Seeding Rates For Early Planted Wheat

(Middlesex SCIA 2008 Major Grant)

Purpose:

Planting wheat in the early part of the seeding window increases the potential of higher yields. However, in years with long, warm, open falls, early planted wheat is subject to risk from fall disease, snow mould and other pests. A management option to mitigate this risk should be to reduce seeding rates when planting early. This technique has been adopted in other high yield areas of the world such as Germany and the United Kingdom. This project was undertaken to assess what the optimal seeding rate might be at early seeding dates, both on loam soils and on the heavy clay soils of the Niagara Peninsula

Methods:

Nine sites were established in the fall of 2007: Four early planted on loam soils, three early planted on clay soils, and two late planted on clay soils (previous work had been done with late planting on loam soils). Randomized field scale two replicate tests were established at each location with seeding rates of 0.9, 1.2, 1.5, 1.8 and 2.1 million seeds/acre. Plots were established using a John Deere 1590 no-till drill, equipped with a population monitor to ensure seed rate accuracy. Plots were monitored for stand establishment, fall disease, winter survival, snow mould, spring growth and disease development. At harvest, yield, moisture, test weight, thousand kernel weight, and protein were all measured. Samples were also evaluated for Fusarium damaged kernel levels.

Results:

In all locations stand establishment was good. Plant counts represented seeding rates with reasonable accuracy. Fall disease was marginally higher in higher seeding rate strips on loam soils but differences were small. Winter survival was good to excellent at all sites with no difference in winter survival between seeding rates. Snow mould was present in St. Mary's and Lucan with results discussed below. Spring growth and disease ratings were similar within any location for all seeding rates. Test weight, thousand kernel weight, protein and fusarium damaged kernel levels were not impacted by seeding rate.

Results for early planted trials on loam soils are presented in Table 1. It is clear that high seeding rates planted earlier than normal reduce yield. At the St. Mary's location, snow mould was a significant issue in low lying areas of the field. The snow mould was significantly worse in the higher seeding rates and was nearly non-existent in the lowest seeding rate. This further adds credence to the recommendation to reduce seeding rates at early dates on loam soils. The exception to this trend was at the Ripley site. However, being much further north, the "early" planting date at Ripley was actually much closer to optimum

than early. Thus, the response to a seeding rate of 1.5 million has some explanation.

Table 1: Loam Soils Planted Early

	Million Seeds/Acre				
	0.9	1.2	1.5	1.8	2.1
	Yield				
St. Mary's	97.2	102.3	99.8	96.5	94.1
Foldens	93.4	101.2	97.0	97.0	94.7
Ripley	114.1	118.8	124.6	118.4	116.2
Lucan	97.1	103.3	101.2	98.1	94.1
AVG	**100.5**	**106.4**	**105.7**	**102.5**	**99.8**

Results from early planted clay sites in the Niagara peninsula are reported in Table 2. In this data set, there is no yield penalty to maintaining higher seeding rates. However, there is also no yield advantage. Thus the most economic seeding rate at early planting dates is the same for both the clay and loam soil types at 1.2 million seeds per acre. Given the challenges of plant establishment on clay soils, growers could not be challenged for maintaining seeding rates of 1.5 million even at early planting dates.

Table 2: Clay Soils Planted Early

	Million Seeds/Acre				
	0.9	1.2	1.5	1.8	2.1
	Yield Bu/Acre				
Clay 1	89.9	96.3	96.1	98.3	97.3
Clay 2	106.3	108.2	109.1	113.1	110.5
Clay 3	70.4	75.1	75.4	72.1	73.1
Avg	**88.9**	**93.2**	**93.5**	**94.5**	**93.6**

Table 3 shows the results of late planted wheat on clay soils. The yield penalty to reduced seeding rates on clay soils at later dates is significant. Growers need to maintain seeding rates of at least 1.8 million seeds per acre on these soil types at later planting dates.

Summary:

Normal seeding rates have been 1.5 million seeds/acre on loam soils and 1.8 million seeds/acre on clay soils. This trial shows that seeding rates of early planted winter wheat crops should be reduced by 20-25% on all soil types.

Most profitable seeding rates appeared to be 1.2 million seeds/acre at early dates regardless of soil type. However, yield penalties to higher seeding rates seen on loam soils did not occur on clay soils. Given the challenges of stand establishment on clay soils, maintaining seeding rates at 1.5 million seeds/acre even at early seeding dates is probably a good management hedge on heavy clay soils. On loam soils, 1.2 million seeds are quite sufficient.

Table 3: Clay Soils Planted Late

	Million Seeds/Acre				
	0.9	1.2	1.5	1.8	2.1
	Yield				
Clay late 1	80.7	80.3	85.4	96.0	94.3
Clay late 2	85.1	89.3	94.1	97.2	97.1
Avg	**82.9**	**84.8**	**89.8**	**96.6**	**95.7**

At later planting dates on clay soils it is imperative to maintain seeding rates at 1.8 million seeds/acre or slightly higher. Yield penalties from lower seeding rates are quite severe.

Next Steps:

This study should be repeated if possible at more locations and over more years.

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Project Contacts:

Peter Johnson
Email: peter.johnson@ontario.ca

Location of Project Final Report:

Peter Johnson