



Evaluating Small Grains for Winter Injury

By Bill Verbeten, Regional Agronomist, Cornell Cooperative Extension

The late fall planting dates combined with the extreme cold this winter have made winter injury a real possibility for a number of small grain crops grown in northwestern NY. Areas where there was little-to-no snow cover during the cold spells have the highest risk of crop loss. Good planting practices can go a long way to reduce the risk of winterkill to barley, wheat, triticale, spelt, & rye but the weather also plays a large role in the winter survival of these crops.

Figure 1: Winterkill Patches in Wheat



Source: [University of Minnesota](http://www.umn.edu)

Effects of Management

Shallow planting depths (less than 1 inch) lead to shallow crown development. These plants may literally be “thrown” out of the soil as the field freezes and thaws. Planting with a drill usually eliminates this risk. However shallower planted small grains can develop an adequate root system if planted early in the fall (usually September in our

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region). Some varieties and some small grain species are more susceptible to winterkill than others. Rye is the most hardy winter small grain, followed by triticale, wheat, spelt, and finally barley. Placing phosphorous fertilizer with the small grain seed, having adequate amounts of other nutrients, and the proper soil pH also increases winter hardiness and yield. Parts of the field that are lower and wetter will have poorer stands than the better drained areas. Damage from ice sheeting is also common in low, wet areas. If the small grain has 2 or more tillers and a well-developed crown root system there is a much greater chance of the crop surviving the winter with little-to-no damage. A small grain crop can also be too large going into winter. If the top growth is greater than 6-8 inches there is an increased risk of snow mold killing the small grain as it smothers itself under the snow.

Effects of Weather

When the fall temperatures quickly drop-off to the teens or lower from above 40°-50°F, small grains are at a higher risk of winter injury than years where the change in air temperatures are more gradual. Most areas in northwestern NY had a gradual change in fall temperatures, but some pockets saw the temperatures fall quickly. During the winter, snow cover and soil moisture are critical to keep the soil temperatures warm enough to protect the crowns of small grains. When temperatures are -10°F or colder and there is no snow cover winterkill risk of small grains increases. Many areas in our region, especially east of Rochester, experienced these conditions this

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winter. Fields that had even an inch or two of snow are at much lower risk of sustaining damage to the small grain crowns. Soil temperatures increase with deeper soil depths—fields drilled at 1-1.5 inches will have deeper crowns (at warmer temperatures) than small grain fields that were broadcasted and packed into the upper 0.5 inch of the soil. The soils in NY generally have adequate moisture in the winter to reduce the risk of injury to small grains compared to the dryer soil conditions of the Great Plains. However high winds, in combination with low temperatures and little snow cover, can also cause significant damage to small grains from drying out the plants & damaging vascular tissue despite higher soil moisture levels.

Evaluation of Small Grain Crops

An easy way to test for winter damage in small grains is to bring in a few plants from each field, place them in pots and watch them. If the plants do not green up after a week with warm temps and water, they are dead. If the small grain greens up a little, but then slowly dies back there is damage to the xylem and phloem. These tissues move the water and plant sugars through crop similar to how veins and arteries work in animals. Extremely cold temperatures, especially with high winds can fracture the crop's vascular tissues, much like breaking a straw, which leads to a slow plant death. If the crowns are white then they are not damaged, but brown crowns will not recover, *Figure 2*. A more detailed method of evaluating small grain crowns for winterkill is available from the [University of Nebraska](http://www.unl.edu).

Figure 2: Dead, Damaged, & Healthy Crowns of Winter Wheat



Source: [Washington State University](http://www.wsu.edu)

Contact your crop consultant, myself, or Mike Stanyard if you have a question about small grain stand evaluation.

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