Soil Treatments

Management of Nematodes and Soilborne Diseases
A number of plant-parasitic nematodes and plant pathogens inhabit the soil and can cause disease in or damage to crops. Soil fumigants (Table 1) can kill plant-parasitic nematodes, soilborne pathogens, insects and weeds in the soil – thereby improving seedling and crop performance. Soil fumigants also kill any beneficial microorganisms in the soil, however, and should be combined with cultural practices that promote good soil health. In addition, many fumigants can be administered only in the presence of a certified applicator. Certified applicators must successfully complete one of the soil fumigant training programs listed on the EPA website (http://www.epa.gov/fumiganttraining). More information on fumigants registered for nematode management in various crops can be found in the nematode sections of this guide.

Unlike conventional farming systems, organic farming systems cannot rely on soil fumigants for disease management. Soil sterilants (Table 2) and microbial biopesticides (Table 3) are alternatives to fumigants. Soil sterilants are simple, safe and economical and are just as effective as fumigants when used in combination with good cultural practices. Although microbial biopesticides are less toxic than soil fumigants, they have a more limited target range, and the efficacy of microbial biopesticides is more variable than fumigants. Information on cultural practices and resistant varieties available to manage nematodes in home gardens can be found in the Nematode-Home Garden section of this guide.

Table 1. Soil fumigants and rates for control of nematodes, soilborne pathogens and weeds

<table>
<thead>
<tr>
<th>Product Choices¹,²</th>
<th>Rate³</th>
<th>Pests Controlled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metam CLR 42% Soil Fumigant</td>
<td>37.5-75 gal</td>
<td>Soilborne fungi and fungal like organisms⁴, Nematodes, Weeds</td>
</tr>
<tr>
<td>Nimitz</td>
<td>3.5-5 pt</td>
<td>Nematodes</td>
</tr>
<tr>
<td>Telone C-17 Soil Fungicide and Nematicide</td>
<td>10.8-45 gal</td>
<td>Garden centipedes, Nematodes, Soilborne fungi and fungal-like organisms⁴</td>
</tr>
<tr>
<td>Vapam HL</td>
<td>37.5-75 gal</td>
<td>Nematodes, Soilborne fungi and fungal-like organisms⁴, Weeds</td>
</tr>
</tbody>
</table>

¹Reference to commercial or trade names is made with the understanding that no discrimination is intended nor endorsement of a particular product by LSU or the LSU AgCenter is implied.
²Not for use in greenhouses or other enclosed areas.
³Rates are the amount of formulation per treated acre for shank applications unless otherwise indicated. Rates vary depending on the crop and soil type. **Always refer to the label for correct rates.**
⁴Includes Clubroot of crucifers, Oak root fungus, Phytophthora, Pythium, Rhizoctonia, Sclerotinia and Verticillium.

Table 2. Soil sterilants for control of soilborne plant pathogens, insects, nematodes and weeds

<table>
<thead>
<tr>
<th>Sterilant</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry heat</td>
<td>180°F, 30 minutes</td>
</tr>
<tr>
<td>Steam heat</td>
<td>145-165°F, 30 minutes</td>
</tr>
<tr>
<td>Soil solarization</td>
<td>99°F, 2-4 weeks</td>
</tr>
</tbody>
</table>
## Soil Treatments

Table 3. Microbial biopesticides for the management of soilborne plant pathogens in organic farming

<table>
<thead>
<tr>
<th>Product Choices2</th>
<th>Biocontrol Organism</th>
<th>Target Diseases</th>
<th>Rate3</th>
<th>Crops</th>
</tr>
</thead>
</table>
| Actinovate AG    | Streptomyces lydicus | Damping-off and rootrots  
  *Fusarium* spp.  
  *Phytophthora* spp.  
  *Pythium* spp.  
  *Rhizoctonia* spp.  
  *Verticillium* spp.  
  Root decay  
  *Phymatotrichum omnivorum*  | 3-12 oz4 | All food crops  
grown from seed |
| Actinovate SP    | Streptomyces lydicus | Damping-off and rootrots  
  *Fusarium* spp.  
  *Phytophthora* spp.  
  *Pythium* spp.  
  *Rhizoctonia* spp.  
  *Verticillium* spp.  
  Root decay  
  *Phymatotrichum omnivorum*  | 4-6 oz/100 gal  
  (ornamentals)  
  18-54 oz/100 gal  
  (turf) | Ornamentals and  
turfgrasses |
| Cease            | Bacillus subtilis    | Sclerotinia diseases  
  *S. sclerotiorum*  
  *S. minor* | 3-6 qt/100 gal | Leafy vegetables |
| Contans WG       | Coniothyrium  
  minitans | Sclerotinia diseases  
  *S. minor*  
  *S. sclerotiorum* | 1-4 lb | Most crops |
| Mycostop         | Streptomyces  
  griseoviridis Strain  
  K61 | Damping-off and rootrots  
  *Alternaria* spp.  
  *Fusarium* spp.  
  *Phomopsis* spp.  
  *Pythium* spp.  
  *Rhizoctonia* spp.  | 1-2 g/cubic yard | Container  
ornamentals  
Vegetable  
transplants |
| Plant Shield® HC  
Biological Foliar and  
Root | Trichoderma  
harzianum | Damping-off and rootrots  
*Fusarium* spp.  
*Pythium* spp.  
*Rhizoctonia* spp.  | 4 oz/100 gal4 | Container  
ornamentals  
Vegetable  
transplants |
| Regalia          | Extract of  
Reynoutria  
sachalinensis | Damping-off and rootrots  
*Fusarium* spp.  
*Phytophthora* spp.  
*Pythium* spp.  
*Rhizoctonia* spp.  
*Verticillium* spp.  
Sclerotinia diseases  
*S. minor*  
*S. sclerotiorum*  
Southern blight  
*Sclerotium rolfsii*  
Clubroot  
*Plasmopara brassicae*  
Common scab  
*Streptomyces scabies* | 1-4 qt | Cotton  
Oil seed crops  
Peanut  
Tobacco Vegetables |
| Root Shield® Granules  
Harzianum | Trichoderma  
harzianum | Damping-off and rootrots  
*Pythium* spp.  
*Rhizoctonia* spp.  
*Wilts*  
*Fusarium* spp.  | 3-12 lb | Bedding plants  
Flowers  
Herbs  
Hydroponic crops  
Oil seed crops  
Ornamentals  
Pome and stone  
fruit  
Tree nuts  
Vegetables |
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<table>
<thead>
<tr>
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<th>Target Diseases</th>
<th>Rate</th>
<th>Crops</th>
</tr>
</thead>
<tbody>
<tr>
<td>SoilGard12G</td>
<td>Trichoderma virens</td>
<td>Damping-off and root rots Pythium spp. Rhizoctonia spp.</td>
<td>See label&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Bedding plants Herbs Ornamentals Vegetables</td>
</tr>
<tr>
<td>T22 HC</td>
<td>Trichoderma harzianum</td>
<td>Damping-off and root rots Fusarium spp. Pythium spp. Rhizoctonia spp.</td>
<td>16-32 oz</td>
<td>Herbs Vegetables</td>
</tr>
</tbody>
</table>

<sup>1</sup>For more information on microbial biopesticides for the management of soilborne pathogens in organic farming, refer to the Ohio State University factsheet HYG-3310-08 (Raudales and McSpadden Gardener, 2008).

<sup>2</sup>Reference to commercial or trade names is made with the understanding that no discrimination is intended or endorsement of a particular product implied by LSU or the LSU AgCenter.

<sup>3</sup>Rates are the amount of formulation per acre unless otherwise indicated.

<sup>4</sup>For agronomic field and row crops, alfalfa hay and forage, small grains and corn apply 1-3 oz/acre.

<sup>5</sup>For use on plants in containers, plug trays or flats.

<sup>6</sup>Rates vary considerably depending on crop and production stage. Refer to labels for specific rates and timing.

The soil treatment section was revised October 2020 by Dr. R. Singh.