

HERBICIDE RESISTANCE IN SASKATCHEWAN: A GROWING THREAT

With limited growing space and an eye on achieving the maximum possible yield, we are all aware how important it is to ensure that our crops are not competing with unwanted weeds. On larger fields in which hand-weeding is impractical, the development of a wide range of herbicides has allowed us to limit the growth and propagation of these weeds for increased productivity and profitability.

Just as our crops are able to tolerate many of these herbicides, weeds can naturally develop resistant traits over successive generations due to natural selection. This builds tolerance to the selected mode of action of the herbicide, and the weed eventually becomes resistant to their effect. The result is increased weed development and lower crop yield, as well as increased tillage, fuel and labour causing higher farming costs. Worse still, once resistance has formed it significantly reduces or eliminates that herbicide as a weed control option.

WE NEED TO TAKE ACTION NOW TO PREVENT FURTHER RESISTANCE!

WEED RESISTANCE IN CANADA: UPDATE

Cases of herbicide resistance are becoming increasingly common, with over 58 weed biotypes reported in Canada, 18 of these biotypes are present in Saskatchewan. Group 9 (EPSP Synthase Inhibitors) is of particular interest – since *Kochia* biotypes have been confirmed to exhibit glyphosate resistance – and this may pose a serious risk for the future in the prairies.

HERBICIDE GROUPS MOST AT RISK

| GROUP 1 ACCASE INHIBITORS | GROUP 2 ALS INHIBITORS | GROUP 9 EPSP SYNTHASE INHIBITORS |
|--|--|---|
| EXTENT OF RESISTANCE | EXTENT OF RESISTANCE | EXTENT OF RESISTANCE |
| Globally: 42 Species | Globally: 129 Species | Globally: 24 Species |
| Canada: 4 Species | Canada: 25 Species | Canada: 5 Species |
| RESISTANCE SPECIES IN SASKATCHEWAN | RESISTANCE SPECIES IN SASKATCHEWAN | RESISTANCE SPECIES IN SASKATCHEWAN |
| Green foxtail Persian dandelion Wild oat | Chickweed Cleavers Hemp-nettle Kochia Lamb's-quarters Redroot pigweed Russian thistle Shepherd's purse Stinkweed Wild mustard Wild oat | Kochia |

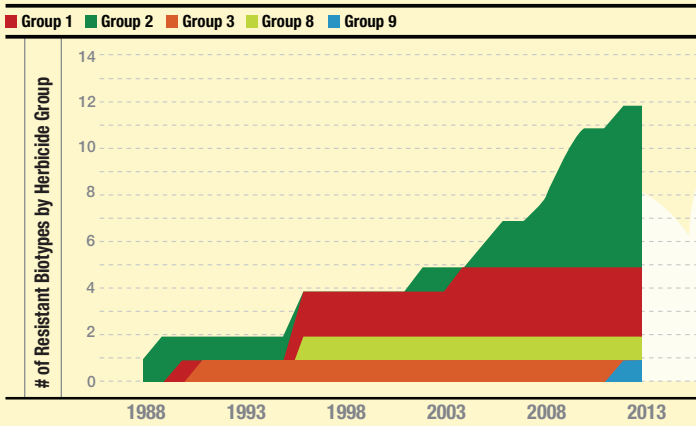
HIGH RISK RESISTANT WEEDS IN SASKATCHEWAN

| WILD OAT | KOCHIA | GREEN FOXTAIL |
|---|--|--|
| First demonstrated resistance to Group 1 herbicides in 1990. Wild oat has since evolved to show extensive resistance to Group 1 and growing resistance to Group 2 herbicides. The latest AAFC surveys indicate up to 15% of the fields surveyed also contain Group 8-resistant wild oats. | Group 2 resistant kochia was first confirmed in 1988. Now considered to be predominately resistant to Group 2 chemistry and past AAFC surveys have confirmed resistance levels upwards of 90%. In 2012, kochia resistant to both Group 2 and Group 9 herbicides was identified. | A monocot weed that first evolved resistance to Group 3 in Saskatchewan in 1991. |
| HERBICIDE RESISTANCES | HERBICIDE RESISTANCES | HERBICIDE RESISTANCES |
| Group 1 (ACCCase Inhibitors) Group 2 (ALS Inhibitors) Group 8 (Fatty Acid & Lipid Biosynthesis Inhibitors) | Group 2 (ALS Inhibitors) Group 9 (EPSPS Inhibitors) | Group 1 (ACCCase Inhibitors) Group 3 (Cell Division Inhibitors) |

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In the fight against herbicide resistance, it's important to know how the problem developed to prevent it from developing further.

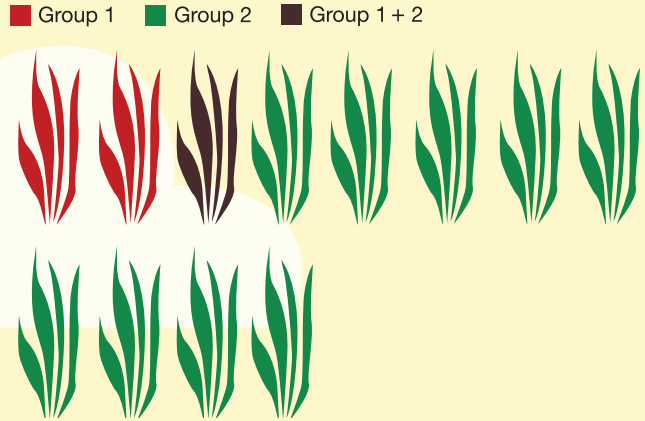
HERBICIDE RESISTANCE IN SASKATCHEWAN HAS BEEN STEADILY ON THE RISE



Source: Heap, I. WeedScience.org, 2014

Today, herbicide groups that are encountering resistant weeds are predominantly Group 2 (ALS Inhibitors), with Group 1 (ACCase Inhibitors) on the rise. Though there have been reported cases of resistance to Group 3 (Cell Division Inhibitors), Group 8 (Fatty Acid & Lipid Biosynthesis Inhibitors) and Group 9 (EPSP Synthase Inhibitors), they are limited.

BREAKDOWN OF THE 12 RESISTANT WEEDS FOUND IN SASKATCHEWAN



Source: Heap, I. WeedScience.org, 2014

HOW CAN WE TAKE ACTION?

It's of utmost importance that herbicide resistance is stopped before it becomes unmanageable. Through increased crop rotation, the use of diverse and multiple modes of action, and early identification of resistant weeds, we can limit the development and growth of new resistant biotypes. This will ensure that treatment options in the future are still available.

Unique modes of action that have been widely accepted to effectively manage herbicide resistance include:

**GROUP 27
HPPD INHIBITORS**

EXTENT OF RESISTANCE

Globally: 2 Species
Canada: 0 Species

PRODUCT LINES INCLUDED

Axial iPak*
Infinity*
Tundra*
Velocity m3*

*Contains at least one non-Group 27 chemistry

**GROUP 10
GLUTAMINE SYNTHETASE INHIBITORS**

EXTENT OF RESISTANCE

Globally: 2 Species
Canada: 0 Species

PRODUCTS INCLUDED

Liberty 150 SN

**GROUP 6
PS II SITE B INHIBITORS**

EXTENT OF RESISTANCE

Globally: 4 Species
Canada: 2 Species

PRODUCTS INCLUDED

Achieve Liquid Gold*
Axial iPak*
Buctril M*
Infinity*
Pardner
Thumper*
Tundra*
Velocity m3*

*Contains at least one non-Group 6 chemistry

