Yield Compensation in Soft Red Winter Wheat and Soybean in Relation to Controlled Tramline and Un-controlled Non-Tramline Field Traffic

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Introduction

To produce consistently high yielding wheat (Triticum aestivum L.) and soybeans (Glycine max L.), high input, intensive management is generally necessary. Late season crop protection is an important part of intensive management, but this often leads to increased traffic in the field. In both wheat and soybean, the amount of yield lost due to field traffic may be offset by higher yield because of the crop protection.1 Application of these products late in the growing season will result in driving over plant rows when planted in narrow rows (<38 cm) unless tramlines or intentionally unplanted traffic lanes are installed at planting. 2

Objectives

Determine wheat and soybean yield compensation in tramline and non-tramline management systems when field traffic occurs at various crop growth stages.

Materials and Methods

Field experiments were conducted near Warsaw, Virginia at the Eastern Virginia Agricultural Research and Extension Center (EVAREC) and near Blacksburg, Virginia at Kentland Farm in 2013-14. Both wheat and soybean were seeded using a no-till drill at both sites, this being the predominant tillage and planting method for wheat and soybean in the Mid-Atlantic region.3,4 Layout was a randomized complete block layout with 9 treatments in wheat and 16 treatments in soybean. Treatments in each crop were divided into two management, tram and no tram. Treatments were applied using a standard 380mm ag tire that affected 2 rows. At maturity 1 meter of row from rows adjacent to the tire track were collected, 2 rows and 4 in wheat and soybean respectively. From each sample the following measurements were collected:

- Total weight (g)
- Plant height
- Head weight (g)
- Grain weight (g)
- 250 kernel weight (g)
- Number of plants
- Number of nodes
- Number of fertile nodes
- Number of branches
- Number of branch pods
- Number of main stem pods
- Total seed weight (g)
- 100 seed weight (g)

Treatment Structure

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Type</th>
<th>Timing</th>
<th>Trips</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat</td>
<td>TRAM</td>
<td>G5+S4</td>
<td>2</td>
</tr>
<tr>
<td>Soybean</td>
<td>TRAM</td>
<td>G5+S4</td>
<td>2</td>
</tr>
</tbody>
</table>

Results

2013-14 Wheat grain yield

2014 Soybean yield

Soybean yield compensation by distance from wheel traffic

Conclusions

Wheat

1. At Blacksburg, 2014, grain yield (g m⁻²) was higher when tramlines were used than when crops were trafficked (no tramline) and at any timing.
2. At Warsaw, 2014, grain yield (g m⁻²) was higher when tramlines were used only at the g5+S4 timing.

Soybean

1. Yields were higher with tramlines installed, in all instances, compared to no tramlines.
2. As the distance between traffic passes or tramline increases, proportionally less of the crop is damaged so less yield loss occurs.
3. Spray boom width should be at least 27.5 m in order to minimize yield losses due to field traffic.

References


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