

## Nitrogen Rates on Hard Red Winter & Spring Wheat

### Purpose:

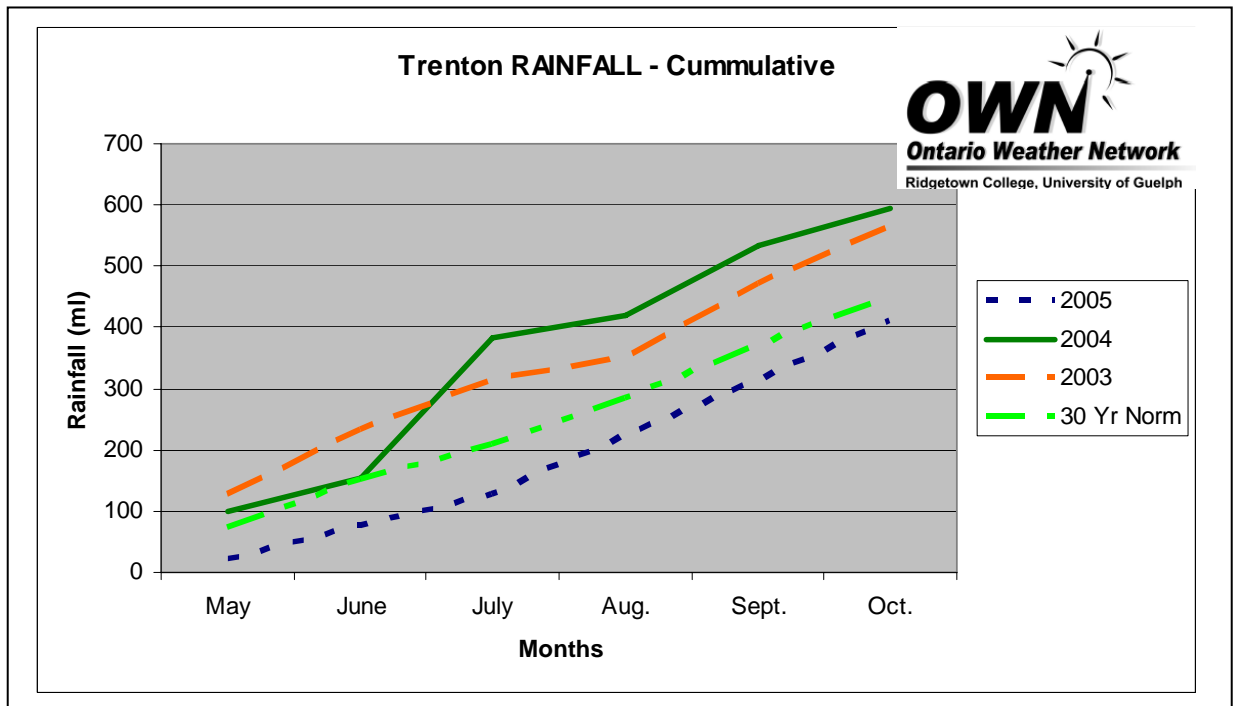
To determine the optimum Nitrogen rates in Hard Red Winter Wheat (HRWW) and Hard Red Spring Wheat (HRSW) for 1) Yield and 2) Protein. With the new higher yielding varieties, the current nitrogen rates may not be optimizing yield and /or achieving the protein level required obtaining the full protein premium.

### Methods:

The comparison of 4 rates of nitrogen. The nitrogen rates to be applied on the HRWW were 0, 90, 120 & 150 lbs/ac (0, 100, 134, 168 kg/ha). The nitrogen rates to be applied on the HRSW were 0, 60, 90 & 120 lbs/ac (0, 67, 100, 134 kg/ha). Each plot was to have 2 replications. The project was to be run over 3 years; 2003, 2004 & 2005. Gross Revenue (\$) per acre for HRWW is at \$160 per tonne and for HRSW is at \$170 per tonne. The protein premium is based on the current protein premium schedule published by the Ontario Wheat Producers Marketing Board. The cost of nitrogen was \$420 per tonne for urea.

### Results:

Figure 1: Cumulative Rainfall at Trenton in 2003, 2004, & 2005 and 30 Year Normal



Crop Advances: OMAFRA Field Crop Project Reports

**Table 1: 2003 & 2004 Nitrogen Rates on Hard Red Winter Wheat**

Cooperator Location	Nitrogen Rate lb/ac (kg/ha)	Protein (%)	Yield @14.5%		\$ Gross /ac	Protein Premium (\$/ac)	Cost of N	Net \$
			bu/ac	t/ha				
Napanee-04	0	11.2	41.1	2.8	\$179	\$8	\$0	\$187
Napanee-04	90 (100)	11.4	75.8	5.1	\$330	\$19	\$41	\$308
Napanee-04	120 (134)	12.3	85.8	5.8	\$374	\$35	\$54	\$354
Napanee-04	150 (168)	12.9	91.4	6.1	\$398	\$37	\$68	\$367
Warkworth - L - 03	0	11.4	50.0	3.4	\$218	\$12	\$0	\$230
Warkworth - L - 03	70 (78)	12.6	60.4	4.1	\$263	\$25	\$32	\$256
Warkworth - L - 03	100 (112)	12.6	65.3	4.4	\$284	\$27	\$45	\$265
Warkworth - L - 03	130 (146)	12.7	73.0	4.9	\$318	\$30	\$59	\$289
Warkworth - G - 03	0	11.6	61.0	4.1	\$266	\$18	\$0	\$284
Warkworth - G - 03	40 (45)	11.9	67.0	4.5	\$292	\$26	\$18	\$299
Warkworth - G - 03	70 (78)	12.1	73.0	4.9	\$318	\$30	\$32	\$316
Warkworth - G - 03	100 (112)	12.6	82.0	5.5	\$357	\$33	\$45	\$345
Picton - 04	0	9.9	49.4	3.3	\$215	\$0	\$0	\$215
Picton - 04	80 (90)	10.5	84.6	5.7	\$368	\$0	\$36	\$332
Picton - 04	90 (100)	10.3	90.0	6.0	\$392	\$0	\$41	\$351
Picton - 04	120 (134)	10.6	97.5	6.6	\$425	\$0	\$54	\$370
Picton - 04	150 (168)	10.6	101.0	6.8	\$440	\$0	\$68	\$372

**Table 2: 2003- 2005 Nitrogen Rates on Hard Red Spring Wheat**

Cooperator Location	Nitrogen Rate lb/ac (kg/ha)	Protein (%)	Yield @14.5%		\$ Gross/ac	Protein Premium (\$/ac)	Cost of N	Net \$
			bu/ac	t/ha				
Warkworth - 03	0	n/a	27.0	1.8	\$125	n/a	\$0	\$125
Warkworth - 03	40 (45)	n/a	32.0	2.2	\$148	n/a	\$18	\$131
Warkworth - 03	70 (78)	n/a	38.0	2.6	\$176	n/a	\$32	\$146
Warkworth - 03	100 (112)	n/a	46.0	3.1	\$213	n/a	\$45	\$171
Napanee - 04	0	12.6	44.9	3.0	\$195	\$22	\$0	\$217
Napanee - 04	50 (57)	13.2	57.8	3.9	\$252	\$28	\$23	\$257
Napanee - 04	74 (83)	13.3	63.6	4.3	\$277	\$31	\$33	\$275
Napanee - 04	97 (109)	13.6	66.8	4.5	\$291	\$33	\$44	\$280
Napanee - 05	0	16.0	44.6	3.0	\$207	\$22	\$0	\$228
Napanee - 05	60 (67)	16.1	46.5	3.1	\$215	\$23	\$27	\$211
Napanee - 05	90 (100)	16.5	46.0	3.1	\$213	\$23	\$41	\$195
Napanee - 05	120 (134)	16.4	43.4	2.9	\$201	\$0	\$27	\$73

**Summary:**

**HRWW** - Both 2003 and 2004 had more rainfall than the 30 year normal rainfall for the area. 2005 received below normal rainfall. Nitrogen trials on HRWW results are available for only 2003 and 2004. On the HRWW, the results would indicate that 120-150 lbs/ac (134-168 kg/ha) of actual nitrogen for HRWW was the most economical. Increasing the nitrogen rate did not always increase the level of protein in the grain enough to optimize the protein premiums. Unfortunately there were no trial results in 2005 where we would expect lower nitrogen rates to be more economical (see Table1).

**HRSW** – In 2003, the 110 kg/ha (100lbs/ac) (see Table 2) rate netted the greatest dollar return per acre (note this site was not replicated). In both the 2004 and 2005 Napanee sites, red clover was the previous crop. In 2004 (Table 2, Napanee - 04) the red clover was sprayed off late the previous fall and soil nitrate test in the spring taken at planting picked up very little available nitrogen in the soil. This may in part explain the response to higher levels of nitrogen. In 2005, there was no economical response to any applied nitrogen (Table 2, Napanee – 05 site). This lack of yield response in 2005 can be explained by the nitrogen credit from the previous red clover stand of 100kg/ha (89 lbs/ac) to the wheat crop. In similar trials, the most economical nitrogen rate has been 100 kg/ha (90 lbs/ac).

**Next Steps:**

Further trials are needed which would include more years and the upper nitrogen rate (ie. 150 lb/ac, 168 kg/ha)) are required to determine a more accurate nitrogen rate recommendation.

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