Comparison of Fumigation Methods in Potatoes

Shane Hansen

Potato Early Dying

- Primarily caused by *Verticillium dahliae*
- Interaction with the root lesion nematode
**Metam Sodium and Potassium**

- Effective against *Verticillium dahliae*.
- Some nematicide activity
  - Root lesion
  - Root knot
- Some weed control
- High active ingredient load
  - 40 gallons/acre = 170 lb a.i.
- Expensive
  - $\$4.90$/gallon x 40 gallon/acre = $\$196$/acre
- Regulatory headache

**Broadcast Fumigation**

[Images of broadcast fumigation equipment]
Broadcast Fumigation

Metam Sodium @ 40 gal/acre

In-Row Fumigation

- 20-30 gal/acre
- 85-127 lb ai/acre
- $98-$147/acre
- One less pass through field
Metam Sodium @ 30 gal/acre
Chloropicrin @ 8.5 gal/acre

In-Row Fumigation

2017 Plant Vigor – Russet Burbank

% Canopy Health

10-Aug
22-Aug

Check Vapam In-Row Vapam Broadcast
2017 Plant Vigor – Russet Norkotah 296

% Canopy Health

Check | Vapam In-Row | Vapam Broadcast

10-Aug: c, bc, ab
22-Aug: b, a, a
2017 – Effect on Nematodes

Very little root lesion nematodes

2014 – Columbia Root Knot
2014 – Stubby Root

![Graph showing the number of corky ringspot (TRV) per 500 cm³ for different treatments:]

- Check
- Vydate program
- Vydate + Vapam (20)
- Vapam (40)

2017 – Total Yield

![Graph showing the total yield in Cwt/acre for different treatments:]

- Burbank
  - Check: 633 b
  - Vapam In-Row: 729 a
  - Vapam Broadcast: 699 a

- Norkotah 296
  - Check: 683 b
  - Vapam In-Row: 775 a
  - Vapam Broadcast: 776 a
2017 – Percent > 10 OZ

% > 10 OZ

Burbank

- Check
- Vapam In-Row
- Vapam Broadcast

2017 – Gross Return Burbank

$/acre

- Processing
- Fresh Pack

- Check
- Vapam In-Row
- Vapam Broadcast
2017 – Net Return Burbank

Processing

Vapam In-Row  Vapam Broadcast

$/acre

0  200  400  600  800  1000  1200

838  1081

2017 – Net Return Burbank

Fresh Pack

Vapam In-Row  Vapam Broadcast

$/acre

0  500  1000  1500  2000  2500

1018  2174

1018
2017-Dollar Return Processed

- In-Row Vapam $1 → $5.70
- Broadcast Vapam $1 → 5.52

2017-Dollar Return Fresh Pack

- In-Row Vapam $1 → $6.93
- Broadcast Vapam $1 → 11.09
Summary – 2017

- Nematode counts very low.
- Both methods increased yields for Burbank and Norkotah.
- Broadcast Vapam results in increased size in Burbank.
- All methods similar for yield and quality on Norkotah 296.
Fumigation Research Summary

<table>
<thead>
<tr>
<th>Year</th>
<th>Trial Type</th>
<th>Variety</th>
<th>Broadcast vs. UTC</th>
<th>In-Row vs. UTC</th>
<th>Broadcast vs. In-Row</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014 Field</td>
<td>Burbank</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>2014 Field</td>
<td>Norkotah 278</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>2014 Field</td>
<td>Canella</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>2014 Field</td>
<td>Norkotah 285</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>2015 Small Plots</td>
<td>Norkotah 296</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>2015 Field (2)</td>
<td>Burbank</td>
<td>--</td>
<td>No</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>2016 Small Plots</td>
<td>Norkotah 296</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>2017 Small Plots</td>
<td>Burbank</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>2017 Small Plots</td>
<td>Norkotah 296</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>2018 Small Plots</td>
<td>Norkotah 296</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

Optimizing Shank Injection Fumigation Using Metam Sodium

- Cooler temperatures are better (< 50 F)
  - 39 F was better than 59 F or 55 F
  - MITC movement in soil is slower
- Single injection depth just as effective as two
  - 10” vs 6 + 10”
- Metam rate more critical at higher temps
  - Rate response (40, 50, 60, 70 gallons) at 55 F
    - Higher (70 gal) can be more effective than lower (40 gal)
    - All rates similar at 39 F
- Marketable yield higher at 39 F fumigation

-Neil C. Gudmestad, Ph.D
Questions?