**OBJECTIVE:** Evaluate crop management interactions with an in-furrow systemic fungicide flutriafol on maize (Zea mays L.) growth and yield.

**INTRODUCTION**

Leaf diseases can cause substantial yield reductions in maize and are traditionally controlled by a foliar fungicide application in response to the presence of disease symptoms.

An alternative proactive approach to foliar disease control may be an in-furrow triazole fungicide, flutriafol, that purportedly provides systemic and season-long preventative protection against leaf diseases.

Flutriafol may also increase root growth and plant health, which may make it more effective when used with certain hybrids or as part of intensively managed agronomic systems.

It is unclear whether in-furrow fungicides are more beneficial in an intensively managed production system or a standard management system, which was the basis for this research.

**RESULTS**

**Emergence and Stand**

- Flutriafol application caused delayed and uneven plant emergence in both hybrids (Table 1) (Figure 1).

- When flutriafol was applied, the defensive hybrid emerged at a slower rate than the offensive hybrid but had a higher plant stand by the V4 growth stage (Table 1).

**Plant Health Evaluations**

- NDVI: Flutriafol application decreased V4 and V7 NDVI values due to delayed emergence and more variability of within-row vegetation (Table 2).

- SPAD: Flutriafol application increased SPAD values of the leaf above the ear at the R3 growth stage, indicating greener and healthier leaves later in the season. We speculate that if flutriafol is placed safely away from the seed, it may exhibit the late season benefit of leaf health without the early season drawback of delayed emergence.

**CONCLUSIONS**

- Grain yield was most affected by the agronomic management system, with a 1.8 Mg ha⁻¹ (14.5%) positive yield response to intensive management.

- In-furrow flutriafol application reduced the rate and uniformity of seedling emergence, but these effects were hybrid dependent. Flutriafol caused the defensive hybrid to have a slower rate of emergence than the offensive hybrid but resulted in a higher V4 plant stand than the offensive hybrid, reflective of greater seedling vigor in the large-rooted defensive hybrid.

- Grain yield was unaffected by in-furrow flutriafol applications, suggesting that the early season problems of uneven and delayed emergence were mitigated by greener and healthier leaves later in the season. We speculate that if flutriafol is placed safely away from the seed, it may exhibit the late season benefit of leaf health without the early season drawback of poorer emergence, although further research is needed to evaluate this theory.

**MATERIALS AND METHODS**

**Trial Design:**

Experimental units were plots four rows wide and 11 m in length with 0.76 m row spacing, planted on 2 May 2021 at Champaign, IL. Treatments were arranged in a randomized complete block experimental design with six replications.

**Two Agronomic Management Systems:**

- **Standard**: 180 kg N ha⁻¹ of N applied pre-plant, and no other mineral nutrient applications based on adequate soil test levels, with a final stand of 84,000 plants ha⁻¹.

- **Intensive**: 90 kg ha⁻¹ P₂O₅, and 70 kg ha⁻¹ K₂O banded 10-15 cm deep directly under the future crop row, 180 kg N ha⁻¹ pre-plant broadcast plus an additional 70 kg ha⁻¹ N sidedress at the V6 growth stage (250 kg N ha⁻¹ total), and a final stand of 99,000 plants ha⁻¹.

**Two Hybrid Types:**

- **Defensive**: GH13Z50 characterized as large-rooted.

- **Offensive**: GH10L16 characterized as smaller-rooted.

**Product Comparison:**

- **No Flutriafol**

- **Flutriafol**: Xyway LFR™ (FMC, Philadelphia, PA) applied in-furrow at 1.1 L ha⁻¹ (232 ml flutriafol ha⁻¹).

**Table 1.** Effect of hybrid type and flutriafol application on emergence and plant stand of maize at Champaign, IL in 2021.

<table>
<thead>
<tr>
<th>Hybrid Type</th>
<th>Flutriafol</th>
<th>Emergence Rating†</th>
<th>V4 Stand‡</th>
</tr>
</thead>
<tbody>
<tr>
<td>Defensive</td>
<td>None</td>
<td>8.0a</td>
<td>100a</td>
</tr>
<tr>
<td>Defensive</td>
<td>Flutriafol</td>
<td>1.8c</td>
<td>98a</td>
</tr>
<tr>
<td>Offensive</td>
<td>None</td>
<td>7.6a</td>
<td>100a</td>
</tr>
<tr>
<td>Offensive</td>
<td>Flutriafol</td>
<td>2.6b</td>
<td>93b</td>
</tr>
</tbody>
</table>

†Emergence Rating evaluated 15 days after planting as a visual estimate on a scale of 0-10 with 0 being no plants emerged and 10 being all plants emerged.
‡Percent stand is compared to no flutriafol averaged across management systems. Values followed by different letters in a column are significantly different at P ≤ 0.1.

**Table 2.** Effect of flutriafol application on plant growth and leaf health evaluations of maize at Champaign, IL in 2021.

<table>
<thead>
<tr>
<th>Flutriafol</th>
<th>V4 NDVI</th>
<th>V7 NDVI</th>
<th>R3 SPAD</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>0.356a</td>
<td>0.574a</td>
<td>64b</td>
</tr>
<tr>
<td>Flutriafol</td>
<td>0.305b</td>
<td>0.541b</td>
<td>65a</td>
</tr>
</tbody>
</table>

Values followed by different letters in a column are significantly different at P ≤ 0.1.

**Table 3.** Interaction of hybrid type, flutriafol application, and agronomic management system on grain yield of maize at Champaign, IL in 2021. Yield expressed at 0% moisture.

<table>
<thead>
<tr>
<th>Hybrid Type</th>
<th>Flutriafol</th>
<th>Management Standard</th>
<th>Management Intensive</th>
<th>Management Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offensive</td>
<td>None</td>
<td>12.5 14.5 13.5</td>
<td>12.5 14.5 13.5</td>
<td>12.5 14.5 13.5</td>
</tr>
<tr>
<td>Defensive</td>
<td>None</td>
<td>12.1 13.9 13.0</td>
<td>12.1 13.9 13.0</td>
<td>12.1 13.9 13.0</td>
</tr>
<tr>
<td></td>
<td>Flutriafol</td>
<td>12.2 13.5 12.8</td>
<td>12.2 13.5 12.8</td>
<td>12.2 13.5 12.8</td>
</tr>
</tbody>
</table>

‡Significantly higher yield compared to standard management at P ≤ 0.1.