Precision Cultivating Technologies for Improved Weed Control in Cotton

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Background

• Herbicide resistant weeds increasingly problematic in Arizona cotton
• Cultivation effective management tool
• Limitations of standard cultivator
  o Controls only the weeds between crop rows
  o Poor lateral precision

Objectives

• Determine if cultivator weed control efficacy can be improved using:
  o GPS-RTK guided tractors
  o In-row weeding tools
  o Camera guided cultivators

Treatments

1) Conventional – 10” uncultivated (band)
2) GPS-RTK – 6” band
3) GPS-RTK – w/ fingers – 6” band
4) Camera guidance – 3.5” band
5) Camera guidance w/ fingers – 3.5” band

Specialized Equipment

In-row finger weeder
Camera guided cultivator

Results

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Prostrate Pigweed (%)</th>
<th>Other Broadleaf Weeds (%)</th>
<th>All Grasses (%)</th>
<th>All Weeds (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional – 10”</td>
<td>80</td>
<td>68</td>
<td>40</td>
<td>68</td>
</tr>
<tr>
<td>GPS-RTK – 6”</td>
<td>65</td>
<td>60</td>
<td>57</td>
<td>62</td>
</tr>
<tr>
<td>GPS-RTK w/fingers – 6”</td>
<td>87</td>
<td>75</td>
<td>60</td>
<td>75</td>
</tr>
<tr>
<td>Cam-Guide – 3.5”</td>
<td>82</td>
<td>95</td>
<td>79</td>
<td>82</td>
</tr>
<tr>
<td>Cam-Guide w/fingers - 3.5”</td>
<td>90</td>
<td>97</td>
<td>73</td>
<td>85</td>
</tr>
</tbody>
</table>

Conclusions (first year study)

• GPS-RTK tractor use did not significantly improve weed control
• Finger weeder
  o Controlled roughly 50% of in-row broadleaf weeds
  o Not effective on LARGE, deep rooted grassy weeds
• Camera guidance
  o Allowed for close cultivation, increasing weed control by ~ 1/3rd
  o In conjunction w/fingers - excellent SMALL broadleaf control (>90%)
• Further study merited

Action Video - https://youtu.be/oQrn1W1J8Q

Outreach

Field day presentations and demos
On-farm demos

Acknowledgements: Project partially funded and supported by Arizona Cotton Growers, Cotton Inc. and K.U.L.T.-Kress, LLC.