25. Insect Resistant Soybean

During vegetative stages of soybean plant growth, either before bloom or after pod formation, soybean plants can often compensate for leaves lost to defoliating insects by producing new leaves. But during bloom and pod development, the threshold for defoliation that a soybean plant can tolerate without suffering economic yield loss is lowered by almost half. When defoliating insects such as velvetbean caterpillar, soybean looper and corn earworm occur in high populations, they can defoliate entire fields.

Soybean production in the Southeastern and Delta states of Georgia, Alabama, Mississippi, Louisiana and South Carolina is under greater insect pest pressure than other production regions because the warmer climate encourages insect survival and reproduction, and because of the proximity to tropical regions where several insects overwinter, particularly defoliators. Each spring moths migrate north into the US from tropical regions. Consequently, insecticide use in southern soybean production is higher than the national average, with approximately one third of soybean acreage in Southeastern and Delta states regularly treated with insecticides, as compared to the national average of 1%. An estimated 295,000 pounds of active ingredient, with a cost of approximately $10 million, is applied to southern soybean acreage annually. However, economic losses amounting to $4.4 million/yr. from defoliating pests are still seen, as not all infested acreage is treated.

Natural insect resistance exists in the soybean genome, but efforts to couple that resistance with commercially viable yields through traditional breeding have been unsuccessful. Through biotechnology, however, researchers have been able to introduce genes from a Bt protein and natural caterpillar-resistance genes from exotic Japanese soybean lines into a soybean variety commercially viable in the US. In preliminary trials, transgenic varieties with stacked resistance have shown a wide range of protection from caterpillar pests, with Bt genes providing protection against velvetbean caterpillar and lesser cornstalk borer, and the resistance genes from the exotic Japanese line providing protection against soybean looper and corn earworm.

Potential Impacts of Insect Resistant Transgenic Soybean

<table>
<thead>
<tr>
<th>Change in Production:</th>
<th>increase of 54 million lb/yr (+ $4.4 million/yr.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in Pesticide Use:</td>
<td>295,000 lbs/yr reduction in insecticides (-67%)</td>
</tr>
<tr>
<td>Change in Production Costs:</td>
<td>$2.4 million/yr. net savings</td>
</tr>
</tbody>
</table>

Contacts:
Wayne Parrott                      Jack Baldwin
University of Georgia              Louisiana State University
Phone: 706-542-0928                Phone: 504-388-4141
Email: wparrot@arches.uga.edu      Email: jhbaldwin@agctr.lsu.edu


Contact: Sara Pace
Phone: 202-328-5044
Email: pace@ncfap.org

For the full report click here