Row Width Effects on Winter Wheat

Purpose:

To evaluate the impacts of various row width configurations on the yield of wheat. There is interest in the opportunity to plant all crops with a planter unit, giving more accurate seeding rates and seed depth placement, eliminating the costs of drill ownership. Most planters will only narrow in to 15" rows, although certain makes can reduce to 10" rows. There has been some interest expressed in the concept of "modified relay intercropping" (MRI), a system where soybeans are seeded into standing wheat three to four weeks prior to harvest, using wider wheat row spacing to facilitate the soybean planting. There is interest in what impact wider wheat row spacing will have on red clover as well, which is addressed in another section of this report.

Methods:

At 8 locations during the fall of 2005, and 6 locations during the fall of 2006, two replicate randomized field length trials of 4 different row width configurations were established. Row width configurations included 7.5", "1 in 4" (1 row blocked, three rows on, or 75% of the rows on), "1 in 3" (1 row blocked, 2 rows on, or 67% of the rows on), and 15" (50% of the rows turned on). With the exception of two sites (2006 Shady, Thorndale), all sites were planted using a John Deere 1560 drill. In 2006 at the Shady and Thorndale locations the 7.5" rows were planted with a drill, while the 15" rows were planted with a planter. Populations were kept as equal as possible, using a population monitor to count seed drop, regardless of row width configuration. Clover was applied by the grower using the normal practice on that farm, in the spring following planting. Nitrogen rates were maintained at full rate across the trials. Weed control was applied as needed, or as per the farms normal practice. Fungicides were applied as per the normal practice for that cooperator. Fields were monitored for disease, weed pressure, and head counts throughout the growing season. Yields, moisture, test weight, thousand kernel weight and protein measurements were taken from the wheat at harvest. Clover stand counts were taken one month after harvest.

Results:

2006 yield results are shown in Table 1 below, with the 2007 data presented in Table 2. Cumulative data is shown in Table 3 and Table 4. Yield data was lost at the Woodstock 2 site in 2006, resulting in data from 13 sites over the two years being reported.

Yields definitely decrease as row configurations move wider, away from the standard 7.5" row width. It is interesting to note that two of the latest planted sites (Woodstock 2006, Oxford 2007), which had very little fall growth and no fall tillering, showed the least effect of row widths. Whether this is an impact of spring tillering, less impact of plant to plant competition, low yield potential, or just a random effect, is unclear.

There is a trend to slightly higher protein levels as row widths increase, which is likely due to lower yields and less protein dilution. Test weights and thousand kernel weights did not change with row width. Disease levels decreased slightly with increased row widths, but the reduction was small and would rarely impact the need for disease control. Weed pressure was noticeably higher in the wider row configurations, indicating that weed control would be a necessary part of any wider row production system.

This data shows that any deviation from the standard row width of 7.5 inches results in yield loss. Yield loss ranges from 5.5% with the least rows removed (1 in 4), to 8.3% at the 15 inch configuration, on average. Growers considering MRI would need to consider at least a 5.5% wheat yield reduction. The subsequent soybean crop would need to compensate for this loss, an economic impact of $20 to $25 per acre, requiring an additional 3 bu ac of soybean production. This economic impact all but rules out wider rows for better clover establishment, as even if clover establishment improves from nothing to a full stand, the yield loss negates the nitrogen value of the clover crop.

The exception to these conclusions may be in late planted or low yield situations. There may be some opportunity for further investigation under specific conditions.

Table 1: Individual Data 2006 Row Widths

Co-operator	7.5"	1 in 4 (75%)	1 in3 (67%)	15" (50%)
Woodham	98.4	84.5	82.4	74.8
Woodstock	69.7	69.5	70.6	69.1
Lucan	97.0	95.9	93.7	93.1
Perth	72.8	72.0	68.3	62.7
Elgin	97.3			95.2
Shady	104.5			106.8
Thorndale	112.8			106.2

Table 2: Individual Data 2007 Row Widths

Cooperator	7.5"	1 in 4 (75%)	1 in 3 (67%)	15" (50%)
Huron	71.7	62.8	62.7	61.7
Lucan	103.9	99.6	95.1	90.5
Oxford	69.2	70.0	66.4	68.1
Blyth	76.6	68.9	71.4	63.1
Elgin	76.1			71.7
Thorndale	109.1			100.5

Table 3: 2 Year Data Summary All Row Widths

	7.5"	1 in 4	1 in 3	15"
2006 4 plots	84.5	80.5	78.8	74.9
2007 4 plots	80.4	75.3	73.9	70.9
Avg 8 plots	82.4	77.9	76.4	72.9

Table 4: 2 Year Data 15 Versus 7.5

	7.5"	15"
2006 7 plots	93.2	86.8
2007 6 plots	84.4	75.9
Avg 13 plots	88.8	81.4

Summary:

Widening row widths reduced wheat yields by 5 to 8% on average. Protein increased slightly, with thousand kernel weight and test weight unaffected. Disease pressure decreased marginally, but weed pressure increased, showing that weed control would be an integral part of any wider row production system. The impact of these results all but eliminate the potential for wider row widths to aid in clover establishment, and add to the soybean yield that would be required to justify any modified relay intercropping system.

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Location of Project Final Report:

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