The Pathogen: *Verticillium dahliae*  
**The Disease: Verticillium Wilt**

**Description of Verticillium wilt on Strawberry**

Early in disease development, the wilting leaves often occur only on one side of the plant. Without exception, the dead and dying foliage is restricted to the outer, older parts of crowns and the inner younger leaves remain symptomless.

The internal crown tissue is likewise healthy in appearance and not discolored. In affected fields, symptomatic plants are randomly scattered throughout large sections of the planting.

**Obj 1 Compost**  
Explore disease-suppressive effects of compost

Can compost induce disease suppressive soil conditions?

Disease suppressive soil is a well-known phenomenon in which soilborne diseases fail to develop in spite of high infestation levels. Quantitative and qualitative changes in the soil microflora are generally regarded as the key suppressive mechanism. Some soils are naturally suppressive, however, suppressiveness can be induced by the addition of soil amendments such as compost. Previous work shows promise for managing *Verticillium* wilt with compost.

### CHARACTERIZATION OF COMPOSTS

<table>
<thead>
<tr>
<th>Central Coast Compost</th>
<th>Monterey Compost</th>
<th>Z-Best Gilroy, CA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sonoma Valley Farm (Vermicompost) Sonoma, CA</td>
<td>Morgan Hill &amp; Arroyo Grande, CA</td>
<td>Z-Best Gilroy, CA</td>
</tr>
<tr>
<td>20% steer manure 30-40% green waste fine 35-45% mix of dairy cows straw bedding/steady straw &lt;5% vegetable waste</td>
<td>100% Composted dairy manure+ rice hull biofertilizer fed to worms</td>
<td>100% Yard Trimmings</td>
</tr>
<tr>
<td><strong>Nitrates N</strong> (mg/kg)</td>
<td><strong>pH</strong></td>
<td><strong>EC</strong> (dS/m)</td>
</tr>
<tr>
<td>234</td>
<td>8.1</td>
<td>28</td>
</tr>
<tr>
<td>380</td>
<td>7.0</td>
<td>7.1</td>
</tr>
<tr>
<td>120</td>
<td>7.3</td>
<td>4.8</td>
</tr>
<tr>
<td><strong>C/N</strong></td>
<td><strong>Cost</strong></td>
<td><strong>Application method</strong></td>
</tr>
<tr>
<td>12:1</td>
<td>$550/T</td>
<td>Broadcast</td>
</tr>
<tr>
<td>13:1</td>
<td>$3.5-$5/T</td>
<td>Apply to rootzone + planting hole + in trench</td>
</tr>
<tr>
<td>14:1</td>
<td>Broadcast</td>
<td>Broadcast</td>
</tr>
<tr>
<td>17:1</td>
<td>Broadcast</td>
<td>Broadcast</td>
</tr>
</tbody>
</table>

**FIELD TRIAL, CENTRAL COAST, CA: Experimental Design**

**TREATMENTS**
- Control (UTC)  
- Central Coast Compost, CC 50T/A (+10T/A Z-Best*)  
- Z-Best, ZB 50T/A (+10T/A Z-Best*)  
- Mushroom compost, MC 50T/A (+10T/A Z-Best*)  
- Vermicompost, VC 1 cup in planting hole (+10T/A Z-Best*)

*All beds were amended with 10T/A of ZB compost  
50T/A adds 3% or less of material when broadcast applied

**FIELD TRIAL, CENTRAL COAST, CA: Initial Yield Results**

**FIELD TRIAL, CENTRAL COAST, CA: Initial Root Assays**

**Result**
- Phytomyxa spp.  
- Pythium spp.  
- Rhizoctonia spp.

**Stunted**  
**Healthy**

**Phytophthora spp. were isolated from several plant roots.**

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**TABLE 1.**  
**Leads to higher adoption rates.**

- **Radicchio, arugula, others?**
- **Other rotation crops**
- **Rye, wheat, oats, triticale**

**Figure 3. Recovery of *Verticillium* dahliae from stems of ten leguminous crops grown in microclima-infested potting mix, at low (A) and high (B) inoculum densities.**

**Obj 2. Rotation crops**  
Establish host suitability of rotation crops

To what extent are rotation crops contributing to soil inoculum?  
To which isolates of *V. dahliae* are these crops susceptible?

**Obj 3. Technology transfer**  
Identify the priorities that motivate strawberry grower decisions, in order to focus technology development and design outreach that will lead to higher adoption rates.

The industry-wide shift in strawberry production generates a tremendous need for knowledge transfer and grower support. A social network analysis and grower-identified needs assessment will be employed to identify pathways of knowledge transfer among strawberry growers and to better understand grower perceptions of their goals, needs and management styles to best develop MB-alternative outreach.

**Example of a Q-sort board used in Q-methodology.**

- **Most disagree**  
- **Agree**

**FIGURE 1.**  
**Yield (lbs) of strawberries grown in different composites during the early harvest period.** Proprietary variety # 273M171 yield through May 11, 2013. Each error bar is constructed using 1 standard error from the mean. See above for treatment explanations.

**FIGURE 2.**  
**Roots assayed from stunted plants.**

**TABLE 2.**  
**Characterization of Composts**

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