil next to the plant stem. The number of plants that wilted out of total number of plants was taken at three-day intervals as a measure of relative susceptibility.

Table 1. Cultivar response to white mold in a filed trail conducted in 2002 at the Spillman Experimental Farm, Pullman, WA.

Cultivar/ Breeding line	Disease Severity* 9 July	Disease Severity 25 July
Palouse	1.25**a	2.50a
Pardina	1.25a	2.25ab
Athena	0.75ab	2.00abc
Mason	1.25a	2.00abc
Brewer	1.00ab	1.75abcd
Crimson	0.50a	1.50bcd
Grandora	0.50a	1.25cd
Merrit	0.50a	1.25cd
Sovereign	0.75ab	1.25cd
Eston	1.00ab	1.00d
LC760209	0.75ab	1.00d
Milestone	1.00ab	1.00d
Pennell	0.75ab	1.00d
Redchief	0.25b	1.00d
Richlea	0.50a	1.00d
Robin	0.25b	1.00d

*Disease severity ratings were according to the following 0-to-8 scale: 0 = no infection, 1 = 1-3% infection, 2 = 4-10%, 3 = 10-25%, 4 = 25-50%, 5 = 50-75%, 6 = 75-90%, 7 = 90-97%, and 8 = 97-100%.

**Values are means of four replications. Means followed by the same letter in the same column are not significantly different from each other at P = 0.05 following a Fisher's protected least significant difference test.

Fig. 1. August 14, 2003 photos showing a lentil field near Colton, WA. infected by white mold.

Fig. 2. Comparison of a resistant (top) and a susceptible (bottom) lentil cultivars in field plots.

Fig. 3. Greenhouse screening of lentil germplasm accessions for resistance to white mold. Each accession is in a row of six pots and the forefront pot is uninoculated control.

Results

The weather conditions in 2002 and 2003 were dry. Low levels of disease symptoms developed in 2002 and very little disease symptoms were observed in 2003. The field data from 2002 plots (Fig. 2; Table 1) did provide information about most susceptible cultivars. Field observations were also confirmed in greenhouse trials. The data from 2003 plots from Corvallis, OR also correlated with the data observed in 2002 except cv. Merrit. Cultivar Merrit was considered to be resistant in 2002 trials but showed high levels of disease in 2003 trials, but Merrit had poor germination in the plots of 2003.

During screening germplasm lines, several accessions showed very good resistance to white mold (Fig. 3). The resistant accessions remained green 12 days after inoculation, whereas susceptible accessions wilted 4 days after inoculation. These resistance accessions include ILL 1878, ILL 668 and Precoz.

Discussion

All lentil genotypes screened so far are susceptible to infection by the white mold pathogen *Scerotinia sclerotiorum*. However, different levels of susceptibility were observed as measured by either number of infected plants in the field or by the number of plants wilted at a defined time period after inoculation in the greenhouse. The resistant accessions provide resistance that is not currently available in commercial cultivars and could be incorporated into lentils for managing white mold. We have started the process to determine the inheritance pattern of the resistance in order to devise the best strategy in breeding lentils for resistance to white mold.

Selected Literature

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