

# Bulletin

## Assessment of Winter Wheat Survival

Winter wheat is seeded in late August or early September into a shallow seedbed to allow the plant to access enough water to germinate quickly and grow for 4 to 5 weeks. The next 4 to 8 weeks (October to November) allow the plant to vernalize (giving the plant the signal to flower next spring) and acclimate to the cold (harden off for the winter). Ideally, this plant would be 3 to 4 leaf, have a tiller or two with developed crown tissue and would be ready to achieve winter wheat's maximum yield potential next spring.

In extremely dry conditions establishment can look quite different. Seeds could be anywhere from lying in dry dirt not germinated, to sprouted and not quite through the ground, to emerged crop in the 1 to 3 leaf stage in wet areas around sloughs or in low spots. In these delayed germination situations vernalization may occur under cool spring conditions. The stage of crop development in the fall influences not only winter survival and yield potential but also crop competitiveness, maturity and the risk of infection with diseases such as rust and fusarium head blight. The table below gives the best idea of what to expect from variable crop stages.

Stage	Date of Germination	Yield Factor	Competition Factor 1=Low 5=High	Winter Survival FSI (514=best)	Rust Risk 1=low 5=high	Maturity (Days Later)
3 Leaf + Tiller	Sept 5	100%	1	514	1	0
1-2 Leaf	Sept 15	90 to 100%	2	510	2	+4
Sprouted (Not yet through ground)	Oct 1	80 to 100%	4	476	4	+8
Not Germinated (Just imbibed)	Oct 15	60-100%	5	499	5	+10

\*From the Winter Wheat Production Manual

## Spring Scouting

A proper spring assessment is a key component to successful winter wheat production. To properly assess the condition of winter wheat in the spring, fall and winter information is very useful. Areas where the crop had poor emergence in the fall will be disadvantaged and more prone to winterkill. Knowledge of winter stresses can give an idea of winter survival potential. Areas with adequate snow protection – more than 4 inches of snow cover in the critical December 20 to March 20 period – will be more likely to survive. If areas of the field have been left bare to encounter cold conditions in this time frame, risk of winterkill is increased. Knowledge of the areas at greatest risk of winterkill from fall and winter observations give “worst case” area to assess survival in the spring.

Assessing the crop condition very early is difficult as brown leaf material in early spring may not be a sign of winterkill and new green leaves may not mean the crop has survived. New growth usually resumes as **white root growth** from the crown tissue.

A quick way of assessing viable plants in early spring is to remove a few plants on a warm day. Place crowns on a moist paper towel in a warm room that will be exposed to light for at least part of the day. Damaged crown tissue will quickly turn brown while healthy tissue will remain white and may begin to produce new roots within a few days.



Favorable conditions for crop survival and growth in spring are cool, damp weather. Hot and dry weather in early spring can result in cracking and drying of the soil which can be very detrimental to struggling plants.

The best way to ensure a proper assessment of the crop is to scout as late as possible. Look at the field after the bulk of seeding has been completed. This will give winter wheat plants time to re-grow while allowing time to re-seed if necessary. This would generally mean assessing the crop between **May 15 and May 25**.

Plant stands for winter wheat can be thin and still produce an excellent crop. Crop Insurance's Establishment Benefit Density Chart gives plant density where reseeding will be allowed. As shown a low plant population of winter wheat can still produce an adequate crop. Winter wheat has a greater capacity to rebound after adverse conditions, tiller and produce yield compared to a spring wheat crop of similar density.

## Establishment Benefit Density Chart

Crop	Est. Benefit (plants/ft <sup>2</sup> )	Customer Choice (plants/ft <sup>2</sup> )	No Est. Benefit (plants/ft <sup>2</sup> )
HRSW	Less than 7.8	7.8-12.2	12.2+
Winter Wheat	Less than 5.0	5.0-7.0	7.0+

\*From Saskatchewan Crop Insurance based on SAF recommended plant densities

## Assessment Decisions

Do not be too quick to give up on a winter wheat stand. The crop may look ragged but it will usually produce more than a re-planted crop. The optimum plant stand is 20-30 plants per square foot however half of these numbers will produce an adequate crop due to the ability of the winter wheat crop to aggressively tiller.

Winter Wheat Yield at Different Stand Densities

Wheat Stand (plants/ square foot)	Yield (bu/ac)
7.7	47
13.3	55
19.0	58
23.0	59
25.5	59
30.4	60

\*from Lafond and Gan, 1999

Variability of the stand within the field can make the decision more difficult. Crops with large bare spots may be in need of re-planting. Delaying the decision until mid May will allow the crop time to recover and still allow time to re-plant.

Thin stands or a weakened crop will need help to become adequate. Consider the following factors:

- Early nitrogen application to encourage tillering of remaining plants
- Early control of broadleaf weeds and wild oats due to the less competitive nature of a thin stand
- Weakened plants may be delayed in maturity which increases their risk to rust and fusarium head blight

Where stands are deemed unacceptable and the decision is made to re-seed to another crop consider:

- Wheat streak mosaic may carry over from infected winter wheat into spring seeded cereals. Avoid replanting to cereals, especially wheat.
- Tillage and/or burn down herbicides will not likely control all plants – particularly if some are suffering injury and slow spring growth. Delay applications until the plants have greened-up and are actively growing. In crop volunteer cereal herbicides may be required.
- Remember to credit any spring applied nitrogen to the following crop.

# Best Management Practices for Winter Wheat Survival

The winter wheat plant must receive insulating snow cover to survive the cold prairie winters. As a result they must be seeded into the standing stubble of the preceding spring crop. The snow trapping potential of this stubble is based upon the height of the stubble and stubble density (number of stems per given area). Preceding crops of cereals usually have the greatest snow trapping potential, followed by oilseed crops such as canola and flax. Pulse crops rarely leave sufficient stubble height to be effective. A minimum of 4 inches of trapped snow cover through December to early March will buffer soil temperature changes and provide protection to the crown tissue. Variable snow catch in fields may occur due to topography, where knolls may be wind swept bare of snow or on headlands where field traffic tramps stubble flat. Weather is beyond the control of the producer and all that can be done during winter is to estimate the impact of adverse conditions on the crop.

Other factors to consider:

- Plant winter wheat between August 25-September 5 so plant reaches 3 leaf stage entering winter
- Plant shallow – 1” or less
- Ensure proper fertility

## Summary:

- Assess crop between May 15 and May 25.
- Look for new growth in the form of white roots arising from the crown tissue
- Proper spring nitrogen management will be required to increase competitiveness of injured stands
- Additional herbicide and fungicide operations may be required
- If a winter wheat stand is destroyed for reseeding of another crop make sure good agronomics are considered
- With proper and timely management and favorable weather an excellent winter wheat crop can still be a possibility

Acknowledgements:

Ducks Unlimited Canada  
Manitoba Zero Tillage Research Association  
Winter Cereals Canada

Prepared by:

Bob Linnell and Wendy Schatz