Soybean aphid reproduction at summer temperatures

Marlin E. Rice
Iowa State University, merice@iastate.edu

Follow this and additional works at: http://lib.dr.iastate.edu/cropnews

Part of the Agricultural Science Commons, Agriculture Commons, and the Entomology Commons

Recommended Citation
http://lib.dr.iastate.edu/cropnews/1587

The Iowa State University Digital Repository provides access to Integrated Crop Management News for historical purposes only. Users are hereby notified that the content may be inaccurate, out of date, incomplete and/or may not meet the needs and requirements of the user. Users should make their own assessment of the information and whether it is suitable for their intended purpose. For current information on integrated crop management from Iowa State University Extension and Outreach, please visit https://crops.extension.iastate.edu/.
Soybean aphid reproduction at summer temperatures

Abstract
One of the more frequently asked questions about soybean aphids is how fast do they reproduce and how long do they live? Now we have an answer based on research from the University of Minnesota. Temperature effects on soybean aphid reproduction and survival have not been well understood until now. Minnesota entomologists determined the optimal temperature for soybean aphid growth and reproduction on soybean under controlled conditions. They conducted their experiments at constant temperatures of 68, 77, 86, and 95°F with a photoperiod of 16:8 (light:dark) hours.

Keywords
Entomology

Disciplines
Agricultural Science | Agriculture | Entomology

This article is available at Iowa State University Digital Repository: http://lib.dr.iastate.edu/cropnews/1587
Soybean aphid reproduction at summer temperatures

One of the more frequently asked questions about soybean aphids is how fast do they reproduce and how long do they live? Now we have an answer based on research from the University of Minnesota.

Temperature effects on soybean aphid reproduction and survival have not been well understood until now. Minnesota entomologists determined the optimal temperature for soybean aphid growth and reproduction on soybean under controlled conditions. They conducted their experiments at constant temperatures of 68, 77, 86, and 95°F with a photoperiod of 16:8 (light:dark) hours.

Soybean aphid development is best between 77 and 86°F, with the optimal temperature estimated to be 82°F, at which time birth to first reproduction was predicted to be 4.5 days. At temperatures between 68 and 86°F, the pre-reproductive period takes five to seven days before aphids start giving birth to nymphs. Nymphs exposed to higher temperatures of 95°F did not complete development, never produced offspring, and all died within 11 days. The base threshold for soybean aphid development is 47.5°F; below this temperature no growth of the aphid occurs.

At temperatures between 68 and 86°F, a soybean aphid population can double in size every 1.5-1.9 days. Soybean aphids reared at the lower temperatures produced significantly more offspring and for a longer period than aphids at higher temperatures. In general, as temperatures increase, survivorship of aphids decreases. The soybean aphid is basically a "cool" weather insect and is not well adapted to "warmer" temperatures. This may explain why we have experienced more aphid problems in northeast Iowa than southwest Iowa.

These data represent aphid population growth potential in the absence of other factors and at constant temperatures. Under normal fluctuating temperatures, their population growth would be expected to be slightly different than what was observed in the laboratory. Also, aphid populations in the field may be impacted by plant stage, pathogens, predators, and parasitoid wasps. These factors can certainly help delay the population increase and give farmers and crop consultants more time to make management decisions. This research was recently published in the *Journal of Economic Entomology* by Brian McCormack, David Ragsdale, and
Rob Venette from the University of Minnesota.

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Days before reproduction</th>
<th>Nymphs born per day&lt;sup&gt;1&lt;/sup&gt;</th>
<th>Nymphs born per female</th>
<th>Population doubling time (days)</th>
<th>Average life expectancy (days)</th>
<th>Maximum life expectancy (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>68°F</td>
<td>7</td>
<td>6.5</td>
<td>75</td>
<td>1.9</td>
<td>22</td>
<td>36</td>
</tr>
<tr>
<td>77°F</td>
<td>5</td>
<td>9.5</td>
<td>73</td>
<td>1.5</td>
<td>15</td>
<td>31</td>
</tr>
<tr>
<td>86°F</td>
<td>5</td>
<td>3.5</td>
<td>23</td>
<td>1.9</td>
<td>12</td>
<td>24</td>
</tr>
<tr>
<td>95°F</td>
<td>--</td>
<td>0</td>
<td>0</td>
<td>--</td>
<td>3</td>
<td>11</td>
</tr>
</tbody>
</table>

<sup>1</sup>at peak reproduction.

This article originally appeared on page 87 of the IC-492(15) -- July 12, 2004 issue.

Source URL:
http://www.ipm.iastate.edu/ipm/icm/ipm/icm/2004/7-12-2004/soyrepro.html

Links: