

M

Module 6.2-1 The placement of nitrogen fertilizer influences weed growth and competition with spring wheat in Alberta, Canada. Adjusting the placement and timing of fertilizer can have a significant impact on crop productivity. In some environments, common agricultural weeds are more responsive to nitrogen (N) fertilizer than crops such as wheat or canola. It is important to manage fertilizer so that the competitive advantage goes to the crop and not to the weeds. A 4-year study was conducted in Alberta, Canada to examine the competition between spring wheat and four common weeds when 50 kg N/ha (as ammonium nitrate) was applied:

Fertilizer Placement: Broadcast on soil surface
 Banded 10 cm deep between every wheat row
 Banded 10 cm deep between every other wheat row
 Point injection of solution at 20-cm intervals and at a 10-cm soil depth (with experimental equipment)

Fertilizer Timing: October or May of each year

Seeds from four weed species were broadcast on the soil surface in the first year (i.e., wild oat, green foxtail, wild mustard, or common lambquarters). Spring wheat was planted in May each year and harvested at maturity.

WEEDS: The N concentration was greater in wild mustard and common lambsquarters than the wild oat and green foxtail. This shows that broadleaf weeds are especially competitive in acquiring soil N in this environment. The placement of N fertilizer was generally more important than the time of application for the weed N concentration. Weed shoot N concentrations were generally greatest with surface fertilizer application and lowest with the point-injected fertilizer.

Weed populations were generally lower with spring-applied N than when the fertilizer was applied in the fall. Weed populations were also generally greatest when the fertilizer was broadcast on the soil surface. Weed growth was always lowest in the unfertilized control treatment.

WHEAT: The N concentration in wheat shoots was positively influenced by fertilizer application method, but not by the time of application. Wheat plant populations were not affected by timing or placement of N fertilizer application.

The method of N application had an impact on wheat yield when weeds were present (**Figure 1**). Grain yields were generally greater with subsurface placement of N fertilizer compared with surface application. Among the subsurface fertilizer placements, the point-injected N always resulted in the highest wheat yield.

The method of N fertilizer application generally had a large effect on weed growth and crop competition. Broadcasting N fertilizer on the soil surface was the least preferred method. Isolating the N fertilizer to a small volume in the soil provided benefits for limiting weed growth while supporting higher grain yield.

More details on this work are available in the publication:

Blackshaw et al. 2004. Nitrogen fertilizer timing and application method affect weed growth and competition with spring wheat. *Weed Sci.* 52: 614-622.

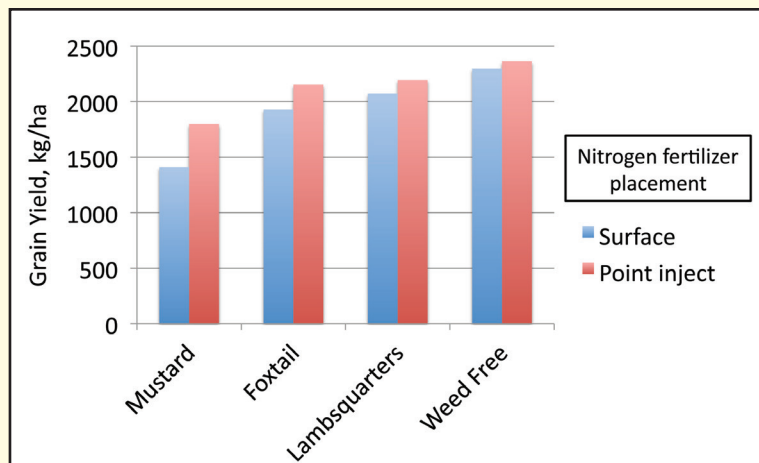


Figure 1. The effect of fertilizer placement and weed species on the 4-year average yield of spring wheat. Data averaged over the fall and spring fertilizer application times.

Submitted by R. Mikkelsen, IPNI, USA, August 2013.