



## Soybean disease reaction and yield loss to *Rhizoctonia solani*

CATEGORY [disease](#) | March 20, 2019

Seedling blight and root rot in soil-inoculated *Rhizoctonia solani* plots decreased soybean stand establishment by 48% and reduced yield by 52% compared to control plots with low levels of *R. solani*. No significant differences in disease severity, nodulation or yield loss were observed among the 21 varieties assessed.

Root rot of soybean is a disease complex caused by *Fusarium*, *Pythium*, *Phytophthora*, and *Rhizoctonia* species. The objectives of the study were to determine the reactions of soybean varieties to *R. solani* and to determine the impact on yield.

Twenty-one soybean varieties were assessed in field trials at the Crop Diversification Centre South at Brooks, Alberta over three years from 2014 through 2016. Plots were inoculated with an isolate of *R. solani* at four inoculum levels to assess stand establishment, root rot severity, nodulation and yield. Soybeans were sown on 12-inch row spacing (30 cm) and standard agronomic practices were used, including inoculation with a *Bradyrhizobium japonicum* nitrogen-fixing inoculant. No fungicide seed treatment for root rot control was utilized. Irrigation was applied as required.

Inoculation with *R. solani* caused pre-emergence damping-off and post-emergence seedling blight, which reduced stand establishment, nodulation, and seed yield among all soybean varieties.

Background levels of *R. solani* were observed in uninoculated *R. solani* control plots with a mean of 0.3 on a 0 to 4 root rot rating scale. This compared to 1.1 mean root rot severity in the inoculated plots. The variation in root rot severity was not statistically significant among the varieties in any of the site-years of the study.



Disease rating scale (0-4)

### **Stand establishment, nodulation and yield all impacted**

Stand establishment was reduced by 48% across the 21 soybean varieties when the plots were inoculated with *R. solani*.

Nodulation declined with increasing *R. solani* inoculum density resulting in a strong negative association of nodulation with root rot severity. Root nodulation reduction due to *R. solani* varied among soybean varieties with a range of 39% to 62% loss in nodulation, although the response among the genotypes was not statistically significant. Across all trials and genotypes, the reduction in nodulation was 54%.

Yield in the control plots had a mean of 63 bushels per acre compared to 43 bushels per acre in the *R. solani*-inoculated plots. Comparing the yield impact on individual varieties, a mean yield loss of

52% (ranging from 40% to 68% for individual varieties) resulted from inoculation with *R. solani*. However, there were no significant differences in yield loss due to *R. solani* between the varieties.

This study showed that rhizoctonia root rot not only reduced stand establishment and seed yield but also reduced the potential benefits of nitrogen fixation by soybean for the subsequent crops in the rotation. None of the soybean genotypes that were evaluated were resistant to *R. solani*, highlighting the importance of fungicide seed treatments for control of soybean root rots.

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**Disease reaction to *Rhizoctonia solani* and yield losses in soybean.** K.F. Chang, S.F. Hwang, H.U. Ahmed, S.E. Strelkov, M.W. Harding, R.L. Conner, D.L. McLaren, B.D. Gossen, G.D. Turnbull. Canadian Journal of Plant Science, 2018, 98:115-124, <https://doi.org/10.1139/cjps-2017-0053>