Using Soil Fumigants with Totally Impermeable Film Mulch

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Totally Impermeable Film Mulch

- An extension of VIF films
- Keep more fumigant in the ground longer
- Greater retention leads to greater exposure
- Extended exposure could maintain efficacy with lower application rates
Retention of Paladin by Various TIF Brands - Spring 2014

- Berry
- Raven
- Guardian

PPM Isobutylene Equivalent vs Days After Fumigation

Days After Fumigation:
- 26
- 29
- 32
- 40

Retention levels are indicated by the height of the bars, with "ns" indicating no significant difference.
Paladin and TIF

• Treatment (broadcast rates)
  – Untreated black Raven Vaporsafe TIF
  – Untreated black Blockade VIF
  – 20 GPA (191 lb/A) Paladin: Pic (79:21) TIF
  – 30 GPA (286 lb/A) Paladin: Pic (79:21) TIF
  – 40 GPA (382 lb/A) Paladin: Pic (79:21) TIF
  – 50 GPA (478 lb/A) Paladin: Pic (79:21) TIF
  – 50 GPA Paladin: Pic (79:21) VIF
  – 60 GPA (573 lb/A) Paladin: Pic (79:21) VIF
Materials and Methods

- Mulch was deployed on 14 June 2011
- Sandy loam soil
- BHN 602 seedlings were transplanted on 25 July 2011
- 41 days post fumigation
- Beds were 8” tall and 30” wide
Materials and Methods

- *Sclerotium rolfsii* was cultured and sclerotia were collected
- Sclerotia were buried in sachet bags at a depth of 4 inches
- Bags were buried the morning following fumigation
- Bags were retrieved before planting
- Sclerotia were surface sterilized and plated on acidified PDA
Isobutylene (ppm)

Days after treatment

20 GPA TIF
30 GPA TIF
40 GPA 1.1 TIF
40 GPA TIF
50 GPA TIF
50 GPA VIF
60 GPA VIF

Paladin Retention Fall 2011
Paladin:Pic(79:21) concentration (ppm isobutylene) under TIF – Fall 2011

<table>
<thead>
<tr>
<th>Days After Treatment</th>
<th>15</th>
<th>17</th>
<th>20</th>
<th>22</th>
<th>24</th>
<th>27</th>
<th>29</th>
<th>31</th>
<th>34</th>
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<tr>
<td>20 GPA TIF</td>
<td>10445</td>
<td>7937</td>
<td>5215</td>
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<td>30 GPA TIF</td>
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<td>14233</td>
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<td>15000</td>
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<td>152</td>
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<td>Paladin: Pic (79:21) concentration (ppm isobutylene) under TIF – Spring 2011</td>
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<tr>
<td>Days after treatment</td>
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<td><strong>128</strong></td>
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### Paladin TIF Fumigation – Fall 2011

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Medium</th>
<th>Large</th>
<th>X-Large</th>
<th>Marketable</th>
<th>Nutsedge/ft²</th>
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<tr>
<td>Untreated VIF</td>
<td>2638 d</td>
<td>6365 c</td>
<td>9202 b</td>
<td>18205 c</td>
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<td>7211 ab</td>
<td>16862 ab</td>
<td>24436 a</td>
<td>48509 ab</td>
<td>0.5 b</td>
</tr>
</tbody>
</table>

Z Means not followed by the same letter are significantly different at P ≤ 0.05 by Duncan’s multiple range test.
<table>
<thead>
<tr>
<th>Treatment</th>
<th>Sclerotium rolfsii</th>
<th>% germinating sclerotia</th>
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<tr>
<td>Untreated VIF</td>
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<td>57.5 a</td>
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<tr>
<td>20 GPA 79:21 TIF</td>
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<td>10.0 bc</td>
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<td>0.0 c</td>
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<tr>
<td>60 GPA 79:21 VIF</td>
<td></td>
<td>2.5 bc</td>
</tr>
</tbody>
</table>

\(^2\) Means not followed by the same letter are significantly different at P ≤ 0.05 by Duncan’s multiple range test.
Pic Clor 60 and TIF

- Fumigant applied June 27, 2014
- Loamy fine sand
- Athena cantaloupe was transplanted July 30, 2014
- 33 days post fumigation
- Beds were 8” tall and 30” wide
Materials and Methods

• Treatment (broadcast rates)
  – Untreated black Blockade VIF
  – 250 lb/A Pic Clor 60 Blockade VIF
  – 100 lb/A Pic Clor 60 Vaporsafe TIF
  – 150 lb/A Pic Clor 60 Vaporsafe TIF
  – 200 lb/A Pic Clor 60 Vaporsafe TIF
  – 250 lb/A Pic Clor 60 Vaporsafe TIF
Pic-Clor 60 Concentration Under TIF Films

PPM Isobutenylene Equivalent

Days after fumigation:

- 6
- 14
- 19
- 21

Concentrations:

- 250 lb VIF
- 100 lb TIF
- 150 lb TIF
- 200 lb TIF
- 250 lb TIF
Effect of Pic-Clor 60 Rate on Nutsedge Density

- UTC
- 250 lb VIF
- 100 lb TIF
- 150 lb TIF
- 200 lb TIF
- 250 lb TIF

Emerged Nutsedge per Square Foot

UTC: a
250 lb VIF: ab
100 lb TIF: abc
150 lb TIF: abc
200 lb TIF: bc
250 lb TIF: c
TIF Fumigation Cost

• Paladin + Pic 79:21 478 lb/Acre VIF ($2.03/lb)
  – $407 + $390 (film) = $797

• Paladin + Pic 79:21 334 lb/Acre TIF
  – TIF - $285 + $453 (film) = $738

• Pic Clor 60 250 lb/Acre VIF ($3.70/lb)
  – $385 + $390 = $775

• Pic Clor 60 200 lb/Acre TIF
  – $308 + $453 = $761
TIF Conclusions

- Rate reductions 20-50% possible with Pic Chlor 60 and Paladin
- Utilizing TIF will increase plant back interval by 4-7 days with Paladin
- Increased buffer zone credits 20% depending on fumigant
- Based on a 20% rate reduction and a 15% increase in film costs TIF saves input costs with Pic Chlor 60 and Paladin based on fumigant cost savings alone
Questions?