FRANC, GARY D.*, ANDREW R. KNISS and WILLIAM L. STUMP, University of Wyoming, Plant Sciences - 3354, Laramie, WY 82071. **Rhizoctonia root and crown rot interactions with fungicide and glyphosate in glyphosate-tolerant sugar beet.**

ABSTRACT

Sugar beet cultivars tolerant to glyphosate are increasingly popular in the Great Plains due to economics of weed control. Anecdotal reports suggested that Rhizoctonia root and crown rot- (RRCR) tolerant cultivars had altered host-plant resistance following application of glyphosate. In 2007 field plots, glyphosate application significantly increased RRCR incidence for inoculated plots lacking azoxystrobin ($P<0.05$). However, this early-season effect was not detected later in the season when all plants became infected ($P>0.05$). Season-long RRCR disease severity values for azoxystrobin-treated plots revealed that glyphosate application significantly reduced disease compared to when glyphosate was not applied ($P\leq0.05$). This initial field study revealed that the RRCR disease reaction in the host plant could be affected by glyphosate application, however, data were not consistent.

In 2008 a field study was conducted using two susceptible and two Rhizoctonia-resistant cultivars, with a main treatment structure of non-treated, glyphosate alone, azoxystrobin alone and glyphosate plus azoxystrobin applications. Three Rhizoctonia inoculum levels (0, 50 and 100%) were applied within each main plot to avoid overwhelming plant responses to infection and masking subtle interactions of glyphosate application. Inoculum was pulverized barley grain previously infested with *Rhizoctonia solani* AG2-2: inoculum was placed on each plant crown prior to azoxystrobin application. The 50% inoculum level was accomplished by diluting the 100% inoculum with an equal volume of sand. Results revealed no disease developed from the 0% inoculum level, which indicated all disease resulted from inoculation and not from natural infection. The 50% inoculation level resulted in less disease incidence (14.6%) and severity (27.7%) compared to the 100% inoculation level ($P\leq0.05$). Most differences between the two inoculum levels were detected early in the season and became less evident later in the season. The 50% inoculation level also resulted in less disease on harvested beets and greater root yields compared to the 100% inoculum level ($P\leq0.05$).

Cultivar effects were measured following RRCR inoculation. Rhizoctonia tolerant cultivars had less overall disease incidence and severity (14.2% and 32.5%, respectively) as measured by area under the disease and necrosis progress curves, and also had greater yields compared to susceptible cultivars ($P\leq0.05$). However, in the absence of azoxystrobin, all cultivars developed severe disease following inoculation and beet root yields significantly reduced ($P\leq0.05$).

The main effect of glyphosate application had no significant effect on overall RRCR disease incidence and disease severity ($P>0.05$). Glyphosate applications significantly increased beet root yields in the absence of inoculation and with inoculation when followed by azoxystrobin, compared to the azoxystrobin alone treatment ($P\leq0.05$). However, these improved yields were most likely due to improved weed control, even though plots were hand-weeded to correct for weed competition in the absence of glyphosate. There was no overall significant effect of glyphosate on RRCR incidence and severity for harvested beets in the azoxystrobin-treated plots ($P\leq0.05$). Several significant complex interactions occurred for specific cultivars, but these effects were inconsistent between inoculation levels. Additionally, there was no indication that glyphosate application compromised azoxystrobin efficacy. In summary, there

was no conclusive evidence that glyphosate application affected inherent beet plant susceptibility or the RRCR disease reaction. The experiment will be repeated with reduced inoculum levels and different glyphosate timings. The potential interaction of weeds on disease development also will be studied.