Pull up the Garlic
Light up the Stove
Throw in some Garlic
Heat up some cloves

Garlic for Breakfast
Garlic for Lunch
Garlic for Dinner
Give me a Bunch!
Stimulated Germination of Allium White Rot Sclerotia Using Diluted Garlic Juice Applied Through Irrigation Water

Fred Crowe, Rhonda Simmons, and Bob Crocker
Oregon State University-COARC
Product Used

Garlic Juice

For R & D

Ingredients: Garlic, Citric Acid

Lot #: 6506-089

MUST KEEP REFRIGERATED (32-36°F)

NET WT. 45 LBS. (18.14 KG.)

THE GARLIC COMPANY
BAKERSFIELD, CA 93314 USA
• **Product affordable if very low rates are effective, but many uncertainties**

  • Will product move downward effectively? Soil type variability? How much need for soil wetting agent?

  • Rate variations with volatility, method of irrigation and product mixing

  • Natural product variability. Could DADS be used similarly?
Garlic Juice Calculations

2 inches water per irrigation
= 7260 ft³/ac/irrigation = 54,460 gal/ac/irrigation

1 PPM = approx. 0.05 gal garlic juice;
garlic juice approx. $8/gallon

<table>
<thead>
<tr>
<th>PPM</th>
<th>Per Ac per Irrigation</th>
<th>Per Ac per 10 Irrigation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gal</td>
<td>$$</td>
</tr>
<tr>
<td>0.1*</td>
<td>0.005</td>
<td>0.04</td>
</tr>
<tr>
<td>1.0*</td>
<td>0.05</td>
<td>0.40</td>
</tr>
<tr>
<td>10</td>
<td>0.5</td>
<td>4.00</td>
</tr>
<tr>
<td>100</td>
<td>5.0</td>
<td>40.00</td>
</tr>
<tr>
<td>1000</td>
<td>50.0</td>
<td>400.00</td>
</tr>
</tbody>
</table>
Soil Wetting agent was used: Advantage® at 8oz/acre
Soil Sample

Blend

Discard 20 mesh

Save 60 mesh

Wet Sieve

Sclerotia

Decant

Wash into Petri Plate

Viability Test

Count

Suspend Sclerotia

Discard
**COARC Plot Plan**

<table>
<thead>
<tr>
<th>96</th>
<th>609</th>
<th>582</th>
<th>395</th>
<th>568</th>
<th>450</th>
<th>500</th>
<th>764</th>
<th>700</th>
<th>455</th>
<th>455</th>
<th>232</th>
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<tbody>
<tr>
<td>32</td>
<td>345</td>
<td>423</td>
<td>373</td>
<td>400</td>
<td>328</td>
<td>341</td>
<td>309</td>
<td>296</td>
<td>323</td>
<td>232</td>
<td>232</td>
</tr>
</tbody>
</table>

- Intact viable sclerotia present in each plot pre treatment
- These converted to percentages, with pre-trt = 100%
- Soil Wetting agent was used: Advantage® at 8oz/acre
### Soil Temperature Highs and Lows at 4 & 8 Inches
#### Apr-Oct 2007, Madras OR

<table>
<thead>
<tr>
<th>Date</th>
<th>Temperature (F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min Temp 4&quot;</td>
<td>Max Temp 4&quot;</td>
</tr>
<tr>
<td>Min Temp 8&quot;</td>
<td>Max Temp 8&quot;</td>
</tr>
<tr>
<td>1-Apr</td>
<td>32</td>
</tr>
<tr>
<td>15-Apr</td>
<td>37</td>
</tr>
<tr>
<td>29-Apr</td>
<td>42</td>
</tr>
<tr>
<td>13-May</td>
<td>47</td>
</tr>
<tr>
<td>27-May</td>
<td>52</td>
</tr>
<tr>
<td>10-Jun</td>
<td>57</td>
</tr>
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<td>24-Jun</td>
<td>62</td>
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<tr>
<td>8-Jul</td>
<td>67</td>
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<td>22-Jul</td>
<td>72</td>
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<tr>
<td>5-Aug</td>
<td>77</td>
</tr>
<tr>
<td>19-Aug</td>
<td>82</td>
</tr>
</tbody>
</table>

The graph above shows the temperature highs and lows at 4 and 8 inches for the period Apr-Oct 2007 in Madras, OR.
Mean Percentage of Intact, Viable Sclerotia Recovered in Plots Irrigated 2x-Monthly with Diluted Garlic Juice*
Observations Under the Microscope

1. No germination seen from untreated plots
2. Germinating sclerotia observed from all treated plots May into July.
3. More germination was observed at highest rates of application
4. No germination was seen after July
Conclusions

- Low rates of garlic juice were effective in eliciting germination responses even when crudely applied as in this experiment.

- Limited data on depth of recovery indicated no depth-related differences.

- Germination responses stopped as soil temperatures exceeded 70°F, even at 8 inches depth. Typically we use 72°F as the upper limit but perhaps this should be lowered?

- Data very preliminary. Further research on repeated application of low rates of germination stimulants (juice, DADS, etc.) may be justified.
Reminder

- Authorization is approved for my replacement in central Oregon

- 2 acres of heavily and uniformly infested soil remain available for future research at COARC in Madras
Field Infestation

2004-2005
2006-2006
2007-2008
Thank you for many years of support. I hope I’ve helped. It’s been a pleasure working with you.
High root density
Garlic White Rot: Pre- and Post-Harvest Inoculum Densities

![Graph showing inoculum densities]
Seed

Roots

U/H

Roots

Seed

Undercut/

Harvest

J NOSAJJMAMF

J NOSAJJMAMF

72°F

Daily 2”

Minimum

soil

temperature

72°F

Parma

Hermiston

48°F

Walla Walla, Central Calif dehy
Cumulative Percent White Rot
Davis, CA 1976-77

Weeks after Emergence

% White Rot

0 2 5.5 9 13 17 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

0 2 5.5 9 13 17

0.1 0.5 1.8 7.2 29 120 460 1900

Weeks after Emergence
Response of Sclerotia of Sclerotium cepivorum to Allium Stimulants

[21 days]

Crowe & Hall, 1980
Phytopath 70:74-78