

### **[13] COMPETITIVE WHEAT: A KEY COMPONENT IN INTEGRATED WEED MANAGEMENT.**

Steven Seefeldt, USDA-ARS, Fairbanks, AK and Alex Ogg\*, USDA-ARS (retired), Ten Sleep, WY.

Jointed goatgrass (*Aegilops cylindrica*) is a troublesome weed in winter wheat. Two studies were supported by the National Jointed Goatgrass Research Program. One study used path analysis to determine plant traits that enhanced winter wheat competitiveness and the other measured the impact of winter wheat height on jointed goatgrass using near isolines with and without reduced height genes, Rht1 and/or Rht2. From the competitive traits study, it was determined that the rate of wheat height gain was positively correlated with winter wheat yield and negatively associated with jointed goatgrass seed yield. Therefore, a focus on breeding for winter wheats that increase height rapidly after seedling emergence should enhance winter wheat competitiveness against jointed goatgrass. In the wheat height study, the three different isolines were 50, 75, and 100 cm tall at maturity. It was determined that in jointed goatgrass free conditions, yield of the tallest wheat was reduced compared to the shorter isolines. When competing with jointed goatgrass, all isolines produced similar yields. However, jointed goatgrass seed production was double when growing with the shortest isolate compared to the tallest isolate. These results are important as they indicate that a taller winter wheat plant comes with yield costs when growing in weed free fields and that final winter wheat height is not as important as rate of winter wheat height gain. An additional advantage of a taller winter wheat cultivar is that they can be harvested with the combine head cutting the wheat above most of the jointed goatgrass seed (maximum height about 80 cm), and thus there is less jointed goatgrass seed in the harvested grain. Breeding for winter wheat cultivars that gain height rapidly will increase crop competitiveness against jointed goatgrass, thus decreasing weed seed production and reducing seed contamination in harvested grain. Our conclusions are as follows:

1. Although rate of winter wheat height gain is an important trait of a competitive winter wheat, other traits, not revealed in this research, are also important.
2. In a field infested with JGG, the selection of a competitive winter wheat cultivar is a key first step in an integrated weed management system.
3. Multiple techniques that further improve wheat yield while reducing JGG seed production may result in an equilibrium where JGG populations are reduced to acceptable levels.