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## Manitoba Field Survey of Herbicide-Resistant Weeds

H. J. Beckie<sup>1</sup>, J. Y. Leeson<sup>1</sup>, A. G. Thomas<sup>1</sup>, T. Andrews<sup>2</sup>, K. R. Brown<sup>2</sup>, and R. C. Van Acker<sup>3</sup>

<sup>1</sup>Agriculture and Agri-Food Canada, Saskatoon, SK; <sup>2</sup>Manitoba Agriculture, Food and Rural Initiatives, Carman, MB; <sup>3</sup>University of Manitoba, Winnipeg, MB

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**Key words:** Herbicide resistance, green foxtail, redroot pigweed, wild oat

### Abstract

In 2002, 150 fields were randomly selected throughout the ecoregions of Manitoba and surveyed for grass and broadleaf weeds resistant to Group 1 (ACCase inhibitor) or Group 2 (ALS inhibitor) herbicides. One-third of surveyed fields had a herbicide-resistant weed biotype. Two biotypes new to western Canada are Group 2-resistant green foxtail and redroot pigweed. Of producers with resistant biotypes, 10% or fewer were aware of their occurrence.

### Introduction

A comprehensive field survey of herbicide-resistant grass and broadleaf weeds had not been conducted in Manitoba. In 2002, 150 fields were randomly selected throughout the ecoregions of Manitoba and surveyed for grass and broadleaf weeds resistant to Group 1 (ACCase inhibitor) or Group 2 (ALS inhibitor) herbicides (Beckie et al. 2004).

### Materials and Methods

All residual weed species with mature seeds were mapped and sampled before harvest. Selected fields were cropped to cereals or oilseeds. Samples of 17 weed species (six grass and 11 broadleaf) were subsequently screened in the greenhouse with high-risk herbicides belonging to Groups 1 and 2. Herbicide group use in Manitoba was obtained from management questionnaires (236 and 386 producers in 1997 and 2002 general weed surveys, respectively). Producers provided information on herbicide use, herbicide group rotation, and resistance awareness and impact by means of a questionnaire.

### Results and Discussion

Group 1 herbicide use declined from about 60% of cropped area between 1992 and 1997 to 38% by 2002 – perhaps due to increasing resistance or awareness of herbicide rotation, or changing cropping systems and practices (e.g., HT canola) (Figure 1). However, Group 2 herbicides were applied to one-third or more of land annually from 1992 to 2002.

One-third of surveyed fields had a herbicide-resistant weed biotype (Figures 2-7). Of 84 fields where wild oat were collected, 40% had Group 1 resistance (22% of all fields surveyed) and 13% had Group 2 resistance (7% of fields surveyed). Most Group 1-resistant wild oat populations

exhibited resistance to both aryloxyphenoxypropionate (“fop”) and cyclohexanedione (“dim”) herbicides. Group 2-resistant populations exhibited broad cross resistance across three classes of Group 2 herbicides. Of 59 fields where green foxtail seeds were collected, 22% had Group 1 resistance (9% of fields surveyed). Group 2 resistance was confirmed in one population - the first case in western Canada. Of 11 broadleaf weed species, Group 2 resistance was detected only in redroot pigweed in one field in the Aspen Parkland ecoregion. Similar to green foxtail, Group 2 resistance in this species had not been reported previously in western Canada.

Although 91% of producers who completed a management questionnaire in 2002 practiced herbicide group rotation, the application of Group 1 or 2 herbicides in about 40% of fields that year indicates that the use of these products is still resulting in high selection pressure for resistance.

Only 10% of producers with resistant wild oat previously suspected or were aware of their occurrence; no producers with resistant green foxtail suspected resistance. This low level of awareness was consistent with findings from previous surveys, and may be partly attributed to the relatively small infestation area of resistant biotypes in most fields. In 2002, only 14% of producers believed that resistance had a significant impact on their farm. In the next five years, 36% producers expected herbicide resistance to pose a moderate or high impact on their farm.

## **Acknowledgments**

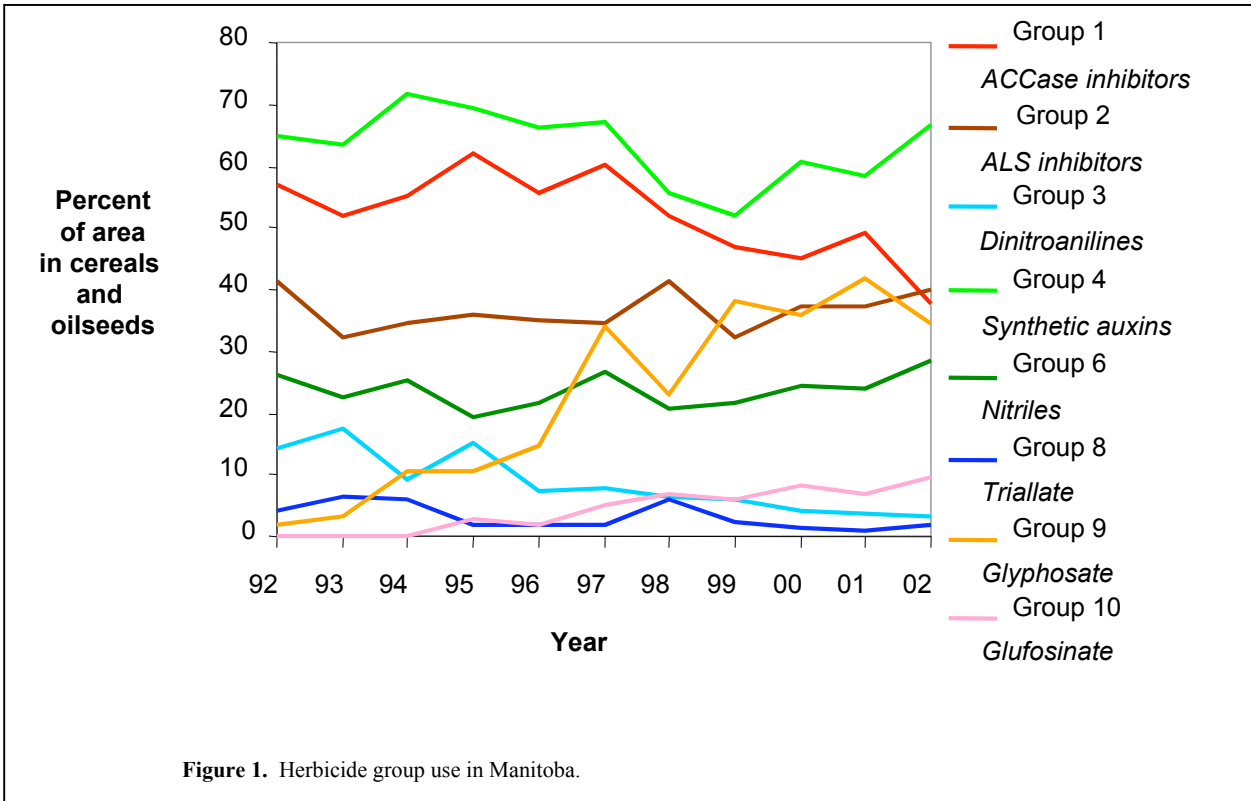
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- Monsanto Canada Inc.
- Nufarm Agriculture Inc.
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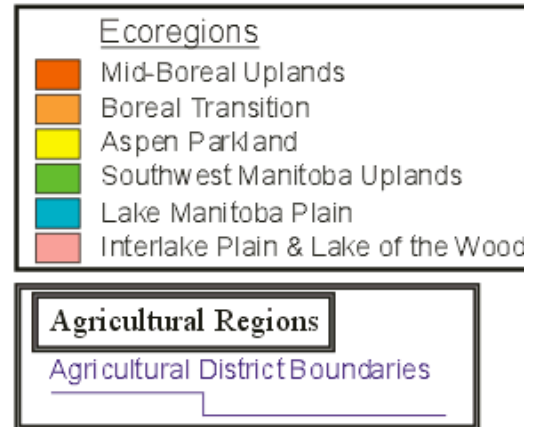
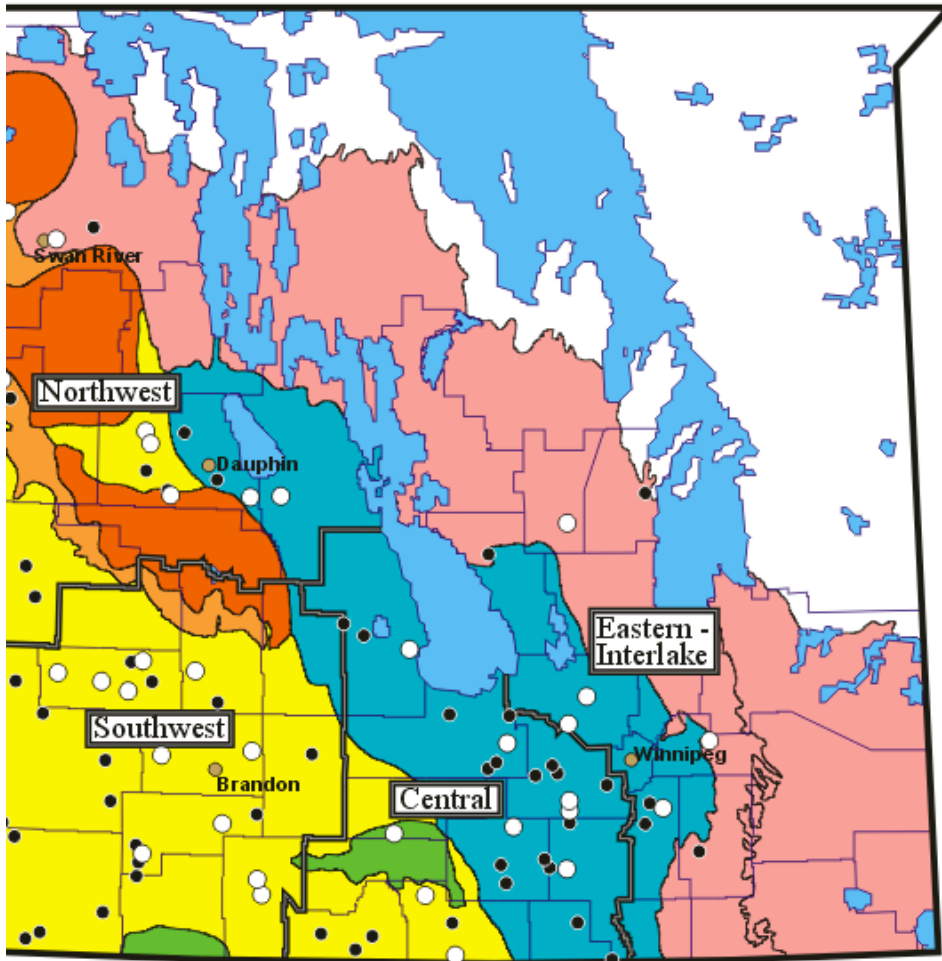
Special thanks are extended to the 150 producers who participated in this survey.

**Beckie, H. J., J. Y. Leeson, A. G. Thomas, T. Andrews, K. R. Brown, and R. C. Van Acker. 2004.** Manitoba Weed Survey of Herbicide-Resistant Weeds in 2002. Weed Survey Series Publ, 04-2, Agriculture and Agri-Food Canada, Saskatoon, SK. 64 p.



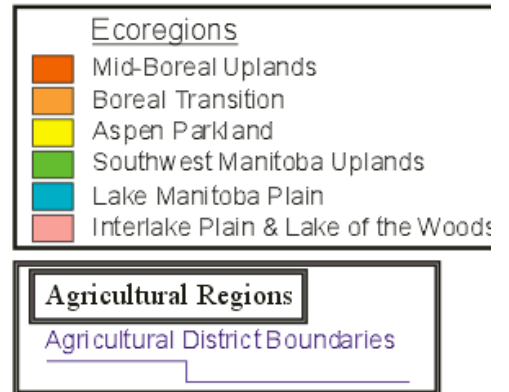
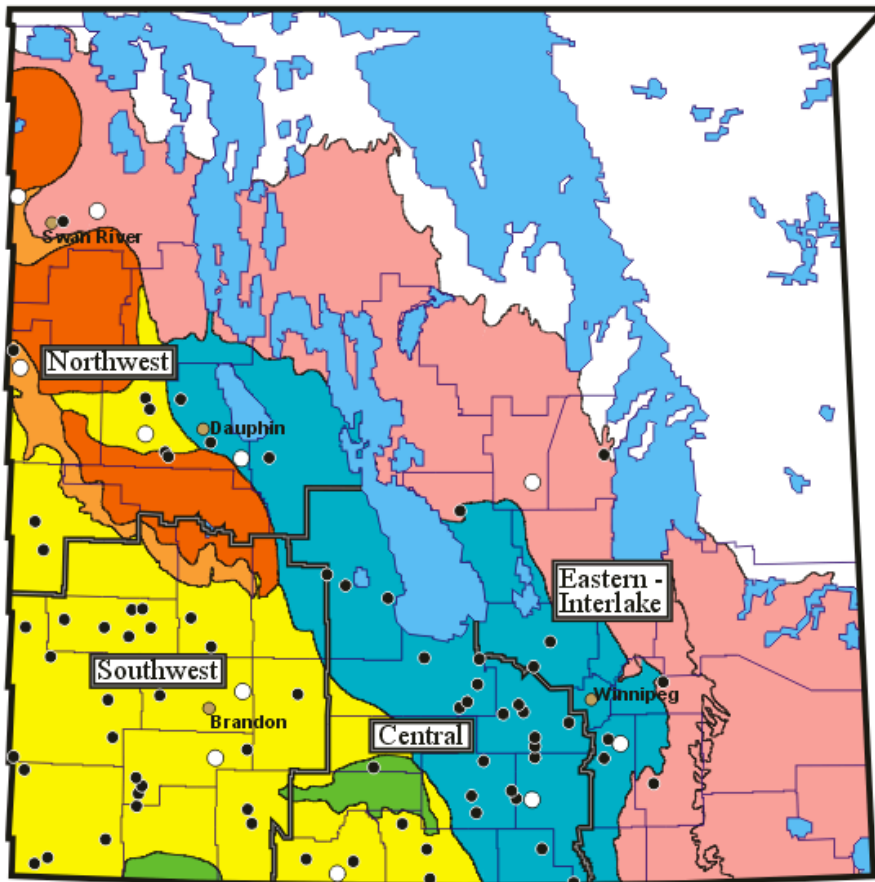
# Gp 1-resistant wild oat

Resistant ○ Not resistant •



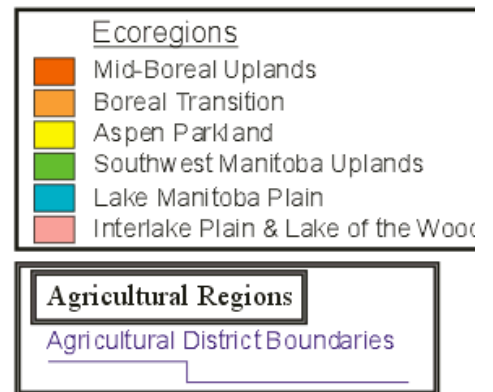
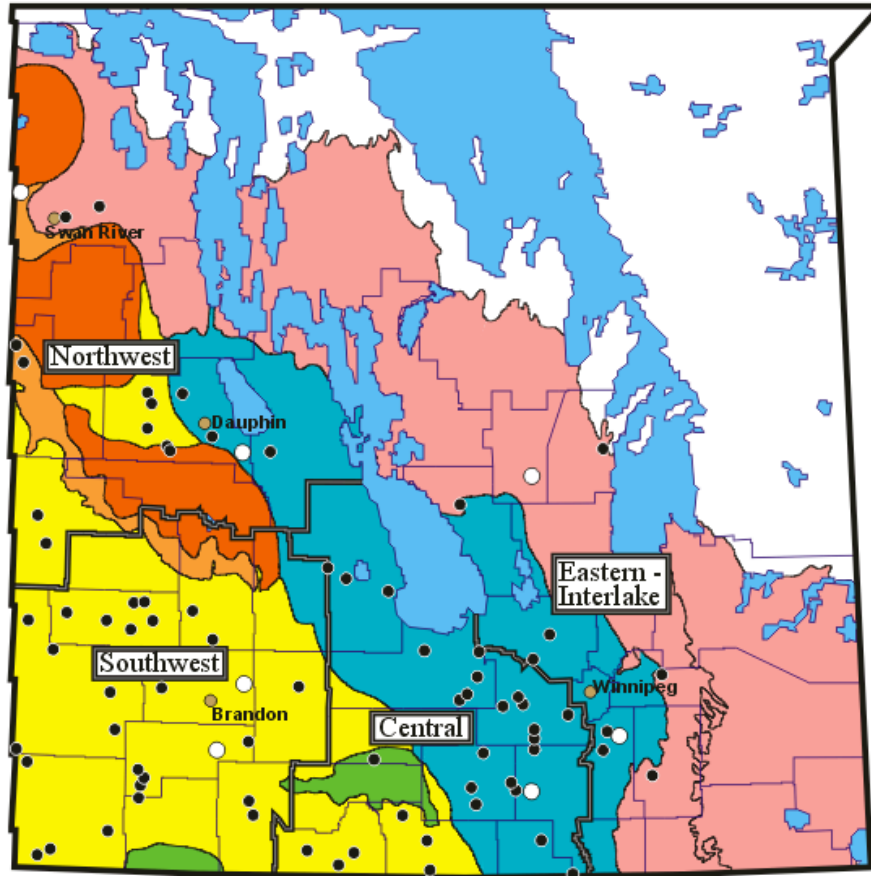
# Gp 2-resistant wild oat

Resistant ○ Not resistant ●



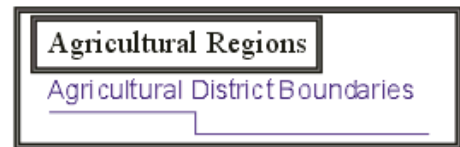
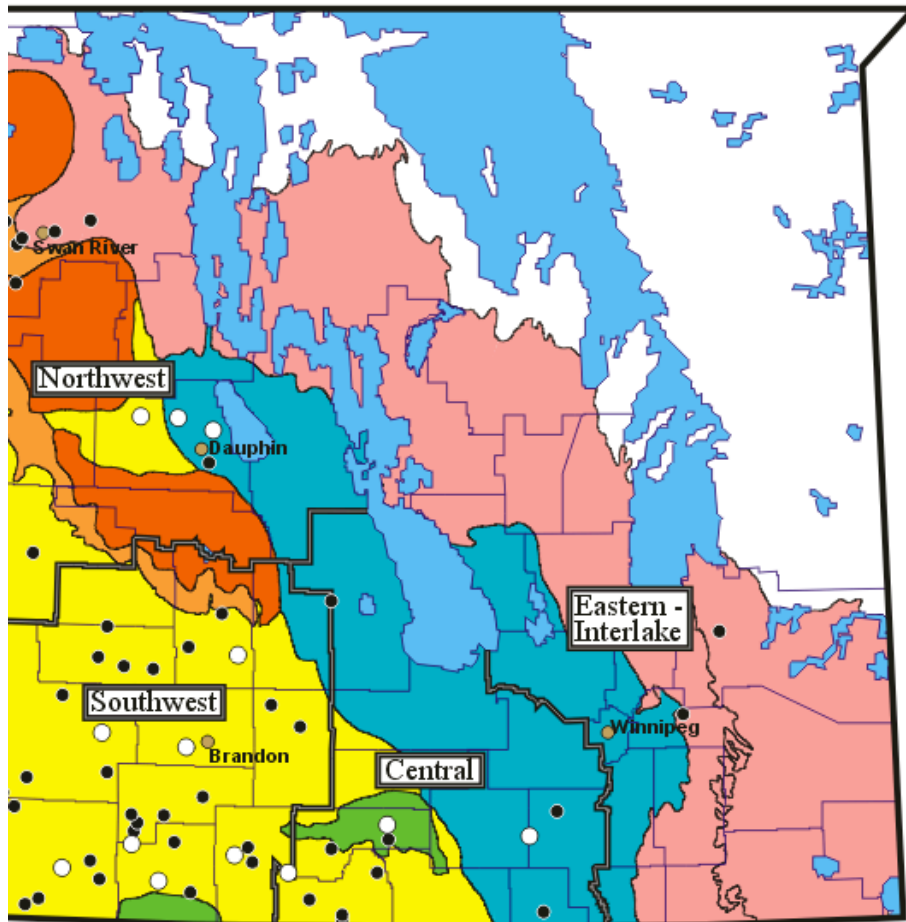
# Gp 1- and 2-resistant wild oat

Resistant ○ Not resistant •



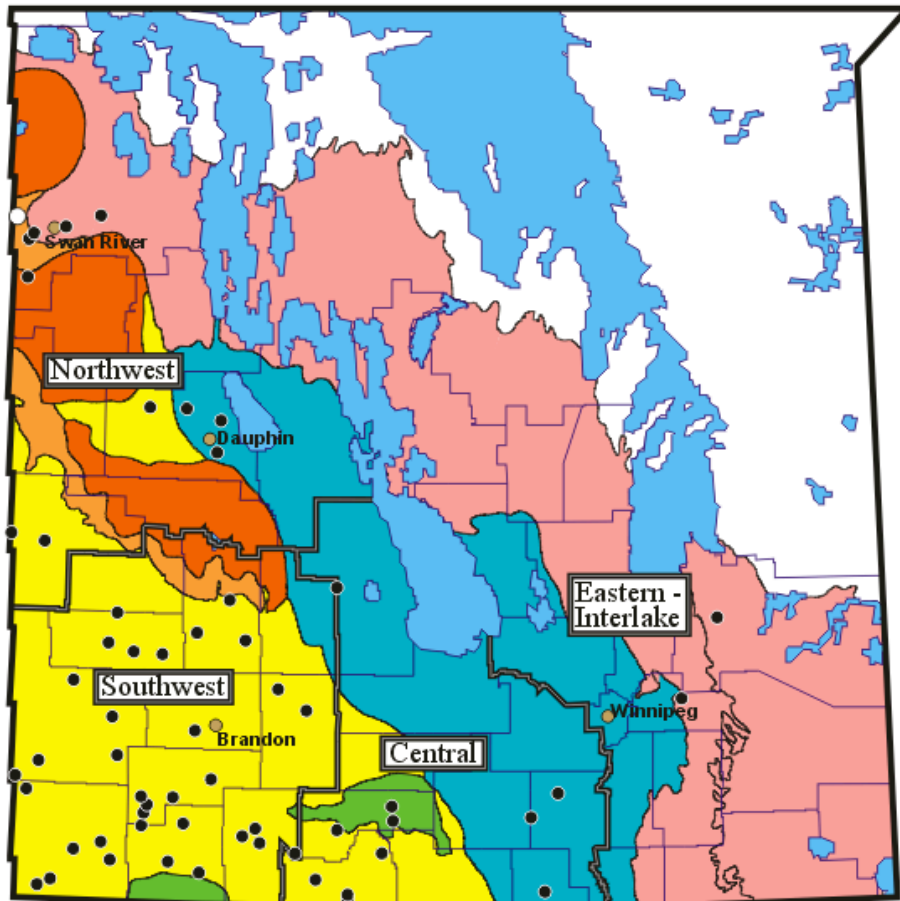
# Gp 1-resistant green foxtail

Resistant ○ Not resistant ●



# Gp 2-resistant green foxtail

Resistant ○ Not resistant •



**Ecoregions**

- Mid-Boreal Uplands
- Boreal Transition
- Aspen Parkland
- Southwest Manitoba Uplands
- Lake Manitoba Plain
- Interlake Plain & Lake of the Woods

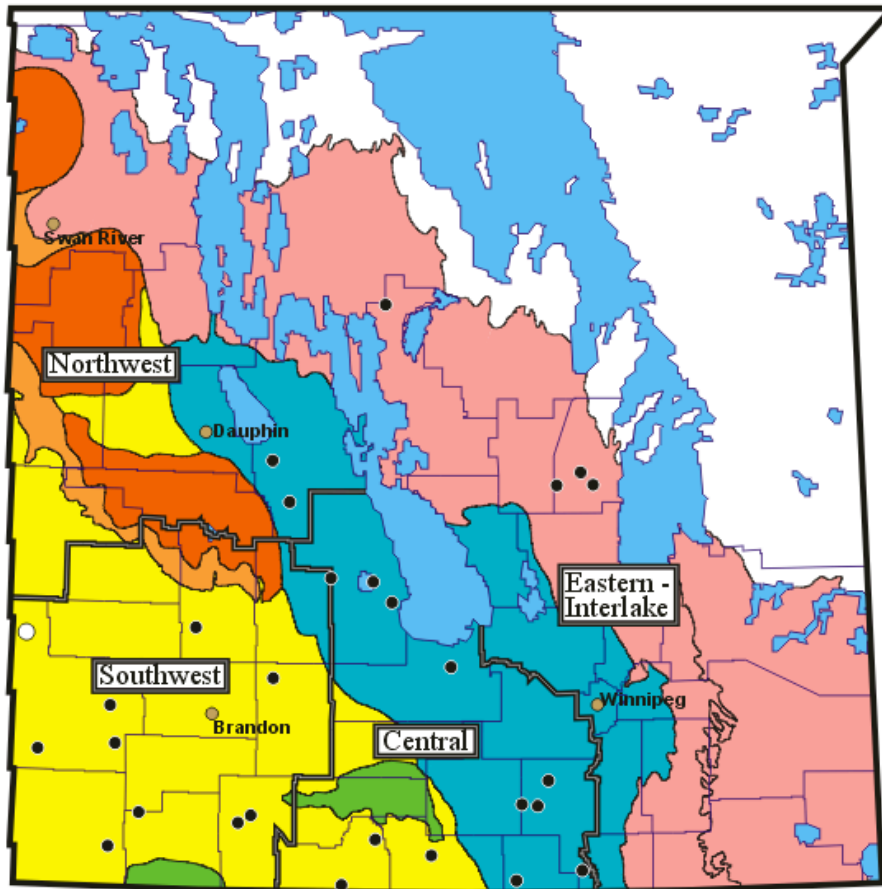
**Agricultural Regions**

Agricultural District Boundaries



# Gp 2-resistant redroot pigweed

Resistant ○ Not resistant •



**Ecoregions**

- Mid-Boreal Uplands
- Boreal Transition
- Aspen Parkland
- Southwest Manitoba Uplands
- Lake Manitoba Plain
- Interlake Plain & Lake of the Woods

**Agricultural Regions**

Agricultural District Boundaries