

Registration of AxN-1-55 Soybean Germplasm with Partial Resistance to Sclerotinia Stem Rot

AxN-1-55 soybean [*Glycine max* (L.) Merr.] (Reg. no. GP-315, PI 640911) was developed by the Illinois Agricultural Experiment Station at the University of Illinois and the Michigan Agricultural Experiment Station at Michigan State University. AxN-1-55 was released in 2005 as a mid group II maturity germplasm line for use as a parent because of its high level of resistance to Sclerotinia stem rot [caused by *Sclerotinia sclerotiorum* (Lib.) de Bary].

AxN-1-55 originated as an F4 plant selection from a cross between the Sclerotinia stem rot partially resistant cultivars Asgrow A2506 and Syngenta (formerly Novartis) S19-90. S19-90 was selected from a cross between Pride 'B152' and 'Pella' (Bahrenfus and Fehr, 1980). The pedigree of B152 is Northrup King 'S1346' (6) × 'Mack' and the pedigree of S1346 is A55-4629-4 × PI 257435 (Caviness et al., 1972). A55-4629-4 was selected from the cross 'Roanoke' × 'Hawkeye' (Weiss, 1953). A2506 was selected from a cross between Northrup King 'S14-60' and Asgrow 'A3501'. The parents of A3501 were Asgrow 'A3127' and 'Williams 82' and the parents of A3127 are 'Williams' and 'Essex' (Bernard and Cremeens, 1988; Bernard and Lindahl, 1972; Smith and Camper, 1973). The pedigree of S14-60 is Northrup King 'S14-92' × 'Hodgson' and the parents of S14-92 are 'Corsoy' and 'Wayne' (Lambert and Kennedy, 1975; Weber and Fehr, 1970; Bernard, 1966). The cross between A2506 and S19-90 was made in East Lansing, MI, and a population was advanced to the F4 generation through single-seed descent (Brim, 1966). F4-derived lines were formed and tested for partial resistance to Sclerotinia stem rot and agronomic traits.

AxN-1-55 was selected from the population of lines based on its resistance to Sclerotinia stem rot and good agronomic performance from 1997 to 2004 in cooperative Sclerotinia stem rot tests across the north central region of the USA. Across 11 environments of these tests that had sufficient Sclerotinia stem rot to rate plant responses in the field, AxN-1-55 was significantly ($P < 0.05$) less diseased than S19-90 or A2506. Sclerotinia stem rot infections were rated in these tests by individually scoring plants and calculating a disease severity index (DSI) for each plot (Grau et al., 1982). The DSI across environments was 17.7 for AxN-1-55, 29.3 for Syngenta S19-90, and 34.7 for A2506. S19-90 is recognized by soybean researchers as a partially resistant check that when challenged with *S. sclerotiorum*, typically shows a high level of resistance (Kim et al., 1999, 2000; Vuong et al., 2004).

AxN-1-55 was tested for yield and other agronomic traits across 19 environments of the cooperative tests. Seven of these environments are included in the 11 that were rated for Sclerotinia stem rot resistance, whereas little or no Sclerotinia stem rot was present at the 12 other locations. Across the 19 environments, AxN-1-55 yielded 2886 kg ha⁻¹ compared to 2928 kg ha⁻¹ for S19-90 and 3033 kg ha⁻¹ for A2506. These differences were not significant at $\alpha = 0.05$. The maturity of AxN-1-55 was 2 d later than S19-90 and 4 d earlier than A2506. AxN-1-55 was 4 cm taller than S19-90 and 3 cm taller than A2506, and the lodging for AxN-1-55 was 0.1 unit (on a 1-to-5 scale) less than S19-90 and 0.2 less than A2506. Compared to 'Loda' across 15 of the 19 environments, AxN-1-55 yielded 147 kg ha⁻¹ less, matured 6 d earlier, was 9 cm taller, and had 0.3 units less lodging (Nickell et al., 2001).

Previous research has shown that canopy architecture can influence Sclerotinia stem rot infection rates in field tests. It is often observed that early maturing genotypes with a short, upright, and nonbushy growth habit escape the disease because their canopies are too dry for disease development (Kim and Diers, 2000). The agronomic characteristics of AxN-1-55, together with field observations of canopy structure, indicate that its low disease ratings are not due to plant escape, but

rather the successful combination of physiological resistance genes from its two parents.

AxN-1-55 is an indeterminate line with purple flowers, tawny pubescence, brown pod color at maturity, and yellow seeds. The line segregates for both black and gray hila.

Seed of AxN-1-55 will be maintained by the Illinois Agricultural Experiment Station at the University of Illinois, Urbana, IL 61801. A small sample of AxN-1-55 may be obtained from the experiment station for research purposes, including development and commercialization of new cultivars, for at least 5 yr. It is requested that appropriate recognition be made if AxN-1-55 contributes to the development of new cultivars, germplasm, parental lines, or genetic stocks. No application will be made for U.S. Plant Variety Protection for AxN-1-55.

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doi:10.2135/cropsci2005.07-0224

Published in *Crop Sci.* 46:1403-1404 (2006).