Proline® Fungicide in Spring Wheat – Field Scale Trials

Purpose:

To evaluate the impact of Proline® fungicide on spring wheat yield and grain quality.

Methods:

Project co-operators were asked to apply Proline® fungicide to a block in a field planted to a single wheat variety. The fungicide was applied between when at least 75% of the wheat heads on the main stem were fully emerged, to when 50% of the heads on the main stem were in flower. At harvest, weights and grain samples were taken from both sides of the treated and untreated blocks as representative replicates.

Results:

Figure 1 – Cumulative Precipitation at the Ottawa Weather Station for 2009 compared to 1971 to 2000 shows more precipitation than the long term average, particularly during the critical fusarium head blight disease period of flowering for spring wheat (June 25th to July 10th).

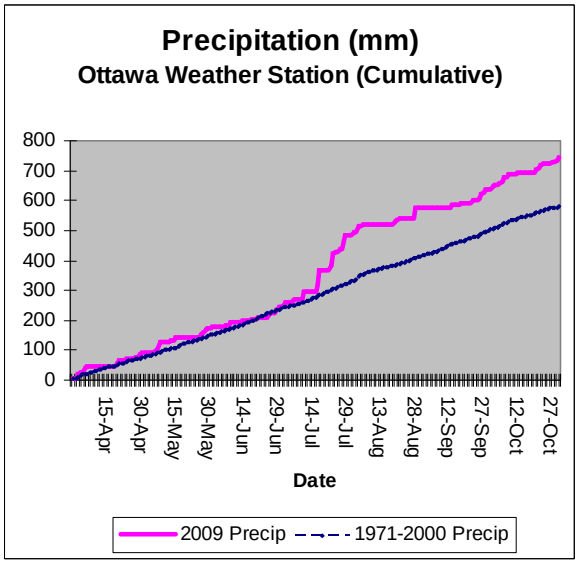

Figure 2 – Daily Maximum and Minimum Temperatures (ºC) at the Ottawa Weather Station from June 20th to July 20th, 2009. This graph shows temperatures were moderate with no extremely hot (above 30 ºC) days or cool nights (below 10 ºC).

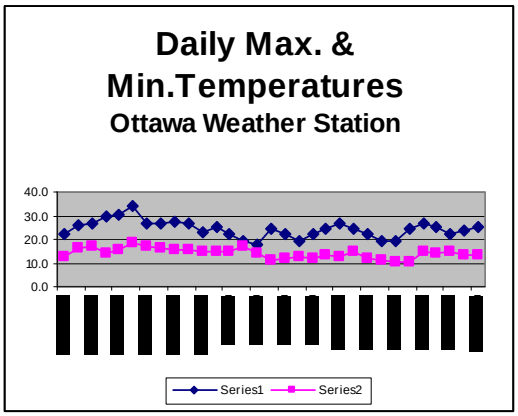

Table 1: Yield & Fusarium Damaged Kernels (FDK) of Treated and Untreated strips of Proline® in 2009 Spring Wheat

Variety	Yield @14.5% (bu/ac) Treated	Yield @14.5% (bu/ac) Untreated	Difference		FDK (%) Treated	FDK (%) Untreated	Difference
Orleans	64.4	53.3	11.1		11.9	18.5	-6.6
Orleans	62.4	54.4	8.0				0.0
Sable	77.8	70.2	7.6		5.3	4.5	0.8
Sable	64.5	63.3	1.2		0.8	5.3	-4.6
Sable	78.3	74.7	3.6		5.4	7.9	-2.5
Sable	79.0	81.9	-2.8		1.8	6.6	-4.8
Sable	66.9	61.3	5.6		8.3	3.7	4.7
Sable	66.8	59.5	7.3		8.9	14.4	-5.6
Sable	68.5	59.9	8.6		7.0	14.5	-7.4
Sable	64.9	60.3	4.6		3.6	6.4	-2.8
Sable	74.7	76.6	-1.9		1.0	2.1	-1.1
AC Brio	70.7	56.5	14.2		1.1	2.7	-1.6
Sable	66.9	57.6	9.3		3.3	1.7	1.6
Sable	83.1	79.9	3.2		2.2	1.6	0.6
Sable	75.2	80.8	-5.6		1.3	4.3	-3.0
Sable	84.3	78.6	5.7		1.0	2.8	-1.8
Sable	81.7	80.2	1.5		0.6	3.3	-2.7
Sable	83.4	77.7	5.7		5.0	5.0	0.0
Sable	80.8	73.2	7.6		1.8	1.5	0.3
Sable	83.6	83.6	0.0		4.5	7.4	-2.9
Sable	84.9	80.7	4.2		7.1	9.0	-1.9
Sable	76.3	70.5	5.8		7.5	10.7	-3.2
Sable	80.6	71.6	9.0		7.8	13.7	-5.9
Sable	68.7	61.4	7.3		0.9	4.7	-3.8
Sable	72.9	71.3	1.6		1.3	2.8	-1.5
Sable	69.3	66.5	2.8		1.0	3.0	-2.0
Sable	69.9	69.1	0.8		1.6	4.3	-2.7
Sable	73.7	69.1	4.6		3.2	4.3	-1.1
Average	**74.1**	**69.4**	**4.7**		**3.9**	**6.2**	**-2.2**
Increase			**6.7%**		**Reduction**		**-35.6%**

Table 2: DON (toxin) of Treated and Untreated trips of Proline® in 2009 Spring Wheat

Variety	DON (ppm) Treated	DON (ppm) Untreated	Difference
Orleans	6.0	6.0	0.0
Orleans	6.0	6.0	0.0
Sable	3.1	4.3	-1.2
Sable	1.4	3.5	-2.1
Sable	2.0	2.7	-0.7
Sable	2.3	3.3	-1.1
Sable	5.2	4.4	0.8
Sable	6.0	6.0	0.0
Sable	6.0	6.0	0.0
Sable	5.5	5.5	0.0
Sable	0.5	2.0	-1.5
AC Brio	0.9	1.6	-0.7
Sable	0.6	0.6	0.0
Sable	1.1	0.5	0.6
Sable	0.6	1.9	-1.3
Sable	0.6	0.9	-0.3
Sable	0.5	1.4	-0.9
Sable	2.1	4.0	-1.9
Sable	1.1	0.5	0.6
Sable	1.1	1.8	-0.7
Sable	3.3	6.0	-2.7
Sable	6.0	6.0	0.0
Sable	6.0	6.0	0.0
Sable	0.5	1.3	-0.8
Sable	1.1	2.0	-0.9
Sable	0.6	1.2	-0.6
Sable	1.1	1.9	-0.8
Sable	1.7	1.9	-0.2
Average	**2.6**	**3.2**	**-0.6**
Reduction			**-18.4%**

Table 3: Average Yield, Fusarium Damaged Kernels (FDK) and DON (toxin) of Treated and Untreated strips of Proline® in 2009 Spring Wheat Summary

Yield @14.5% (bu/ac) Difference	FDK (%) Difference	DON (ppm) Difference
+4.7	**-2.2**	**-0.6**
+6.7%	**-35.6%**	**-18.4%**

Table 4: Average Yield, Fusarium Damaged Kernels (FDK) and DON (toxin) of Treated and Untreated strips of Proline® in 2008 Spring Wheat Summary

Yield @14.5% (bu/ac) Difference	FDK (%) Difference	DON (ppm) Difference
+7.7	**-3.5**	**-0.7**
+13.9%	**-29.0%**	**-13.3%**

Picture 1 – Pink and white Fusarium mould & Fusarium Damaged Kernels in Spring Wheat grain head.

Picture 2 - Note the darker (more disease pressure) wheat straw of the untreated vs treated strip.

Summary:

2009 received above normal rainfall at the end of June, throughout July, and early August which favoured leaf disease growth and Fusarium Head Blight (FHB). Figure 1 shows the cumulative precipitation at the Ottawa Weather Station for 2009 compared to the long term average from 1971 to 2000. This shows that the area received more precipitation than the long term average, particularly during the critical period of FHB disease development of flowering for spring wheat (June 25th to July 10th). Figure 2 shows the Daily Maximum and Minimum Temperatures (ºC) at the Ottawa Weather Station from June 20th to July 20th, 2009. This graph shows that temperatures were moderate, meaning there were no extreme hot (above 30 ºC) days or cool nights (below 10 ºC), thus favourable temperatures during the critical period of FHB disease development of flowering for spring wheat. The weather in 2009 was similar to the conditions in 2008, which was also a year of high FHB.

Table 1 gives the Yield & Fusarium Damaged Kernels (FDK) of strips treated with Proline® fungicide compared to untreated strips from the on-farm trials in eastern Ontario on 2009 Spring Wheat. There was a yield increase of 4.7 bushels per acre (bu/ac) or 6.7% on average where Proline® fungicide was applied, as compared to the untreated strips. In the grain samples, the amount of FDK was lowered by 2.2 percentage points or 35.6% in the Proline® fungicide strips, as compared to the untreated strips in spring wheat in 2009. The DON or toxin levels were about 0.6 ppm or 18.4% lower on average from the Proline® fungicide strips, as compared to the untreated strips in 2009.

Comparing the results in Table 3 – 2009 and Table 4 – 2008, Proline® fungicide gave a higher yield in 2008, but similar FDK and DON reductions. Note in 2008, there was a lower number of comparison of only 11 as compared to 28 side-by-side on-farm strips in 2009.

At the current food grade market price of approximately $5.00 per bushel, a yield advantage of 4.7 bu/ac would generate an additional $23.50 per acre. The cost of Proline® including application is approximately $36.00 per acre. In addition to the product and application cost, is the lost wheat yield due to trampling. On a 90 foot sprayer, trampling is about 2.6%. Using the average yield of 74 bu/ac, the trampling cost is about 1.9 bu/ac or $9.63 per acre (at $5.00 per bushel).

Comparing the FDK level, therefore grade, from the grain samples of the Proline® fungicide treated strip to the untreated strip of the 28 side-by-side on-farm strips in 2009, about 1/3 (9) of the grain samples were improved enough to make food grade (grade 3 or better). It should be noted that in 5 samples the FDK was higher in the treated than the untreated. This would be explained as due to sample variability, but could mean that only 4 of the 28 comparisons had valid made a difference in improving the wheat grain grade to food grade from feed grade.

However, as an addition, it should be noted that the DON levels were low in many of the samples, and would be acceptable to many millers, even though the FDK was above the 1 or 1 ½ %. This would give growers an advantage who have the ability to store and deliver directly to millers.

Next Steps:

Proline® fungicide is still a relatively new product available to spring wheat growers and we have only had two years experience with this product. There is also the possibility of a new fungicide called Prosaro that may be on the market for 2010. The plan is to continue a similar project for 2010 with Proline® and Prosaro if the product is available.

Acknowledgements:

Thank you to the co-operators for their time, effort and inconvenience on this project. Thank you also to the local agri-business for their involvement in this project, Mackenzie Denyes, OMAFRA Summer Technician and Patti Arts, Client Service Representative, Kemptville OMAFRA. This project was supported by the Ottawa Valley Seed Growers Association.

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Location of Project Final Report: