Harvest Weed Seed Control

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Why are we interested in Harvest Weed Seed Control?

- Abbreviated as HWSC
- Herbicide resistance
  - Present and increasing in Western Canada and Alberta
  - Evolution of glyphosate resistant kochia
  - Expected evolution of more glyphosate resistance
- Lack of new herbicide modes of actions
  - New herbicides, act on ‘old’ targets in the plant
What is Harvest Weed Seed Control?

• New method of weed control developed in Australia

• **Prevention of viable weed seed return to the field at harvest**

• Not intended as a standalone

• Numerous ways of conducting HWSC

• High levels of adoption across Australia

• Effective
Types of Harvest Weed Seed Control

Narrow Windrow Burning

Direct Bale

Chaff Cart

Others: chaff deck (weed seeds on to tramlines), windrow rotting
Harrington Seed Destructor

- Weed seeds processed through an opposing cage mill
- Impact of the mill on the seeds renders them unviable
- Extremely effective on wild radish and annual ryegrass
- Residue is left on the field (spreader at the back)
- Cost prohibitive: $205,000 CAD
- Further developments: Cage mill integrated into back of the combine

Walsh et al. 2012
Canadian Research

• Weed biology: Are our weeds compatible with HWSC methods?

• Are weeds grown/seeded in plots biologically similar to producer fields?

• Harrington Seed Destructor Efficacy (seed size, seed load, chaff type)

• Harrington Seed Destructor Field Level Tests
Requirements for Weeds to be Compatible with HWSC

1. Weed seeds must be produced at a height from which they are collectible (i.e. above 6” or 15cm in height)

2. Weed seeds must be retained on the plant at the time of harvest.

Weed biology study

Objective: To determine if these requirements are met by wild oat, cleavers and volunteer canola, and if crop competition effects change retention or height
Site Locations

- 2014
- Lacombe, AB
- St. Albert, AB
- Scott, SK
Materials and Methods

• Why wild oat, cleavers, and canola?
  • #2,3 and 6 in relative abundance in Alberta
  • Cleavers fastest increasing weed in relative abundance

J. Leeson, C. Neeser N. Kimmel and M. Vadnais

• Increases in herbicide resistance in wild oat and cleavers: expected evolution of glyphosate resistance
Materials and Methods

• Weeds cross-seeded against crops
• Shatter trays placed between crop rows prior to any seed loss
• Trays checked and emptied twice/week
Materials and Methods

- Weeds harvested at three times:
  - Wheat Swath timing
  - Wheat Direct Harvest timing
  - Fababean Direct Harvest timing
- Plants sectioned into four heights
  - 0-15cm, 15-30cm, 30-45cm, 45+cm
- Dried, dry weights measured
Materials and Methods

• Height sections containing seeds threshed and cleaned
• Retained seeds counted
• # of seeds lost and percentage of seeds retained calculated
Results

• One year of data: second year in 2015

• Not discussing height:
  • Only reviewed in Lacombe
  • Majority of weed seeds produced in collectible range (>15cm)

• Start with Lacombe
  • In detail
  • Other two sites more quickly
  • Producer fields
Lacombe Wild Oat Seed Retention

Date

Average Seed Retained (%)
Lacombe Cleavers Seed Retention

Average Seed Retained (%)

Date


Fababean 1x
Fababean 2x
Wheat 1x
Wheat 2x
Producer Fields

- Placement of shatter trays
- Seeds collected each week
- 3 producer fields near Lethbridge:
  - 2 wild oat only
  - 1 wild oat, wild mustard, foxtail barley, sow thistle, barnyard-grass, persian darnel, lamb’s quarters

- Harvested at swath and direct harvest timings
- % retained determined
Producer Field Seed Retention

![Graph showing average seed retention for different species.]

Species
- Wild Oat - Field 1
- Wild Oat - Field 2
- Wild Oat - Field 3
- Wild Mustard
- Foxtail Barley
- Sow Thistle
- Barnyardgrass
- Persian Darnel
- Lambsquarters

Average Seed Retention (%)

- Swath
- Harvest
Conclusions

- Variation between sites
  - Environment (heat, precipitation)
  - Competition (volunteer weed population)

- Same pattern
  - Canola retaining most: Good target for HWSC
  - Cleavers: Swathing may be a valuable tool, variable between sites
  - Wild Oat: Least retention, likely not a good target for HWSC

- Plots vs Producer Fields
  - Showing same pattern for wild oat, likely not a good target

- Need other options for wild oat
- Field scale efficacy of Harrington Seed Destructor
- Efficacy of Harrington Seed Destructor on seeds of these species
Thank You!

Questions?