

Growth Habit, Lodging and Resistance of White Bean to White MoldR. Hall¹, S.J. Park² and L.G. Phillips¹,

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Forty cultivars and lines of white bean were assessed for resistance to white mold, caused by Sclerotinia sclerotiorum. Plots were established at the Arkell Research Station, University of Guelph, on 23 June and 25 June 1992 in an area naturally infested with sclerotia of the pathogen. The plots were arranged in a randomized complete block design with three replicates. Each plot contained three rows 4.5 m long and 18 cm apart and plots were spaced 72 cm apart. Seeds were sown 5 cm apart in the row. The experimental area was treated with glyphosate (as Roundup) and trifluralin (as Treflan) four weeks and one week, respectively, before seeding. During the growing season, weeds were controlled by hoeing and hand pulling. Fifty-eight days after sowing, plots were rated as being upright, semi upright or lodged. During the period 14-28 September, 1992 (83-95 days after sowing) 50 plants were taken from the centre of the middle row of each plot and were rated for severity of disease on a scale of 0, 1, 2, 3, and 4 representing 0, 1-25, 26-50, 51-75, and 76-100% of the stem and branches with symptoms of white mold. Data on disease severity, disease incidence (percentage of diseased plants), pods per plant and diseased pods per plant were analyzed by ANOVA, experimental variability was expressed as coefficient of variation (CV), and means were compared by least significant difference (LSD) at $P = 0.05$. Percentages were arcsine transformed to angles before statistical analysis.

Disease severity ranged from 0.8 to 3.1 (Table 1), showing a wide range of susceptibilities to white mold in this germplasm. Several lines and cultivars showed high levels of resistance to the disease. However, disease incidences were high, ranging from 64 to 100%. The rank order of resistance to white mold, assessed by disease incidence, of 17 cultivars tested in this trial was similar to the ranking of the same cultivars at three other locations in 1990 (1991-1992 Field Crop Recommendations, Publication 296, Ontario Ministry of Agriculture and Food). Spearman's coefficient of rank correlation was 0.70. This indicates that resistance rankings are relatively stable in separate trials. Disease incidence was moderately correlated ($r = 0.77$) with disease severity. Disease severity showed a wider range of values (20-78% of the maximum possible value of 4) than disease incidence (64-100% of the maximum possible value of 100%) and may therefore be a more sensitive measure of resistance to the disease. The incidence of infected pods ranged from 0 to 26.9%. Disease severity was highly correlated with the incidence of diseased pods ($r = 0.89$), suggesting that there is a common mechanism for resistance of branches and pods. Disease severity was only weakly correlated with the total number of pods per plant ($r = 0.41$), indicating that resistance to white mold was not linked to yield potential. The mean disease severity rating was 1.9. There were 21 cultivars below the mean and 19 cultivars above. Cultivars below the mean tended to have an indeterminate growth habit and resistance to lodging. These observations may assist in the selection of resistance to white mold.

Table 1. Severity and incidence of white mold, pods per plant, diseased pods (%), growth habit and lodging in 40 cultivars and lines of white bean.

Cultivar/line	DS	DI	PP	DP	GH	L
Ex Rico 23	0.8	68.6	7.3	1.4	I Ib	2
W1445b-45494	0.9	76.0	4.3	0.0	IIa	1
Crestwood	1.0	76.0	5.6	1.8	I Ib	2
Vista	1.0	78.0	5.9	1.7	IIa	1
GTS 525	1.0	78.0	4.8	2.1	I Ib	2
Stinger	1.1	83.4	6.3	4.8	I Ib	2
OAC 92-2	1.1	83.4	4.8	4.2	Ia	1
OAC Gryphon	1.2	90.6	7.5	4.0	I Ib	2
OAC Rico	1.3	86.6	5.8	3.4	I Ib	2
Centralia	1.4	84.0	5.6	5.4	I Ib	3
Anchor	1.4	90.0	5.6	7.1	I Ib	1
HR44-1285	1.4	91.4	5.7	5.3	I Ib	1
Harowood	1.4	64.0	5.4	9.3	I Ib	1
T9201	1.4	96.6	5.7	12.3	IIa	1
OAC 92-4	1.5	90.6	5.6	1.8	I Ib	2
HR43-1582	1.6	86.6	6.1	6.6	I Ib	2
Avanti	1.6	95.4	5.8	8.6	IIa	1
HR46-1657	1.7	87.4	5.5	7.3	I Ib	1
OAC Laser	1.7	88.6	4.9	6.1	IIa	1
Schooner	1.7	88.0	5.3	13.2	IIa	3
Shetland	1.8	97.4	6.6	15.2	I Ib	2
Mitchell	2.0	90.0	7.0	12.9	I	2
T9006	2.0	94.0	6.6	15.2	I	2
GTS 0786-2	2.2	96.6	6.4	15.6	I	2
Fleetside	2.2	98.6	4.6	15.2	I	3
OAC 92-1	2.3	96.0	4.7	14.9	I	1
T9203	2.3	96.0	6.5	16.9	I	2
Dresden	2.4	96.0	5.4	18.5	I	3
OAC Seaforth	2.5	98.6	4.9	16.3	I	3
HR40-1285	2.5	93.4	4.5	13.3	IIa	1
OAC 91-2	2.7	98.6	5.5	25.5	I	3
OAC Cygnus	2.8	98.0	4.4	18.2	I	3
OAC Sprint	2.8	95.4	3.8	18.4	I	3
Wesland	2.8	99.4	5.3	18.9	I	3
T9004	2.8	97.4	5.4	20.4	I	2
OAC 92-3	2.9	100.0	3.7	21.6	Ia	1
Rocket	2.9	100.0	4.8	22.9	I	3
T9202	3.1	97.4	4.5	17.8	I	3
Midland	3.1	98.0	5.2	26.9	I	3
OAC Speedvale	3.1	100.0	3.7	21.6	I	3
LSD	0.8	15.2	1.5	9.1		
CV	24.3	11.6	17.4	29.3		

DS, disease severity (0-4 scale); DI, disease incidence (%); PP, pods per plant; DP, diseased pods per plant (%); GH, growth habit (I = determinate, Ia = upright determinate, IIa = indeterminate without guides, IIb = indeterminate with guides); L, lodging (1 = upright, 2 = semi upright, 3 = lodged).