Cropping Peppermint on Soils Infested with Verticillium Wilt

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The development of Todd's Mitcham peppermint, a variety tolerant to Verticillium wilt, has made cropping of peppermint feasible in areas where wilt infestation formerly would have prevented recropping with peppermint. This fact sheet provides guidelines for growers who wish to replant Todd's Mitcham peppermint in those areas.

Crop Rotation

Crop rotation reduces the amount of Verticillium in the soil, but only gradually over a period of years. Therefore, fields taken out of peppermint because of wilt should not be replanted even to Todd's Mitcham, unless planting is preceded by three to five years rotation to other crops or by soil fumigation. When replanting fields with a previous wilt history, five or more years rotation is preferred, unless fumigation is used before planting.

Soil Fumigation

The past history of a field can be used to decide whether to fumigate. The wilt potential, or probability of disease occurring, is directly related to the amount of wilt present in the last planting of peppermint and to the number of years crops other than peppermint in the interval since the last peppermint crop.

For soil fumigation, the Verticillium wilt potential can be divided into two categories, high and low. High wilt potential exists in those fields where peppermint has failed due to wilt and the fields have been rotated to other crops for up to four years. Low wilt potential exists in fields that had a small amount of wilt in peppermint; in fields never in peppermint that have received Verticillium inoculum from wind-blown dust, refuse, or water; or in fields severely infested, but rotated out of mint for five or more years.

Todd's Mitcham can be planted in fields with low wilt potential, but it is preferable to fumigate first at low rates of fumigant. Fields with high wilt potential should be fumigated with high rates (see table on other side for fumigants and rates). Other materials such as chloropicrin-methyl bromide mixtures and chloropicrin-ethylene dibromide mixtures have been used successfully for wilt control. These materials are not registered for soil fumigation directly preceding peppermint. It is possible to use these materials legally, however, if one crop for which they are registered is grown between fumigation and peppermint planting. Any soil fumigant to be effective, must be applied properly. Offlooking any of the precautions listed here may result in a failure of the fumigant to control Verticillium wilt.

Organic matter. Little undecayed crop residue should be in the soil. Fungi and nematodes are protected by intact plant material. Undecomposed crop residue also ties up fumigants, lowering the effective concentration within the soil profile. Crops that leave little residue, such as cereals (straw removed) or potatoes, should be planted the year before fumigation. Crops with high residue, such as grass sod or alfalfa, should be avoided the year before fumigation.

Soil moisture. Soil moisture should be adequate for seed germination. Wet soil limits the spread of the fumigant from injection points, whereas dry soil allows the fumigant to escape from the soil.

Extension Service, Oregon State University, Corvallis, Joseph R. Cox, director. This publication was produced and distributed in furtherance of the Acts of Congress of May 8 and June 30, 1914. Extension work is a cooperative program of Oregon State University, the U. S. Department of Agriculture, and Oregon counties.
### Rates of Fumigants

<table>
<thead>
<tr>
<th>Material</th>
<th>Active ingredients</th>
<th>Rates to use (gallons/acre)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Low wilt potential</td>
</tr>
<tr>
<td>Telone (1,3-D)</td>
<td>1,3-dichloropropene and related chlorinated C₃ hydrocarbons 100%</td>
<td>30-35</td>
</tr>
<tr>
<td>Telone C (1,3-D)</td>
<td>Mixture, 1,3-dichloropropene and related chlorinated C₃ hydrocarbons 85% and chloropicrin 15%</td>
<td>25</td>
</tr>
<tr>
<td>Terr-o-cide 15-D</td>
<td>1,3-dichloropropene, 1,2-dichloropropane mixture 85% chloropicrin 15%</td>
<td>25</td>
</tr>
<tr>
<td>Terr-o-cide 30-D</td>
<td>1,3-dichloropropene, 1,2-dichloropropane mixture 70% chloropicrin 30%</td>
<td>25</td>
</tr>
<tr>
<td>Vapam (SMDC)</td>
<td>Sodium methyldithiocarbamate 32.7%</td>
<td>37</td>
</tr>
<tr>
<td>Vorlex</td>
<td>Mixture, 1,3-dichloropropene, 1,2-dichloropropane 85% and methyl isothiocyanate 15%</td>
<td>10-14</td>
</tr>
</tbody>
</table>

Note: All of the above rates of fumigants are sufficient to control nematodes that affect mint production, except low rates of Vapam and Vorlex.

- **Soil temperature.** A common cause of fumigation failure is injection of chemicals into cold, wet soil. Soil temperatures should reach a minimum of 50°F at an 8-inch depth and be rising before fumigant is injected. The ideal temperature is 55 to 75°F at the 8-inch depth. In Oregon, fall fumigation in September or early October gives best results, because soil temperatures are ideal. Spring fumigation is effective if carried out under the proper soil temperature-moisture conditions.

- **Soil aeration.** After the waiting period, the soil should be worked to allow the fumigant to escape. The label of each fumigant material gives directions to be followed exactly. The label interval should be regarded as the minimum time needed for escape of the fumigant. When it rains 1 inch or more, or soil temperature is below 50°F, the aeration period should be extended to avoid crop damage. Crops usually are not damaged if the fumigant cannot be smelled in soil from the 8-inch depth.

- **Waiting period.** After fumigation, a waiting period is necessary to allow the fumigant to spread through the soil to reach and kill the target organisms. The waiting period varies with soil temperature, moisture, texture, and fumigant. If rain falls or the soil temperature drops, the waiting period should be increased. If the soil is wet or cold at the time of application, the length of the waiting period should be increased.

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All normal measures for Verticillium wilt control must be followed even after fumigation and planting with Todd’s Mitcham. These include:

1. Planting certified stock.
2. Flaming stubble immediately after harvest.
3. Limited or no plowing and cultivation.

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