Introduction

Tenacity™ is a selective, systemic herbicide developed by Syngenta for pre- and post-emergence grass and broadleaf weed control in several cool- and warm-season turf species. It is currently registered for use on golf courses and sod farms in most states.* Tenacity provides the flexibility to control weeds in established turf stands or at seeding to enhance turf establishment. The active ingredient, mesotrione, has a novel mode of action based on a naturally occurring compound produced by the bottlebrush plant (Callistemon citrinis). Tenacity is a HPPD (p-hydroxyphenylpyruvate dioxygenase) inhibitor that prevents formation of carotenoids in susceptible plant species. Without carotenoids, light energy and by-products of photosynthesis destroy chlorophyll and cell membranes resulting in bleaching of leaves followed by necrosis and death of the plant.

The EPA has granted reduced-risk status for Tenacity due to its favorable environmental fate, environmental toxicity, and human health profile when compared to many registered alternatives. It provides control of major turf weeds, including crabgrass, goosegrass, bentgrass, nimblewill, dandelion, clover, speedwell, Canada thistle; plus many others (see label). Product use rates range from 4 to 8 oz per acre. A repeat application in two to three weeks is necessary for control of most weeds that are treated post-emergence. Tenacity herbicide can be used for weed control prior to or at seeding of certain turf species to reduce weed competition at establishment. Tenacity will also control bentgrass contamination in Kentucky bluegrass and perennial ryegrass turf and is compatible with a seeding program into treated areas to enhance conversion.

Physical and chemical properties

<table>
<thead>
<tr>
<th>Call Name:</th>
<th>2,4-Dichloro-6-(2,4-dichlorophenoxy)pyridine</th>
<th>Chemical structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical formula:</td>
<td>C10H7Cl2NO3</td>
<td></td>
</tr>
<tr>
<td>Molecular weight</td>
<td>250.16</td>
<td></td>
</tr>
<tr>
<td>Physical properties</td>
<td>Solid at 24°C; Soluble in 95% ethanol</td>
<td></td>
</tr>
<tr>
<td>pH</td>
<td>7.0</td>
<td></td>
</tr>
<tr>
<td>Volatility</td>
<td>Not volatile</td>
<td></td>
</tr>
<tr>
<td>Evaporation rate at 25°C</td>
<td>0.002 lb/hr</td>
<td></td>
</tr>
<tr>
<td>Evaporation half-life</td>
<td>3 to 12 days (24-hr-bioassay)</td>
<td></td>
</tr>
<tr>
<td>Form</td>
<td>70% wettable powder</td>
<td></td>
</tr>
</tbody>
</table>

Tenacity is:
- A new turf herbicide with a novel mode of action based on a naturally produced compound from the bottlebrush plant (Callistemon citrinis)
- Highly active at low use rates as a pre- and post-emergence herbicide
- Provides selective broad-spectrum dicot and monosot weed control in a number of turf species.
- Absorbable by leaves, shoots, and roots and rapidly translocated in the xylem and phloem of susceptible plants
- Favorable environmental fate and environmental toxicity profile compared to many herbicides
- Can use at or prior to seeding of proposed labeled turf grass species
- Low toxicity to wildlife and aquatic organisms and non-persistent in the environment

*Tenacity™ is not currently registered for use in all states. Please check with your state or local extension service prior to buying or using this product.
Turfgrass species have been tested for both pre-emergence and post-emergence on these species and was found to be safe for turf under trial conditions to both established and newly seeded turf.

- Kentucky bluegrass
- Centipedegrass
- Tall fescue
- Perennial ryegrass
- Fine fescue (creeping red, chewings, and hard)
- St. Augustinegrass (grown for sod)

- Poa pratensis
- Eremochloa ophiuroides
- Festuca arundinacea
- Lolium perenne
- Festuca spp.
- Stenotaphrum secundatum

5–8 fl oz
5–8 fl oz
5–8 fl oz
5 fl oz
5 fl oz
4 fl oz

Tenacity selectively controls bentgrass out of Kentucky bluegrass, perennial ryegrass, and tall fescue turf.

Tenacity controls a number of key dicot weeds such as dandelion, white clover, and buckhorn plantain. (NY, IN)

- Control of crabgrass (PA trial)
  - Comparison of tank mix to untreated check
  - Clear control with 6 oz/A Tenacity and 0.65 lbs ai/A Barricade

- Site of action for Tenacity: Tenacity inhibits the enzyme HPPD (p-hydroxyphenylpyruvate dioxygenase) blocking the formation of plastochron and isopentenol resulting in a number of biochemical reactions including carotenoid synthesis inhibition and the bleaching of new growth.

- Environmental safety
  - The toxicity of Tenacity to aquatic organisms is very low.
  - Mammalian toxicological properties: Tenacity has low acute mammalian toxicity and is not mutagenic, teratogenic, neurotoxic, or a reproductive or developmental toxicant.

- Turfgrass species: Tenacity has been tested on both pre-emergence and post-emergence on these species and was found to be safe for turf under trial conditions to both established and newly seeded turf.

- Data from five trials, 2005–2007, (IL, IN, VA, WA)

Tenacity selectively controls yellow nutsedge in a new seeding of tall fescue. (MD trial)