

## Does Herbicide Tolerance Mean Higher Yielding Hybrids?

### Purpose:

It is often implied that by growing a herbicide tolerant corn hybrid, yields will be greater due to effective weed control and increased crop safety when using the “system” herbicide instead of a conventional one. However, if excellent weed control can be achieved using a conventional herbicide program will a “herbicide tolerant” hybrid be put at a yield disadvantage when treated with a conventional herbicide program due to the implied increased risk of crop injury? Experiments were conducted at the Huron Park, Ridgeway and Woodstock Research Stations in 2003 and 2004 to see what impact herbicide treatments had on the growth, maturity and yield of 3 different Roundup Ready and Liberty Link corn hybrids.

### Methods:

A split plot design was used with hybrids being the main plots and herbicide treatments being the split plots. Hybrids included 3 “Roundup Ready” and “3 Liberty-Link” cultivars.

### Herbicide treatments:

- 1) Atrazine\* plus glyphosate or Liberty
- 2) Atrazine\* plus Dual II Magnum plus Banvel
- 3) Atrazine\* plus Dual II Magnum plus Callisto
- 4) Atrazine\* plus Prowl
- 5) Atrazine\* plus Distinct plus Accent
- 6) Atrazine\* + no herbicide

\* indicates blanket treatment of atrazine for residual control of weeds to aid in keeping all treatments weed-free.

### Measurements:

Assessments were taken for Plant Population, Leaf stage and plant height on June 20, Leaf chlorophyll concentrations on June 20, Days to 50% Silk Emergence, Final Grain Yield, Moisture and % Broken Stalks.

### Notes:

- 1) All plots were to be maintained weed-free throughout the growing season.
- 2) As indicated, all plot areas were treated with a pre-emergence treatment of atrazine.
- 3) RR and LL hybrid blocks were treated as two separate, parallel experiments.

### Results:

Of all the measurements taken, only grain yield will be presented as it is has the greatest economic significance. Results from the 5 “Roundup Ready” trials and the 4 “Liberty-Link” trials conducted over 2 growing seasons were pooled by herbicide tolerance trait since a “proc mixed” analysis in SAS indicated that there was no significant year affect ( $\infty = 0.10$ ). The pooled results showed that the various herbicide treatments had no significant impact on grain yield ( $\infty = 0.10$ ), and that any slight differences in yield could be attributed to normal variability within the field (See Tables 1 & 2).

**Table 1. Summary of Grain Yield for three "Roundup Ready" hybrids treated with six different herbicide treatments in 5 trials conducted at the Huron Park, Ridgeway and Woodstock Research Stations between 2003 and 2004.**

Crop Advances: OMAFRA Field Crop Project Reports

TREATMENT	Grain Yield – t/ha (bu/ac)		
	DKC 42-71	Pioneer 3870	Hyland 234RR
Weed-free control	11.27 (174)	11.40 (176)	11.27 (174)
glyphosate + glyphosate (weed-free)	11.27 (174)	11.66 (180)	10.82 (167)
Dual II Magnum + Banvel II (weed-free)	10.82 (167)	11.34 (175)	10.75 (166)
Dual II Magnum + Callisto (weed-free)	11.14 (172)	11.53 (178)	11.14 (172)
Prowl (weed-free)	11.14 (172)	11.85 (183)	11.14 (172)
Accent Total (weed-free)	11.34 (175)	11.53 (178)	11.14 (172)

**Table 2. Summary of Grain Yield for three "Liberty Link" hybrids treated with six different herbicide treatments in 4 trials conducted at the Ridgetown and Woodstock Research Stations between 2003 and 2004.**

TREATMENT	Grain Yield (bu/ac)		
	NK 3030BT	NK N27M3	Pioneer 37H27
Weed-free control	9.65 (149)	9.13 (141)	10.17 (157)
Liberty + Liberty (weed-free)	9.65 (149)	9.39 (145)	9.91 (153)
Dual II Magnum + Banvel II (weed-free)	9.59 (148)	9.20 (142)	10.11 (156)
Dual II Magnum + Callisto (weed-free)	9.78 (151)	9.20 (142)	9.72 (150)
Prowl (weed-free)	9.98 (154)	9.20 (142)	9.52 (147)
Accent Total (weed-free)	9.78 (151)	9.33 (144)	9.85 (152)

**Summary:**

Under typical environmental conditions and excellent weed control, herbicide selection had no impact on grain yield. Therefore, herbicide tolerant hybrids treated with a conventional herbicide program would not be put at a disadvantage in corn hybrid performance trials provided that excellent weed control is achieved and significant crop injury from spraying under adverse weather conditions is avoided.

**Next Steps:**

Results have been communicated to the Ontario Corn Committee for consideration when designing their corn performance trials.

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