Can Residue Decline Curves Help Compliance with Foreign and Secondary MRLs?

Molly Miller
Import Tolerance Strategist
BASF Agricultural Solutions
How are Residue Data Generated?

- Registrants generate residue data based on max use rate, max number of applications, min spray interval, and min PHI.

- Trials to support MRLs are conducted in the country of registration.

- The number of residue trials vary.
Residue Data Example: Grapes

<table>
<thead>
<tr>
<th>Residue Control Number</th>
<th>County/State</th>
<th>EPA Region</th>
<th>PHI</th>
<th>GPA</th>
<th>Residue (ppm)</th>
<th>Total Residue (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>BAS</td>
<td>F</td>
</tr>
<tr>
<td>50 GPA (Treatment 2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>97131</td>
<td>Yates County, NY</td>
<td>I</td>
<td>14</td>
<td>50</td>
<td>0.75²</td>
<td>0.09²</td>
</tr>
<tr>
<td>97132</td>
<td>Kern County, CA</td>
<td>X</td>
<td>14</td>
<td>50</td>
<td>0.33</td>
<td>0.08</td>
</tr>
<tr>
<td>97133</td>
<td>Fresno County, CA</td>
<td>X</td>
<td>14</td>
<td>50</td>
<td>0.49</td>
<td>0.11</td>
</tr>
<tr>
<td>97134</td>
<td>Glenn County, CA</td>
<td>X</td>
<td>14</td>
<td>50</td>
<td>0.66</td>
<td>0.09</td>
</tr>
<tr>
<td>97135</td>
<td>Fresno County, CA</td>
<td>X</td>
<td>14</td>
<td>50</td>
<td>0.21</td>
<td>0.04</td>
</tr>
<tr>
<td>97136</td>
<td>Hood River County, OR</td>
<td>XI</td>
<td>14</td>
<td>50</td>
<td>1.34²</td>
<td>0.15²</td>
</tr>
<tr>
<td>Average Residue (ppm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.63</td>
<td>0.09</td>
</tr>
</tbody>
</table>
Why are Decline Curves Generated?

- DCs establish the relationship between residues at a range of PHIs. May be affected by:
  - Application timing/ Size of commodity at application
  - PreHarvest Interval/ Size of the commodity at harvest

- DCs may not be linear. Depending on properties, compounds may be affected by:
  - Exposure to Sunlight (photolysis)
  - Moisture levels (hydrolysis)
  - Plant uptake
  - Plant Metabolism
Decline Curve Example- Textbook

Leaf Lettuce
Average Decline

Residue

Initial Residue

1/2 Initial Residue

PHI (days)
Decline Curve Example - Lettuce

Field Lettuce - BASF

- $y = 6.4881e^{-0.08x}$
- $R^2 = 0.9755$

Pre-Harvest Interval (days)

Residue (mg/kg)
Decline Curve Example - Lettuce
What is learned from Decline Curve data?

- Provides information to:
  - Estimate likely residues at PHIs longer than the label.
  - Estimate total residues compared to parent. May be useful in estimating MRLs where there are different residue definitions.
  - Estimate residues at an alternative PHI in case of dietary risk concerns at the target PHI.
What are the Limitations of Decline Curves?

- Few data points provide only a general idea of the behavior of the molecule.

- Like residue trials to support the MRL, trials are conducted at the max rate and number of applications, which may differ from a commercial situation.

- May not be a linear relationship between residue and time, making exact predictions of residues difficult.
MRLs vs. Secondary Standards

- MRLs are enforcement and trading standards established by authorities.
- Differences in MRLs are often related to local use patterns or residue definitions.
- Secondary standards are arbitrary standards by retailers or food processors below the actual MRL.

They may include:
- A list of permitted pesticides
- Maximum number of pesticides
- Percentage of the MRL
Summary

- DCs are a tool to help predict compliance with foreign or secondary MRLs.
- Limitations have to be realized as numerous factors may affect declines, and the data set may be small.
- Check current MRLs before shipment, as they do sometimes change.
- When possible, it is advisable to test produce prior to export to confirm compliance with lower MRLs.
Thank You!

150 years

- BASF

We create chemistry