Post-Emergence Control of Velvetleaf in Popcorn

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INTRODUCTION

Popcorn production
- Nebraska is the number one producer of popcorn in the United States
- 160 million kg on 30,000 hectares and 45% of the U.S. supply (NASS 2016)
- Popcorn is more sensitive to herbicides than field corn (Edenfield and Allen 2005)
- Research gap around weed control in popcorn

Velvetleaf (Abutilon theophrasti Medik.)
- Can emerge throughout the summer escaping PRE residuals
- Long-term problem in crop production
- Seeds can remain viable for up to 50 years (Warwick and Black 1988) with up to 43% germination after 39 years (Toole and Brown 1946)
- S-metolachlor and/or atrazine is often used PRE in popcorn
- Only partial control of velvetleaf

OBJECTIVE & HYPOTHESIS

Objective: To evaluate the efficacy of POST herbicides for controlling 15 or 30 cm tall velvetleaf in popcorn

Hypothesis: Effective herbicides are available for late season control of 15 to 30 cm tall velvetleaf that will not injure popcorn

MATERIALS & METHODS

Treatment design and field details
- A field experiment was conducted in 2018 at the University of Nebraska–Lincoln South Central Agricultural Laboratory near Clay Center, NE
- A split-plot design with 2 application timings (15 and 30 cm velvetleaf) main plots and 11 POST herbicides (Table 1.)
- S-metolachlor/ atrazine (Bicep II Magnum) was applied at 2470 g ai ha⁻¹ to achieve only partial control of velvetleaf on April 30.
- 15 cm velvetleaf applications were applied on June 8 (V6)
- 30 cm velvetleaf applications were applied on June 22 (V9)

Data Collection
- Visual estimations of velvetleaf control 0% (no injury) to 100% (complete plant death)
- Velvetleaf density
- Velvetleaf biomass (35 days after 30 cm applications)
- Biomass reduction compared to the non-treated control
- Popcorn yield harvested September 27

Data Analysis
- Data analysis was preformed in R software
- ANOVA was conducted and means separated using Fisher’s LSD test

RESULTS & DISCUSSION

Table 1. POST Herbicide Treatments

<table>
<thead>
<tr>
<th>POST herbicide</th>
<th>Trade name</th>
<th>Rate (g ai ha⁻¹)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-treated control</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Carfentrazone</td>
<td>Aim</td>
<td>17.5</td>
</tr>
<tr>
<td>Fluthiacet</td>
<td>Cadet</td>
<td>7.2</td>
</tr>
<tr>
<td>Topramezone</td>
<td>Impact</td>
<td>24.5</td>
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<tr>
<td>Tembotrione</td>
<td>Laudis</td>
<td>76</td>
</tr>
<tr>
<td>Halosulfuron</td>
<td>Permit</td>
<td>165</td>
</tr>
<tr>
<td>Dicamba</td>
<td>DiFlexx</td>
<td>560</td>
</tr>
<tr>
<td>Dicamba/diflufenzopyr</td>
<td>Status</td>
<td>392</td>
</tr>
<tr>
<td>Dicamba/tembotrione</td>
<td>DiFlexx DUO</td>
<td>597</td>
</tr>
<tr>
<td>Mesotrione/fluthiacet</td>
<td>Solstice</td>
<td>2.8</td>
</tr>
<tr>
<td>Nicosulfuron/mesotrione</td>
<td>Revlin Q</td>
<td>118</td>
</tr>
<tr>
<td>Dicamba/halosulfuron</td>
<td>Yukon</td>
<td>190</td>
</tr>
</tbody>
</table>

CONCLUSIONS & FUTURE RESEARCH

- Topramezone, tembotrione, halosulfuron, and dicamba/halosulfuron did not provide adequate control of velvetleaf for 15 cm
- Topramezone and tembotrione for 30 cm provided <90% control
- Tembotrione and halosulfuron did not reduce velvetleaf density for 15 cm
- Topramezone and dicamba/halosulfuron resulted in high densities for 15 cm
- Topramezone and tembotrione resulted in high densities for 30 cm
- Halosulfuron, dicamba, dicamba/tembotrione, and dicamba/halosulfuron yielded ≤ 5,000 kg ha⁻¹ for 15 cm
- Halosulfuron, dicamba, dicamba/diflufenzopyr, dicamba/tembotrione, and dicamba/halosulfuron yielded ≤ 5,000 kg ha⁻¹ for 30 cm

APPLICATIONS WHEN VELVETLEAF WAS 15 CM IN HEIGHT
- Applications when velvetleaf was 15 cm resulted in similar control, density, biomass reduction, and grain yield as 30 cm applications for most herbicide programs
- Halosulfuron and tembotrione did not provide adequate control, biomass reduction, or density reduction of 15 cm velvetleaf
- Topramezone and tembotrione resulted in little control, biomass reduction and density reduction when applied to 30 cm velvetleaf
- Dicamba alone or in premix and halosulfuron resulted in ≤ 5,000 kg ha⁻¹ for 15 and 30 cm velvetleaf, likely due to higher lodging observed from these herbicides

FUTURE RESEARCH
- This study will be repeated in 2018
- Hybrid differences may affect the response to herbicide injury (lodging) observed

LITERATURE CITED
- Toole and Brown (1946) Final results of the buried seed experiment. J. Agric. Res. 72.201-210