



## LATE PLANTING OF SMALL GRAINS

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Wheat, barley, and oat are cool season annuals and are most productive when they grow and develop during cool weather. The yield potential of a crop is largely determined by the 6 leaf stage. Cool temperatures during this period are particularly important for the development of a high yield potential. For example, the number of tillers that ultimately produce grain at harvest declines as planting is delayed (Figure 1). The number of spikelets per spike is determined during the 4 to 5.5 leaf stage (Figure 2). Spikelet numbers are negatively correlated with temperature; spikelet numbers are greater when temperatures during the 4-5.5 leaf stages are cool.

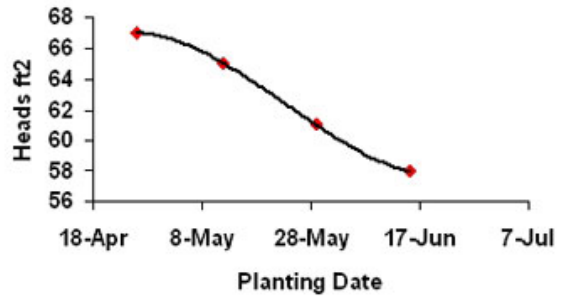
Because of the expectation that average temperatures will be higher as we plant later, development of the crop will speed up too. The number of heat units required for a plant to move to the next phase of development will accumulate faster. This forces development along faster and causes the plant to have less time to grow. Plants end up with fewer tillers, smaller heads, and fewer and smaller kernels per head, cutting into our yields.

To improve the odds of high grain yields is to ensure that the tillering and head initiation phases occur during relatively cool temperatures is by planting early. Early planting is pivotal in this regard (Table 1).

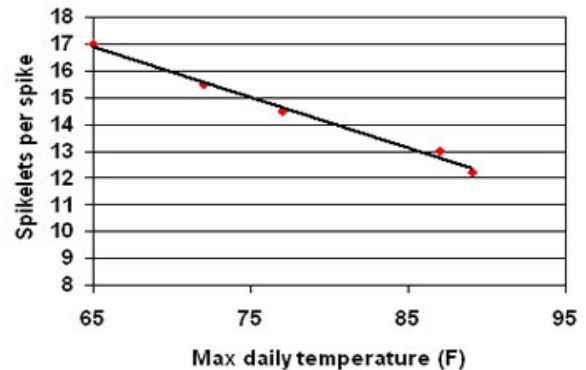
**Table 1 - The average seeding dates and last recommended seeding dates for small grains in Minnesota.**

Minnesota	Optimum	Last Planting Date:
South of US Hwy 12	1 <sup>st</sup> week of April	1 <sup>st</sup> week of May
South of MN Hwy 210	1 <sup>st</sup> week of April	2 <sup>nd</sup> week of May
South of US Hwy 10	3 <sup>rd</sup> week of April	3 <sup>rd</sup> week of May
South of US Hwy 2	4 <sup>th</sup> week of April	4 <sup>th</sup> week of May
South of Canadian Border	1 <sup>st</sup> week of May	1 <sup>st</sup> week of June

Research has shown that, on average, yields decreased 1% per day when planting is delayed past the optimum planting date. Planting after the last possible date is not recommended because the odds that grain yield and quality (test weight) will be dramatically reduced due to heat stress.



**Figure 1 – The effect of planting date for on number of heads per square feet of hard spring wheat at harvest in Langdon, ND (data and graph courtesy of Terry Gregoire, Area Agronomist, NDSU).**



**Figure 2 - The effect of maximum daily temperatures on the number of spikelets per spike that are initiated between the 4 and 5.5 leaf stage of spring wheat in Langdon, ND (data and graph courtesy of Terry Gregoire, Area Agronomist, NDSU).**

You can partially offset this yield loss by increasing the seeding rate and ensuring that you have more main stems per unit area. The recommendation is to increase the seeding rate by 1 percent for every day after the optimum planting window.

The last possible date for planting is not chiseled in stone. The chances of a profitable crop just drop because of the anticipated weather and temperatures later during the growing season. Past the last possible date, you may want to consider an alternative crop, though economic reality might prevent this. If you stay with small grains past that date you will have to hope for a cool and dry summer.