Quackgrass Management in Four Corn Hybrid Technologies

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Quackgrass Status

Still out there

- Less in cash grain systems
- Overall less in livestock systems
- Will still need systems to keep it in check
Quackgrass and Cropping Systems

- Many technologies in corn and associated herbicide modes of action

- Rotation is always best
  - Crops
  - Modes of action
  - Especially true in continual no-till systems
Quackgrass and Cropping Systems

Questions to ponder regarding quackgrass:

- Does it matter which hybrid technology or MOA a grower starts with?
- Will one or more technology or herbicide be better than another in the long term?

My objectives were to compare various treatments within Liberty Link, Roundup Ready, ClearField and conventional hybrids in rotation with soybeans for 5 years.
Site was an old alfalfa stand at Arlington ARS

Deep disked twice, field cultivated in 1999
  - No tillage or cultivation done for next 4 years

Corn planted in 1999 and then rotated annually with conventional no-till soybeans in 7” rows
Methods

- Annual weeds controlled each year with soil active herbicides with no quackgrass activity

- After 1999, paraquat used each year as a burndown treatment
  - Allowed the corn and soybean to “start with a clean slate”
  - Preemergence herbicide applied then, too
**Methods**

**Rotation of corn hybrid technologies:**

<table>
<thead>
<tr>
<th></th>
<th>1999</th>
<th>2001</th>
<th>2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liberty Link</td>
<td>Conventional</td>
<td>Liberty Link</td>
<td>Roundup Ready</td>
</tr>
<tr>
<td>Roundup Ready</td>
<td>Conventional</td>
<td>Roundup Ready</td>
<td>ClearField</td>
</tr>
<tr>
<td>ClearField</td>
<td>Roundup Ready</td>
<td>LL and CF</td>
<td>Conventional</td>
</tr>
<tr>
<td>Conventional</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*(specific hybrids given in Table 1 of proceedings)*
Methods

- Corn planted in six 30” rows in plots 25 ft long
  - Plots blocked so same hybrid was in adjacent plots within a rep

- All quackgrass treatments applied postemergence
  - Quackgrass 6 to 10 inches tall
  - Herbicides applied in 20 gal/a water; flat fan XR nozzles
  - Standard rates used (given in Table 2)
  - Additives used as recommended (see Table 3 and 4 footnotes)
Methods

- Quackgrass treatments rotated to avoid consecutive use of same mode of action in consecutive cycles of corn

- After 1999, treatment decisions based on quackgrass pressure in fall
  - Threshold of 10% in 2001
  - Lowered to 5% in 2003
Methods

- Quackgrass control and pressure ratings taken regularly; only October pressure data presented
  - Data in Table 3

- Corn yield taken in 1999, 2001 and 2003
  - Data in Tables 4, 5 and 6
Quackgrass Pressure

A relative term based on quackgrass vigor, abundance and health

- 0 = no quackgrass
- 100 = complete cover of dense, vigorous quack
- 1-5% = very light
- 6-10% = light
- 11-20% = moderately light
- 21-40% = moderate
- 41-60% = high
- 61-80% = serious
Results

- In 2001, treatments with >10% quack pressure retreated
  - Of 22 possible retreat situations, only 4 treated
  - Three followed Liberty; the other followed NorthStar

- In 2003, treatments with >5% quack pressure retreated
  - 14 retreated; 12 did not need retreating
  - 7 of the 1999 treatments did not need treating in 2001 or 2003
Results

Accent, Accent + Beacon, Accent + NorthStar and Basis Gold

- One shot in 1999 suppressed quack through 2003

- Beacon, NorthStar and Lightning needed retreatment in 2003

- Better than glyphosate in RR corn
  - A no-till system: did not double glyphosate rate
  - Did not cut spray volume in half
Liberty Link System

LL- conv- LL  tmt. 1

quack press oct (%)

Liberty

Accent

cn 99  sb 00  cn 01  sb 02  cn 03
Liberty Link System

LL- conv- LL  tmt. 2

quack press oct (%)

Lib + Atra split
ClearField System

imi - conv - imi  
tmt. 14-15

quack press oct (%)

Lightning

Option or Steadfast

Parameters: cn 99, sb 00, cn 01, sb 02, cn 03
Conventional System

Conv – LL & imi - conv tmt. 20-22

quack press oct (%)

Accent or
Accent + Beacon

cn 99 sb 00 cn 01 sb 02 cn 03
Conventional System

Conv – LL & imi - conv tmt. 23

quack press oct (%) vs. years:

- NorthStar
- Conventional System

Year:
- cn 99
- sb 00
- cn 01
- sb 02
- cn 03
Corn Yield Observations

- Not a hybrid test
- Yields for all years in Table 6
- When quackgrass controlled, yields:
  - Excellent
  - Similar for all technologies in 1999
  - Poorer for RR hybrid in 2001 and 2003
Corn Yield when Quackgrass Controlled

![Bar chart showing corn yield when quackgrass is controlled by different methods and years.]

- **1999**
  - Liberty: 120 bu/acre
  - Roundup: 160 bu/acre
  - ClearField: 180 bu/acre
  - Conven.: 140 bu/acre

- **2001**
  - Liberty: 200 bu/acre
  - Roundup: 180 bu/acre
  - ClearField: 220 bu/acre
  - Conven.: 160 bu/acre

- **2003**
  - Liberty: 210 bu/acre
  - Roundup: 190 bu/acre
  - ClearField: 230 bu/acre
  - Conven.: 170 bu/acre

- **Average**
  - Liberty: 180 bu/acre
  - Roundup: 190 bu/acre
  - ClearField: 200 bu/acre
  - Conven.: 160 bu/acre
Corn Yield when Quackgrass Not Controlled

- Liberty
- Roundup
- ClearField
- Conven.

Bu/acre

1999  2001  2003  average
## Corn Yield Loss (%) Due to Uncontrolled Quackgrass

<table>
<thead>
<tr>
<th>Technology</th>
<th>1999</th>
<th>2001</th>
<th>2003</th>
<th>average</th>
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</thead>
<tbody>
<tr>
<td>Liberty Link</td>
<td>38</td>
<td>11</td>
<td>69</td>
<td>39</td>
</tr>
<tr>
<td>Rndup Rdy</td>
<td>37</td>
<td>38</td>
<td>80</td>
<td>52</td>
</tr>
<tr>
<td>ClearField</td>
<td>18</td>
<td>10</td>
<td>53</td>
<td>27</td>
</tr>
<tr>
<td>Conven.</td>
<td>30</td>
<td>27</td>
<td>63</td>
<td>40</td>
</tr>
<tr>
<td><strong>mean</strong></td>
<td><strong>31</strong></td>
<td><strong>22</strong></td>
<td><strong>66</strong></td>
<td><strong>40%</strong></td>
</tr>
</tbody>
</table>
Corn Yield Loss (%) Due to Uncontrolled Quackgrass

- Yields averaged 40% loss
  - Would have been much lower without tillage in 1999 and burndown other years

- Losses greatest in 2003
  - drought + quack = 66% yield reduction

- Technologies differed in competitiveness
  - ClearField most competitive in 1999 and 2003
  - ClearField and Liberty Link equal in 2001
  - Roundup Ready affected the most
Observations

- Do not start with Liberty Link for quackgrass
- For first year corn after alfalfa, conventional or ClearField hybrid and herbicides with ALS mode of action suggested
  - Longest quackgrass suppression
  - Economical products
  - High yields
Rotation Observations

- Did hybrid technologies differ?
  - Yes: do not start with Liberty Link for quack

- Did MOA rotation help?
  - Can’t say because so few treatments needed re-treatment in 2001; in 2003 back to the original modes

- If more than 2 years control given, can select crop and herbicide rotation based on other weeds
Summary

- Many effective tools to control quackgrass in corn
- When controlled in corn, no quackgrass control needed in soybean phase
- Quackgrass may be a non-issue in RR soybean systems