**ADDITIONAL FUNGICIDES (CONTINUED)**

<table>
<thead>
<tr>
<th>Fungicide</th>
<th>Brand Name</th>
<th>Mode of Action</th>
<th>Activity</th>
<th>Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flutolanil</td>
<td>ProStar</td>
<td>specific</td>
<td>systemic (upward)</td>
<td>low</td>
</tr>
<tr>
<td>PCNB</td>
<td>Terrachlor, Turfcide, Revere, FFII, PCNB, Defend, Engage</td>
<td>general</td>
<td>contact</td>
<td>low</td>
</tr>
<tr>
<td>Fludioxonil</td>
<td>Medallion</td>
<td>specific</td>
<td>contact</td>
<td>moderate to low</td>
</tr>
</tbody>
</table>

**CHEMICAL FAMILY: STEROL INHIBITORS OR DEMETHYLASE INHIBITORS**

<table>
<thead>
<tr>
<th>Fungicide</th>
<th>Brand Name</th>
<th>Mode of Action</th>
<th>Activity</th>
<th>Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mefenoxam</td>
<td>Subdue MAXX</td>
<td>specific</td>
<td>systemic (upward)</td>
<td>high</td>
</tr>
<tr>
<td>Propamocarb</td>
<td>Banol</td>
<td>not well known</td>
<td>systemic (upward)</td>
<td>low</td>
</tr>
<tr>
<td>Fosetyl-aluminum</td>
<td>Prodigy, Chipco Signature (Aliette)</td>
<td>not well known</td>
<td>systemic (upward &amp; downward)</td>
<td>low</td>
</tr>
<tr>
<td>Azoxystrobin</td>
<td>Heritage</td>
<td>specific</td>
<td>systemic (upward)</td>
<td>moderate to high</td>
</tr>
<tr>
<td>Chloroneb</td>
<td>Teremec Sp</td>
<td>general</td>
<td>contact (local penetrant)</td>
<td>low</td>
</tr>
<tr>
<td>Ethazol (Etridiazol)</td>
<td>Koban, Terrazole</td>
<td>general</td>
<td>contact</td>
<td>low</td>
</tr>
</tbody>
</table>

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**SOURCE:** "2002 MANAGEMENT OF TURFGRASS PESTS," OHIO STATE UNIVERSITY EXTENSION, AUTHORS MICHAEL J. BOEHM AND JOSEPH W. RIMELSBACH, TURFGRASS PATHOLOGISTS

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**5 tips to beat resistance**

**BY RICH HANRAHAN**

Fungicides are valuable turfgrass management tools. To preserve their usefulness, develop a strategy to prevent resistance, which begins to take place when a fungus makes a genetic adjustment or undergoes a mutation that reduces its sensitivity to a particular fungicide. This change allows the affected fungus to survive the fungicide. In time, this surviving organism is likely to become the dominant strain when the same fungicide is used frequently and exclusively with it. It becomes more difficult to control.

**It's a class thing**

When resistance develops, it’s typically not limited to individual chemical compounds. Usually, strains of fungi that have become resistant to a fungicide will be resistant to all fungicides in the same chemical class.

Overexposure to just one fungicide might destroy the usefulness of several.

Here are five quick tips for maintaining the effectiveness of your disease-fighting chemical tools:

1. **Mix it up.** Use multiple fungicides from different chemical classes with varying modes of action. The two basic approaches are rotation and tank mixing. If a fungus has developed resistance to one of your fungicides, multiple
fungicides will increase your odds of rid-
ding turf of the fungus before it has a
chance to spread and mutate further.

2 Reduce the frequency. Never make
more applications than you ab-
solutely need to achieve control.
The fewer applications you make, the
less the fungus is exposed to the chemi-
cal class.

3 Apply at the right rate. It’s ex-
tremely important to apply enough
product. Cutting the rate used in a
single application will increase the likeli-
hood of resistance developing. Observe
recommended rates and strive to achieve
complete coverage of the plants.

4 Reduce your dependence. Develop a
solid Integrated Pest Management
approach to disease control. Wher-
ever possible, use plant species and/or vari-
ties that are disease resistant. Keep abreast
of the newer varieties entering the market.

5 Fungicide selection. Although a
product may be labeled for a par-
ticular disease, it doesn’t guaran-
tee it will solve your problem. Efficacy
can vary from region to region. How do
you know which to choose? Consult
with an expert such as a turf pathologist
or university researcher.

--- The author is technical development
manager of fungicides for Chipco
Professional Products.

Basic resistance info
Here are some points to keep in
mind when developing your resis-
tance strategy:

- The chemistries of some fungicides
  are more inclined to provide resis-
tance than others.

- Fungi with higher reproductive
  rates are more likely to develop resis-
tance because they pass on the mu-
tated gene more quickly and broadly.

- Site-specific fungicides run a higher
  risk of resistance because they work
  by inhibiting just function in the fun-
gal cell. Multi-site fungicides interfere
  with several vital functions of the fun-
gal cell.

- When rotated and used in tank-mix
  combinations, certain fungicides can
  effectively control a broad spectrum
  of diseases without the concern for
  resistance development.