An Economic Perspective on Outcomes

Leah Duzy
Compliance Services International
CLA
1. Production agriculture and pesticides
2. Economic impact of restrictions on pesticides
3. Role of voluntary conservation
Benefits describe how well a pesticide prevents negative impacts to public health, industry, or agriculture.

Pesticides can benefit society by controlling pests that:
1) Cause or carry disease
2) Cause environmental damage
3) Cause damage to industrial materials
4) Reduce food production
All of that amounts to just the hors d’oeuvres. So far, scientists have discovered more than two hundred and fifty plants that the brown marmorated stinkbug will consume. Together, those plants represent every major agricultural and horticultural sector of the American economy: vegetables, fruit trees, berries, nuts, ornamental plants, and row crops, including sweet corn, cotton, soybeans, and virtually every other legume.
Apple growers in the Mid-Atlantic estimated they lost over $37 million due to stinkbug damage in 2010.

In 2010, peach growers in PA lost almost 50% of their crop ($15 million) and in MD some growers lost 100%.

Source: https://www.newyorker.com/magazine/2018/02/12/when-twenty-six-thousand-stinkbugs-invade-your-home; photo credit – USDA, ARS – Scott Bauer (Apples) and Ken Hammond (Peaches).
CSIRO scientists have confirmed the hybridization of two of the world’s major pest species, into a new and improved mega-pest.

“One of the pests, the cotton bollworm, is widespread in Africa, Asia and Europe and causes damage to over 100 crops, including corn, cotton, tomato and soybean.”

“The other pest, the corn earworm, is a native of the Americas and has comparatively limited resistance and host range.”

Analyze the economic impacts of:

1) New uses of pesticides
2) Registration of new active ingredients
3) Potential restrictions on continued use of a particular pesticide

Goal is to express the biological impacts of yield loss, reduced crop quality, and alternative pest control methods in economic terms.
Restriction (Loss of use, buffers, etc.)

Production Options
- No Change
- Alternative Product
- Alternative Crop
- Land taken out of production

Production Options
- Resistance? Future pests?
- Efficacy? Cost? Resistance?
- Market? Restrictions? Establishment?
- Production? Profitability?
### Pesticide Use

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Planted acres</td>
<td>1,000 acres</td>
<td>81,740</td>
<td>993</td>
</tr>
<tr>
<td>Acres treated with any pesticide</td>
<td>% of planted acres</td>
<td>97.33</td>
<td>93.01</td>
</tr>
<tr>
<td>Number of treatments with any pesticide</td>
<td>Number</td>
<td>3.37</td>
<td>12.94</td>
</tr>
<tr>
<td>Treatment rate with any pesticide</td>
<td>lbs a.i. per treated acre</td>
<td>2.33</td>
<td>7.16</td>
</tr>
<tr>
<td>Acres treated with insecticide</td>
<td>% of planted acres</td>
<td>9.28</td>
<td>44.32</td>
</tr>
<tr>
<td>Number of treatments with insecticide</td>
<td>Number</td>
<td>1.25</td>
<td>2.09</td>
</tr>
<tr>
<td>Treatment rate with insecticide</td>
<td>lbs a.i. per treated acre</td>
<td>0.19</td>
<td>0.71</td>
</tr>
<tr>
<td>Acres treated with herbicide</td>
<td>% of planted acres</td>
<td>95.11</td>
<td>91.15</td>
</tr>
<tr>
<td>Number of treatments with herbicide</td>
<td>Number</td>
<td>2.85</td>
<td>4.91</td>
</tr>
<tr>
<td>Treatment rate with herbicide</td>
<td>lbs a.i. per treated acre</td>
<td>2.25</td>
<td>1.92</td>
</tr>
<tr>
<td>Acres treated with fungicide</td>
<td>% of planted acres</td>
<td>7.49</td>
<td>84.97</td>
</tr>
<tr>
<td>Number of treatments with fungicide</td>
<td>Number</td>
<td>1.37</td>
<td>7.77</td>
</tr>
<tr>
<td>Treatment rate with fungicide</td>
<td>lbs a.i. per treated acre</td>
<td>0.12</td>
<td>3.86</td>
</tr>
</tbody>
</table>

Source: Agricultural Resource Management Survey (ARMS), USDA.
## Getting started: What questions need to be answered?

<table>
<thead>
<tr>
<th><strong>WHO?</strong></th>
<th><strong>WHAT?</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Which active ingredient is under review/being registered/evaluated?</td>
<td>What crops are being grown using the a.i.? What restrictions are being proposed?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>WHERE?</strong></th>
<th><strong>WHY?</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Where are the crops being grown? Do those acres overlap with where the product is being used?</td>
<td>Why are producers using the product/need the product? Which pests are being targeted?</td>
</tr>
</tbody>
</table>
AGSIM

- National model for the U.S.
- Supported by EPA since the early 1980’s
- Major Commodity Crops
  - Corn, Cotton, Peanuts, Rice, Soybeans, Wheat, Barley, Oats, Sorghum, and Hay
- Specialty Crops
  - Apples, Oranges, Potatoes, Fresh Tomatoes, and Processing Tomatoes
- Investigate production changes, such as yield, acreage, and variable costs.
Objective: model the aggregate economic impact of the loss or significant limitation of pesticides based on per-acre yield and variable cost changes from research conducted in 1990 and 1993.

Purpose: provide a reference point for future analyses, such as crop-specific or regional, ESA-specific impact analysis.

The costs of reduced pesticide use were modeled using AGSIM for corn, cotton, peanuts, rice, soybeans, and wheat and for specialty crops including apples, oranges, potatoes, fresh tomatoes, and tomatoes for processing. Barley, oats, sorghum, and hay were included to obtain the acreage substitution effects with the other field crops.
General Results

• Adverse economic impact due to a substantial increase in costs to consumers.

• With higher prices, consumers spend more on food items, and consumption of domestically produced food declines.

• Under a scenario without pesticides, consumers would have limited or no supply of some domestically grown fruits and vegetables, such as apples and fresh tomatoes.

• More acres would be brought into production to account for lost production due to lower yields.

• Additionally, foreign producer income would increase due to the increase in imports to the US.
Voluntary Conservation

- Conservation practices installed on working lands through Federal conservation programs (EQIP, CSP, CRP).
- There are also state programs, as well as locally led programs (Atrazine Program administered by the City of Wichita)
- Non-profits and industry-sponsored programs
- Conservation practices are being installed that directly benefit species and provide numerous other environmental benefits.
Benefits flow from grower level to national level.

Costs flow from the national level down to the grower level.

How do you define the baseline? Benefits accrue to new conservation.
Riparian Buffers, Filter Strips, and Other Conservation Practices

- Practices, such as riparian forest buffers, may take land out of production.
- Management practices, such as conservation tillage and use of precision agriculture, may limit drift and runoff.
- Conservation adoption is complicated.
  - Depends on cost, understanding of need, ability of the producer to adapt to new management requirements.

What are the economic consequences to growers? Does it have regional or national implications?
Thank you!

Leah M. Duzy
Principal Consultant/Agricultural Economist
Compliance Services International

7501 Bridgeport Way West
Lakewood, WA 98499
(706) 980-0999 – lduzy@complianceservices.com