Organic Weed Management in Field Crops

Erin Taylor, Karen Renner, and Christy Sprague
Department of Crop and Soil Sciences

Dale Mutch and Todd Martin
Kellogg Biological Station
Organic Field Crop Weed Control Options

Water

Steel

Fire

http://academic.evergreen.edu/curricular/experiencejapan/assets/img/toyooka_rice_patty.jpg
Flaming for Weed Control

1. Propane flamer versus rotary hoe

2. Flaming time of day

3. Tractor speed for flaming
Flamer vs. Rotary Hoe

- Alma, MI

- Soybean (organic) flamed at:
  - VE in 2006
  - PRE in 2007

- Weeds at cotyledon stage

- Treatments
  - Flame + cultivate
  - Rotary hoe + cultivate
  - Flame + rotary hoe + cultivate

- Measurements
  - Weed density
  - Fuel use
  - Hand labor costs
Flamer vs. Rotary Hoe

Weed Control Results

- 2006- Flaming reduced giant foxtail
- 2007- No difference
  - Low weed pressure
  - Dry year

<table>
<thead>
<tr>
<th>RH alone</th>
<th>Flamer alone</th>
</tr>
</thead>
</table>

(Images of weed control results)
## Flamer vs. Rotary Hoe

### Total costs of weed control ($/acre)

<table>
<thead>
<tr>
<th>Year</th>
<th>Rotary Hoe Only</th>
<th>Flamer Only</th>
<th>Flamer + Rotary Hoe</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>$54</td>
<td>$46</td>
<td>$48</td>
</tr>
<tr>
<td>2007</td>
<td>$35</td>
<td>$54</td>
<td>$42</td>
</tr>
</tbody>
</table>

- Economic analysis includes:
  - Diesel fuel costs
  - Propane costs
  - Hand labor costs
Flaming Time of Day

- Kellogg Biological Station
- Corn @ V3 stage
- Weeds @ ¾-2”
- Flaming times= 8am, Noon, 4pm, & 8pm
- Additional treatment= Rotary hoe only
- All plots uniformly cultivated
- Weed densities measured @ 3 permanent stations
Flaming Time of Day

- **Reduction in Weed Density (%)**
  - 8 a.m.: 78.1 °
  - 12 p.m.: 84.6 °
  - 4 p.m.: 91.2 °
  - 8 p.m.: 83.5 °

- **Humidity (%)**

<table>
<thead>
<tr>
<th>Time of Flaming</th>
<th>Percent Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 a.m.</td>
<td>40</td>
</tr>
<tr>
<td>12 p.m.</td>
<td>55</td>
</tr>
<tr>
<td>4 p.m.</td>
<td>50</td>
</tr>
<tr>
<td>8 p.m.</td>
<td>30</td>
</tr>
</tbody>
</table>
Flaming Time of Day

Corn 4 days after flaming
Conclusions

- Differences were not explained by humidity & temperature
- 1 month later, no weed differences among timings
- Better broadleaf control than grass
- Fewer weeds in rotary hoe treatment (2.5/ft²) than flaming treatments (15/ft²)
Tractor Speed for Flaming

- Alma, MI
- Soybean @ PRE
- Weeds @ cotyledon stage
- Speeds= 3.5, 4.0, 4.5, 5.0, & 5.5 mph
- All plots rotary hoed and cultivated uniformly
- Weed densities measured
  - 4 days after flaming
  - 1 month after flaming
Tractor Speed for Flaming

![Graph showing the relationship between tractor speed and weed density.](image)
Tractor Speed for Flaming

July 12th 2007 - After cultivation, before hand weeding

4.0 mph

5.5 mph
Other Flaming FAQ

- Average LP use/acre = 7-9 gpa
- Average costs in Alma, MI = $9-13/acre
- LP pressure
  - 35 psi in Alma, MI
  - 30 psi at KBS