

Evaluation of soybean cultivars for resistance to *Sclerotinia* stalk rot in South Africa

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Abstract

Eighteen soybean varieties were evaluated for resistance to Sclerotinia stem rot during the 2003/04 to 2005/06 seasons. Sequentially planted field experiments were conducted, consisting of three plantings at Bethlehem during the 2003/04 and 2004/05 seasons and four plantings at Bethlehem and Greytown during the 2005/06 season. Planting was spaced from mid-November to late-December to ensure a range of weather conditions subsequent to flowering and inoculation during each season. Each plot consisted of 4 rows, 8 m in length, spaced 45 cm apart. At flowering, plots were inoculated with Sclerotinia sclerotiorum, which had been grown on sterile sorghum grain in fruit flasks. Colonised sorghum grain was dried and milled prior to being hand-distributed over the test plot. This was repeated after two weeks during 2003/04 and 2004/05. During 2005/06 the second inoculation was conducted using ground PDA-grown mycelium in a water suspension. All cultivars were susceptible to Sclerotinia stem rot to a greater or lesser degree. Ranking of cultivars according to disease incidence was not correlated over planting dates, seasons or localities and differential responses of cultivars to the pathogen under different environmental conditions were evident. The use of mean Sclerotinia stem rot incidence as a parameter for the measurement of resistance was questioned. Nonlinear regression analysis was used to determine the relationship between Sclerotinia stem rot potential associated with inoculation dates and observed disease incidence within cultivars. Disease potential was quantified as the mean disease incidence associated with a planting date at a locality over all entries in the trial. Cultivar responses could be classified into three categories, i.e., those linearly related to disease potential, those highly susceptible even at low disease potentials, and those with various degrees of resistance despite increasing disease potentials. Cultivars in the latter group differed with respect to the disease potential required to initiate disease onset (arbitrarily taken as 10 % disease incidence) and the subsequent rate of resistance breakdown. AG 5601 was the most resistant with an onset potential of 23.7 % compared with A 5409 RG with an onset potential of 3.63 %. These criteria proved useful for quantifying resistance as they are fixed values independent of fluctuations in flowering dates and variations in climatic conditions. Area under the disease potential curve also proved a useful criterion to quantify cultivar response to changing environment although this criterion could not differentiate between the time of disease onset and the rate of disease response to changing environment.