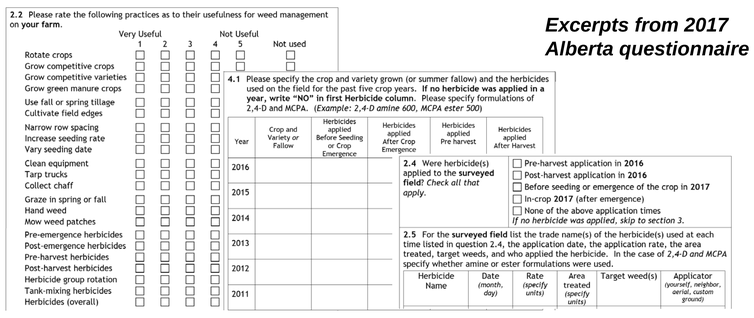
Agriculture and Agri-Food Canada | Agriculture et Agroalimentaire Canada

Weed Management Practices in Annual Cropping Systems in the Prairie Provinces

Julia Y. Leeson
Agriculture and Agri-Food Canada, Saskatoon, SK

Introduction

Producers in the Prairie Provinces have been advised to adopt various weed management practices to delay the development and spread of herbicide resistant weed biotypes. This poster documents the current use of chemical, physical and cultural weed control practices in Alberta, Saskatchewan and Manitoba.



2.2 Please rate the following practices as to their usefulness for weed management on your farm.

	Very Useful 1	2	3	4	Not Useful 5	Not used
Rotate crops	☐	☐	☐	☐	☐	☐
Grow competitive crops	☐	☐	☐	☐	☐	☐
Grow competitive varieties	☐	☐	☐	☐	☐	☐
Grow green manure crops	☐	☐	☐	☐	☐	☐
Use fall or spring tillage	☐	☐	☐	☐	☐	☐
Cultivate field edges	☐	☐	☐	☐	☐	☐
Narrow row spacing	☐	☐	☐	☐	☐	☐
Increase seeding rate	☐	☐	☐	☐	☐	☐
Vary seeding date	☐	☐	☐	☐	☐	☐
Clean equipment	☐	☐	☐	☐	☐	☐
Tarp trucks	☐	☐	☐	☐	☐	☐
Collect chaff	☐	☐	☐	☐	☐	☐
Graze in spring or fall	☐	☐	☐	☐	☐	☐
Hand weed	☐	☐	☐	☐	☐	☐
Mow weed patches	☐	☐	☐	☐	☐	☐
Pre-emergence herbicides	☐	☐	☐	☐	☐	☐
Post-emergence herbicides	☐	☐	☐	☐	☐	☐
Pre-harvest herbicides	☐	☐	☐	☐	☐	☐
Post-harvest herbicides	☐	☐	☐	☐	☐	☐
Herbicide group rotation	☐	☐	☐	☐	☐	☐
Tank-mixing herbicides	☐	☐	☐	☐	☐	☐
Herbicides (overall)	☐	☐	☐	☐	☐	☐

4.1 Please specify the crop and variety grown (or summer fallow) and the herbicides used on the field for the past five crop years. **If no herbicide was applied in a year, write "NO" in first Herbicide column.** Please specify formulations of 2,4-D and MCPA. *(Example: 2,4-D amine 600, MCPA ester 500)*

Year	Crop and Variety or Fallow	Herbicides applied Before Seeding or Crop Emergence	Herbicides applied After Crop Emergence	Herbicides applied Pre harvest	Herbicides applied After Harvest
2016					
2015					
2014					
2013					
2012					
2011					

2.4 Were herbicide(s) applied to the **surveyed field**? *Check all that apply.*

☐ Pre-harvest application in **2016**
☐ Post-harvest application in **2016**
☐ Before seeding or emergence of the crop in **2017**
☐ In-crop **2017** (after emergence)
☐ None of the above application times
If no herbicide was applied, skip to section 3.

2.5 For the **surveyed field** list the trade name(s) of the herbicide(s) used at each time listed in question 2.4, the application date, the application rate, the area treated, target weeds, and who applied the herbicide. In the case of *2,4-D and MCPA* specify whether amine or ester formulations were used.

Herbicide Name	Date (month, day)	Rate (specify unit(s))	Area treated (specify unit(s))	Target weed(s)	Applicator (yourself, neighbor, aerial, custom ground)

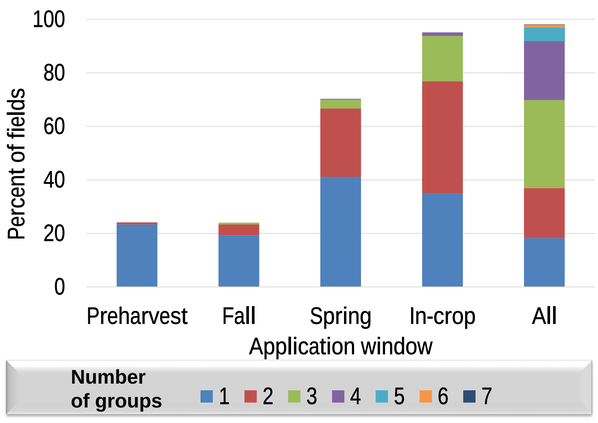
Excerpts from 2017 Alberta questionnaire

Data Source

Data are from weed management questionnaires distributed in conjunction with the provincial weed surveys of spring-seeded cereal, oilseed and pulse crops conducted in 2017 in Alberta, 2016 in Manitoba and 2014/15 in Saskatchewan (306, 106, and 685 responses to date, respectively). Organic producers are not included in the analysis. Data are weighted for non-response.

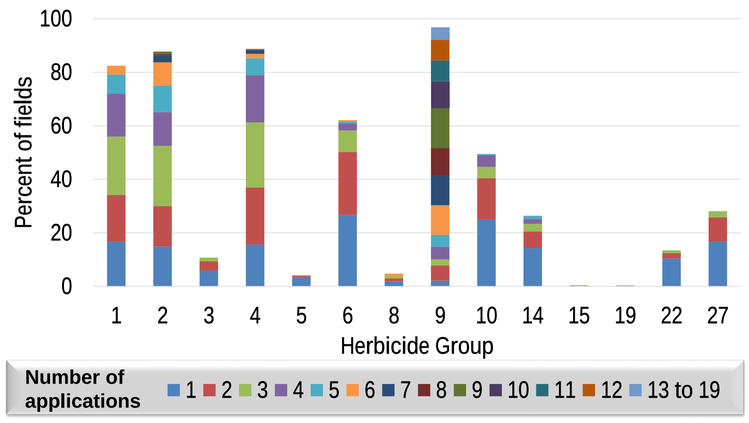
Chemical Weed Control

Herbicide Use for Surveyed Crop



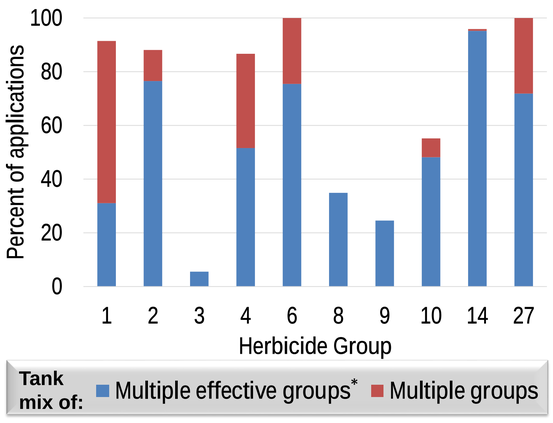
98% of the fields received at least one herbicide application in the cropping season leading up to the weed survey. Use of multiple herbicide groups within a cropping season is a measure of herbicide group rotation (sequence), related to delayed development of resistance. 18% of fields had only one herbicide group applied in the cropping season.

Number of Applications (over six years)



Herbicide rotation is recommended to reduce repeated use of individual herbicide groups and the risk of developing resistance. Weeds have a high risk of developing resistance to Group 1 and 2 herbicides with fewer than 10 applications; but they are amongst the most frequently applied herbicides with 48% and 58% of the fields having applications at least every other year, respectively. While resistance to Group 9 herbicides may take more than 20 applications to develop, 66% of fields had Group 9 products applied more than once per year.

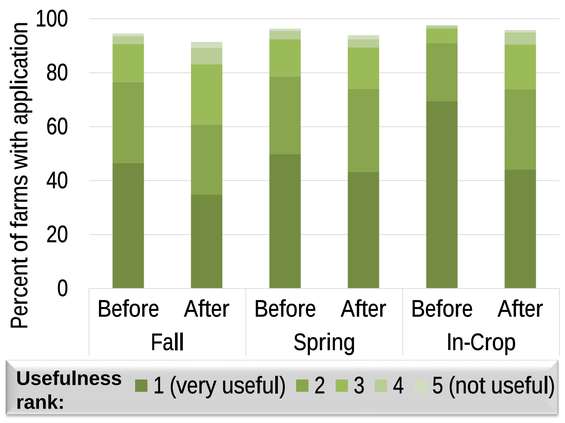
Herbicide Mixing



Tank mixing multiple effective herbicide groups can be used to delay the development of herbicide resistance. Groups that are both frequently used and rarely tank mixed with at least one additional effective group include Group 1 and Group 9.

* Applied with at least one other herbicide group that was equally effective on at least one target weed based on rates applied

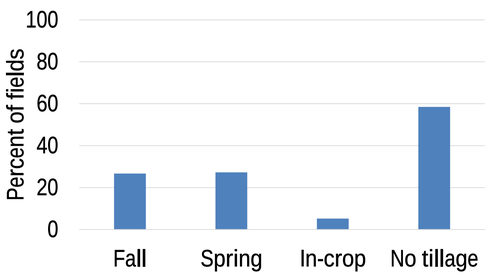
Scouting



Most producers report scouting before and after herbicide applications. All producers reported scouting their fields at least once (data not shown). However, producers generally consider scouting before herbicide applications more useful than after herbicide applications. This may result in delayed detection of herbicide resistance.

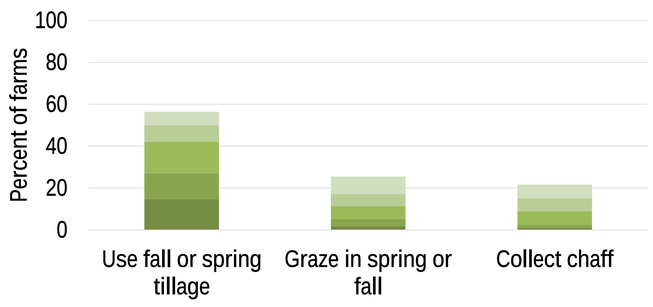
Physical Weed Control

Tillage in Surveyed Field



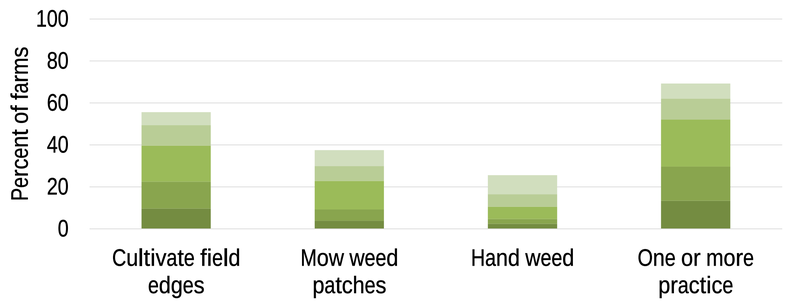
Due to concerns about soil erosion, tillage for weed control is not commonly practised in the drier areas of the Prairie Provinces. Still, 42% of fields surveyed reported at least one tillage pass for weed control and 27% of the fields had at least one tillage pass in the fall.

Physical Weed Control on Farm



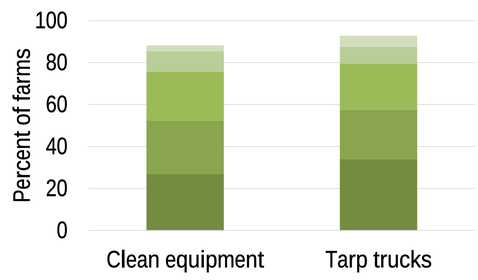
Over 20% of producers report grazing or collecting chaff for weed control on their farms, but few producers consider these methods very useful.

Targeted Physical Weed Control on Farm



Management of weed patches can slow the spread of herbicide resistant weeds. 69% of producers are using physical weed control to control patches of weeds or specific species.

Sanitation

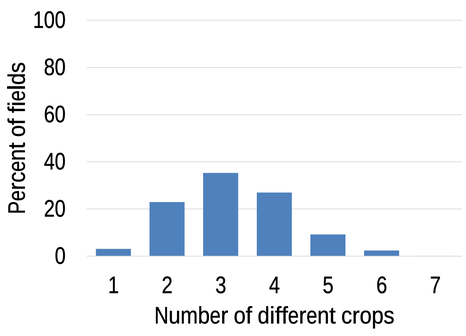


Most producers report attempting to prevent the spread of weeds through cleaning equipment (88%) and tarping trucks (93%).

Usefulness rank: 1 (very useful) 2 3 4 5 (not useful)

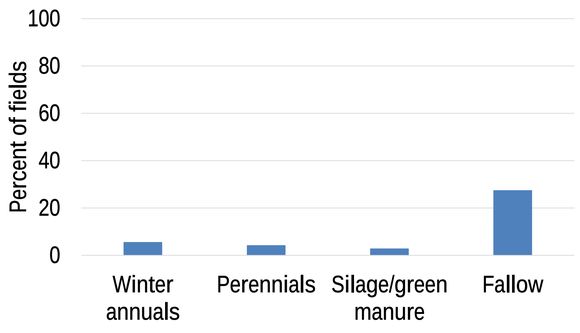
Cultural Weed Control

Crop Rotation



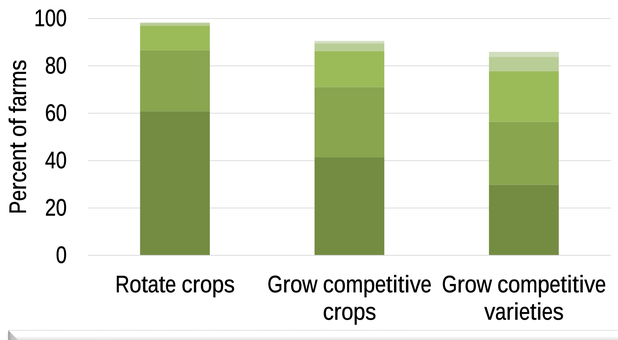
Planting different crops can facilitate herbicide group rotation. 73% of fields had at least three different crops planted in seven years.

Crop Rotation Complexity



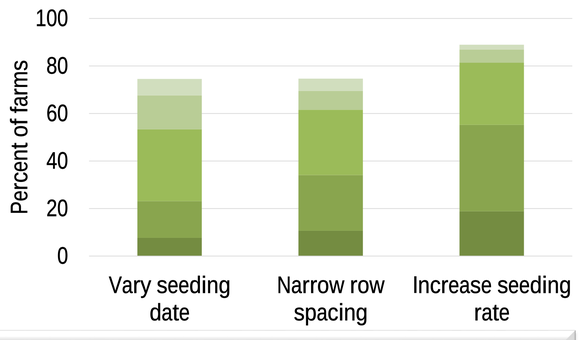
Planting crops with different life cycles can select for different weed species; however, most fields only had spring annual crops planted seven years in a row.

Crop Selection



Most producers report rotating and selecting crops for weed management.

Increased Crop Competition



Most producers report enhancing crop competition through cultural control strategies, most commonly increasing seeding rates.

Usefulness rank: 1 (very useful) 2 3 4 5 (not useful)

Summary

Producers report using diverse management strategies to manage weeds on their farms:

- 99% of fields used chemical weed control
- 83% of farms used physical weed control
- 99% of farms used cultural weed control

However, several individual physical and cultural weed control practices are rarely used, or, if they are, producers do not consider them very useful for weed management.

The potential of some widely adopted practices such as herbicide group rotation, tank mixing of multiple effective herbicide groups and crop rotations are not being fully realized.

Therefore, there is opportunity to increase understanding and adoption of several individual weed management practices with the potential to delay the development and spread of herbicide resistant weed biotypes.

Acknowledgments

The weed surveys were funded in part by the: Western Grains Research Foundation, Saskatchewan Ministry of Agriculture and the Canada-Saskatchewan Growing Forward 2 bi-lateral agreement, Saskatchewan Pulse Growers, Alberta Wheat Commission, Alberta Pulse Growers Commission, Alberta Canola Producers Commission, Manitoba Agri-Research and Development Fund (GF2), Manitoba Pulse & Soybean Growers, Manitoba Wheat & Barley Growers Association, Manitoba Canola Growers, Manitoba Oat Growers Association, Manitoba Corn Growers Association, Manitoba Seed Growers Association, Manitoba Flax Growers Association and National Sunflower Association of Canada. We would like to thank the producers who completed the management questionnaires.

Canada