Natural Products
For Pest Management
Early Stage Herbicides Currently in Development

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MBI-005
Streptomycete

Product Description

• New, selective herbicide for use in rice and possibly other cereal crops.

• Streptomycete - Marine Streptomycete acquired by MBI as part of the DuPont/Instituto Biomar microbial collection.

• Active Ingredient - Produces phytotoxic secondary metabolites such as thaxtomin A (4-(nitroindol-3-yl-containing 2,5-dioxopiperazine) that inhibits cellulose biosynthesis in plants.

• Product Development - MBI is developing the microbe into a commercial bioherbicide through fermentation and formulation optimization.
Efficacy Against Common Rice Weeds (California)

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arrowhead, California</td>
<td><em>Sagittaria montevidensis</em></td>
<td>Good</td>
</tr>
<tr>
<td>Barnyardgrass</td>
<td><em>Echinochloa crus-galli</em></td>
<td>Poor</td>
</tr>
<tr>
<td>Bulrush, Ricefield</td>
<td><em>Scirpus mucronatus</em></td>
<td>Fair</td>
</tr>
<tr>
<td>Bulrush, River</td>
<td><em>Scirpus fluviatilis</em></td>
<td>Fair</td>
</tr>
<tr>
<td>Ducksalad</td>
<td><em>Heteranthera limosa</em></td>
<td>Fair</td>
</tr>
<tr>
<td>Redstems</td>
<td><em>Ammania spp.</em></td>
<td>Good</td>
</tr>
<tr>
<td>Sedge, Smallflower</td>
<td><em>Cyperus difformis</em></td>
<td>Excellent</td>
</tr>
<tr>
<td>Sprangletop, Bearded</td>
<td><em>Leptochloa fascicularis</em></td>
<td>Poor</td>
</tr>
<tr>
<td>Watergrass, Early</td>
<td><em>Echinochloa oryzoides</em></td>
<td>Poor</td>
</tr>
<tr>
<td>Watergrass, Late</td>
<td><em>Echinochloa phyllopoligon</em></td>
<td>Poor</td>
</tr>
</tbody>
</table>

- Efficacy against grass weeds can be improved in tank mixes and/or rotations with grass herbicides.
MBI-005
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Conclusions

• Broadleaf & Sedge - MBI-005 has good efficacy against broadleaf weeds and excellent efficacy against sedge.

• Grass - Efficacy against grass weeds can be improved using tank mixes and/or rotations with grass herbicides at lower than label rates.

• Resistance - MBI-005 inhibits cellulose biosynthesis (no known herbicide resistance for this mode of action among weed populations yet).

• Phytotoxicity - MBI-005 has no phytotoxicity on rice.
Product Description

- GreenMatch is a “knockdown” or “burndown”, non-selective herbicide.

- Organic Use - NOP compliant, OMRI listed, WSDA approved.

- Active Ingredient - d-limonene, which occurs naturally in citrus and other fruits.

- Mode of Action - GreenMatch has a unique mode of action that removes the waxy cuticle from the leaves, causing necrosis of the leaves or fast wilting.
Before
Untreated Control

After
14 Days After Treatment
14% Dilution, 60 GPA
Conclusions

• GreenMatch shows excellent control of a wide variety of broadleaf and grassy weeds.

• Rate - Use a 14% solution in 60 GPA.

• Coverage - For best results, complete coverage is important.

• Surfactant - Use of an organic surfactant is recommended.

• Weed Size - Treat weeds 6 inches or smaller for best results.
Thank you!

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