HERBICIDE ROTATION INTERVALS (PLANT-BACK RESTRICTIONS) AND COVER CROP ISSUES

POM-EQI SEPTEMBER 20, 2015
FARM DAYS AUGUST 2015

Audience: Maine Farmers and Growers

Talk titled: “Rotational and Cover Crop; Herbicide Issues”

Discussion started with Food and Non-food pesticide uses, when asked to name some non-food pesticide uses….

The 1st response was “COVER CROPS”
Before we get into the specific cover crop-herbicide issues, here are a few EPA/FDA and USDA definitions we might find useful....
Food Use and Non-Food Uses

“Food” is defined in FFDCA as articles used for food or drink for man or other animals, chewing gum, etc. (1)

If a pesticide use is “likely to result” in residues on food, the use is a food use, a petition for tolerance or exemption is required, and appropriate residue chemistry considerations apply. (2)

(1) 21 USC Title 21 2015, FFDCA Chapter 9 § 321 (f)
(2) EPA 1996o, Residue Chemistry Test Guidelines OPPTS 860.1000 § (e) (1) § (e) (1)
In some cases residue chemistry data are needed to determine whether a proposed use is a food use or a nonfood use.

The general criteria for food use/nonfood use determinations is that if residues COULD occur in foods or feed, the use is a food use and a petition for tolerance/exemption from tolerance is required \(^{(1)}\)

\(^{(1)}\) EPA 1996o, Residue Chemistry Test Guidelines OPPTS 860.1000 § (e) (2)
EPA’S RESPONSIBILITY

Confined Accumulation in Rotational Crops

Studies are required when the Agency determines that it is reasonably foreseeable that a food or feed crop could be subsequently planted on the site of pesticide application after harvest or failure of the treated crop (1)

(1) 40CFR158.1410 § (d Table) Guideline 860.1850, Confined Rotational Crop, Footnote 7
CROPPING SYSTEMS

- **Cover Crops** planted for conservation purposes, used for erosion control, soil health improvement, and water quality improvement

- **Double cropping** is producing at least 2 crops from the same acreage and does not include cover crops

(1) USDA 2014a, NRCS Cover Crop Termination Guidelines; Sept 2014 Volume 3
CROPPING SYSTEMS

- **Inter-seeding or Over-seeding** is planting 1 or more cover crops into an existing crop.
- **Inter-planted** is multiple crop species grown together such that separate management is not possible.
- **Continuous Cropping** is any non-irrigated production practice that is not summer fallow (1).

(1) USDA 2014a, NRCS Cover Crop Termination Guidelines; Sept 2014 Volume 3
CROP ROTATION & COVER CROPS

All cover crops are rotational crops; Not all rotational crops are cover crops

- Crop rotation and cover crops are encouraged as good agricultural practices
- EPA; Encourages crop rotation to reduce herbicide resistance (1)
- USDA; Provides cost share assistance for cover crops (2)

(1) EPA 2014j, Label Review Manual
(2) USDA 2015b, 2015 Cover Crops, Crop Insurance, Cover Crops and NRCS Cover Crop Termination Guidelines, FAQs
COVER CROP PLANTS, USED IN MAINE

Brassicas; Radishes, Turnip, Canola, Mustard
Legumes; Peas, Clover, Vetch, Sunnhemp
Grains; Barley, Oats, Wheat, Rye, Triticale
Grasses; Ryegrass, Timothy, Orchard Grass
Other; Buckwheat \(^{(1)}\)

\(^{(1)}\) Jemison and Titus 2015, personal communication via e-mail
TODAY’S DISCUSSION

- Cover crop usage from 2009 to 2015
- Label review, selected herbicides
- Rotation intervals\(^{(a)}\)
  - General rotation intervals and how they relate to cover crop species
  - Cover crop specific language
  - Suggestions for label improvement

\(^{(a)}\) Cotton, peanuts, and sugarcane rotation intervals were not considered
FIG 1. COVER CROP ACREAGE REPORTED BY RESPONDENTS (1, 2)

(1) SARE and CTIC 2014, REPORT; A synopsis of the information collected during the 2013-2014 cover crop survey. 2013-2014 COVER CROP SURVEY
(2) CTIC 2015, Chad Watts personal communication via e-mail
FIG 2. % TOTAL ACREAGE BY COVER CROP GROUP (a) (1, 2)

(a) Percentages add up to greater than 100 because of the use of cover mixes. 64.7% of the respondents reported using mixes in 2014 and 49.4% in 2015

(1) SARE and CTIC 2014, REPORT; A synopsis of the information collected during the 2013-2014 cover crop survey. 2013-2014 COVER CROP SURVEY
(2) CTIC 2015, Chad Watts personal communication via e-mail
HOW DO HERBICIDES FIT IN?

The cover crop may be terminated by natural causes such as frost, or intentionally terminated through chemical application, crimping, rolling, tillage, or cutting (1)

48% of cover crops from the SARE-CTIC 2014 survey were terminated with herbicides (2)

(1) USDA 2014a, NRCS Cover Crop Termination Guidelines; Sept 2014 Volume 3
(2) SARE and CTIC 2014, REPORT; A synopsis of the information collected during the 2013-2014 cover crop survey. 2013-2014 COVER CROP SURVEY
TERMINATION GUIDELINES

California is in USDA Zone 1; Late Spring to Fall seeded cover crops in Zone 1 must be terminated at or within 35 Days after planting (of primary crop) but before plant emergence.

Maine is in USDA Zone 4; Cover crops in Zone 4 must be terminated at or within 5 Days after planting (of primary crop) but before plant emergence. (1)

(1) USDA 2014a, NRCS Cover Crop Termination Guidelines; Sept 2014 Volume 3
ISSUES WITH HERBICIDES

Illegal residues in food or feed
- Residues in plants may be eaten by humans and/or livestock

Crop damage to secondary crop
- Uptake of herbicide active residues in the soil by secondary crop
- Registrant liability for crop damage
Pesticide Directions for Use

Sites must be on the pesticide label (40CFR156.10) (1)

“Any limitations or restrictions on use to prevent unreasonable adverse effects such as:
(A) Pre-harvest intervals
(B) Rotational Intervals
(C) Warnings for use on particular crops….” (2)

(1) 40CFR156.10 § (h) (2) (iii)
(2) EPA 2014j, Label Review Manual
Do label replant restrictions apply if the cover crop will not be harvested as food or forage?

In other words, planted for conservation purposes only....
“Replant/plant-back restrictions apply even if the cover crop will not be harvest [sic] as food, feed or forage. The label must be amended to include appropriate application and management directions in cases where cover crops are being use for conservation purposes and will not be use for food or forage” (1)

(1) EPA 2015ba, E-mail from State Label Issue Tracking System (SLITS) to Maine’s Pesticides Registrar, Mary Tomlinson
What label language are users finding?
LABEL REVIEW

Maine-2015 products used on corn or selected vegetables (1)

Selection criteria for product search (2)
- Concentrated (EC, SC, FC etc.) if available
- Single active ingredient, if available
- 475 products were identified
- 31 active ingredients; Varying chemistries
  - 1 product had 2 active ingredients
  - 2 Rimsulfuron products were reviewed
- Actual review 32 labels

(1) Jemison and Titus 2105, personal communication via e-mail
(2) NPIRS 2015, National Pesticide Information Retrieval System
### THE LABEL REVIEW

Keyword search of the most recent EPA approved labels from Pesticide Product Label System (2015)

<table>
<thead>
<tr>
<th>Key Word</th>
<th>Looking for</th>
<th># Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>“rota”</td>
<td>rotational intervals</td>
<td>31/32</td>
</tr>
<tr>
<td>“graz”</td>
<td>grazing restrictions</td>
<td>17/32</td>
</tr>
<tr>
<td>“cover crop”</td>
<td>cover crop specific statements of any kind</td>
<td>8/32</td>
</tr>
<tr>
<td>“under-seed” or “underseed”</td>
<td>underseeding</td>
<td>4/32</td>
</tr>
</tbody>
</table>
LABEL REVIEW

- Examples
  - Illegal residues
    - Food/feed and nonfood uses (acetoxychlor)
    - Language indicating cover crops may be grazed (clomazone)
  - Crop injury (parameters for determining rotation intervals)
    - Requirements for bioassays (7 products)
    - Conflicting restriction language versus guideline (rimsulfuron fruit and vegetable uses)
  - Statement regarding possible stand reduction (clomazone)
CADENCE NXT (1)

Label contents

- Food/feed and nonfood uses on the same label
- Specific instructions regarding rotational intervals
  - Regular food and feed crops; corn, wheat, non-grass animal feeds and a mix of other commodities
  - Cover crops; non-winter cover crops

(1) Loveland Products 2013b, Cadence NXT Herbicide 75.9% acetochlor EC (7 lbs/gal) EPA# 34704-1083
Current label Language:

“For use only on field corn, production seed corn, silage corn, sweet corn, popcorn, Miscanthus and other non-food perennial bioenergy crops”

Suggestion:

For use only on field corn, production seed corn, silage corn, sweet corn, popcorn, Miscanthus and other non-food perennial bioenergy Cover crops

(1) Loveland Products 2013b, Cadence NXT Herbicide 75.9% acetochlor EC (7 lbs/gal) EPA# 34704-1083
Current label language

“Do not allow the Miscanthus or other non-food perennial bioenergy crop treated with Cadence NXT Herbicide to be grazed or used as animal feed”

Suggestion:

Do not allow the Miscanthus or other non-food perennial bioenergy cover crop treated with Cadence NXT Herbicide to be grazed or used as animal feed

(1) Loveland Products 2013b, Cadence NXT Herbicide 75.9% acetochlor EC (7 lbs/gal) EPA# 34704-1083
Current label language

- **Rotation to Non-food Winter Cover Crops**: Following harvest of food crops treated with Cadence NXT Herbicide, only non-food or non-feed winter cover crops (with the exception of wheat) may be planted.

Suggestions:

- Language regarding rotational intervals needs to remain, in order that these rotated crops grown for feed and food do not have illegal residues.
- Following harvest of food crops treated with Cadence NXT Herbicide, only non-food or non-feed **winter** cover crops may be planted.

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(1) Loveland Products 2013b, Cadence NXT Herbicide 75.9% acetochlor EC (7 lbs/gal) EPA# 34704-1083
CLOMAZONE (1)

Current label language

- Cover crops, however, may be planted anytime but stand reductions may occur in some areas. Do not graze or harvest for food or feed cover crops planted less than 9 months after Command 3ME treatment.

Suggestion:

- **Nonfood** Cover crops, however, may be planted anytime but stand reductions may occur in some areas. Do not graze or harvest for food or feed cover crops planted less than 9 months after Command 3ME treatment.

(1) FMC, 2014, Command 3ME, Clomazone 31.1% ME (3 lbs/gal), EPA# 279-3158
ISSUES WITH HERBICIDES

Crop damage to secondary crop

- Uptake of herbicide active residues in the soil by secondary crop

- Registrant liability for crop damage (Let’s leave this one for the attorneys)
PARAMETERS LISTED ON LABELS AFFECTING ROTATIONAL INTERVALS

- Rotation Intervals varied by a number of parameter
  - Region
  - Uses; rates, plowing habits, method
  - Soil; temperature, pH, soil type
  - Water; rainfall, irrigation
  - Bioassay
FIG. 3. PARAMETERS ON LABELS AFFECTING ROTATION INTERVALS
### REGIONS AFFECTING ROTATIONAL INTERVALS

<table>
<thead>
<tr>
<th>Definition of regions</th>
<th># Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>States</td>
<td>8</td>
</tr>
<tr>
<td>States with subdivision</td>
<td>4</td>
</tr>
<tr>
<td>National regions</td>
<td>2</td>
</tr>
<tr>
<td>Mississippi River and Rocky Mountains</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>16</strong></td>
</tr>
</tbody>
</table>

Suggestion: Regions should be standardized
## Prototype Product Labels with Bioassays

<table>
<thead>
<tr>
<th>Product</th>
<th>Registrant</th>
<th>Active Ingredient</th>
<th>EPA#</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stinger</td>
<td>Dow</td>
<td>Clopyralid</td>
<td>62719-73</td>
</tr>
<tr>
<td>Python WDG,</td>
<td>Dow</td>
<td>Flumetsulam</td>
<td>62719-277</td>
</tr>
<tr>
<td>Iodosulfuron-methyl 10 WDG</td>
<td>Bayer</td>
<td>Iodosulfuron</td>
<td>264-856</td>
</tr>
<tr>
<td>Pendi Hydrocap</td>
<td>UPI</td>
<td>Pendimethalin</td>
<td>70506-230</td>
</tr>
<tr>
<td>Matrix SG,</td>
<td>DuPont</td>
<td>Rimsulfuron</td>
<td>352-768</td>
</tr>
<tr>
<td>Laudis</td>
<td>Bayer</td>
<td>Tembotrione</td>
<td>264-860</td>
</tr>
<tr>
<td>Autumn Super 51 WDG</td>
<td>Bayer</td>
<td>Thiencarbazone and Iodosulfuron</td>
<td>264-1134</td>
</tr>
</tbody>
</table>

Suggestion: Bioassays should be encouraged, they provide empirical data on the parameters found in fig 3.
RESTRICTIONS, GUIDELINES ETC.

- Matrix SG (1)
- CROP ROTATION – “Fruit, Nut, and Vine Crops: Do not plant any crops…”
- POTATOES GROWN FOR SEED, “Restrictions, The rotational crop interval for Spring Barley is extended…”
- ROTATIONAL CROP GUIDELINES – POTATO, “Guidelines for Potato Uses, with table…”

Suggestion: Keep PR-notice 2000-5 (2) in mind regarding mandatory and advisory labeling

(1) DuPont 2010, Matrix SG, Rimsulfuron Water Soluble Granular 25%, EPA# 352-768
(2) EPA 2000e, PRN 2000-5: Guidance for Mandatory and Advisory Labeling Statements
CLOMAZONE \(^{(1)}\)

- Illegal residues, grazing restrictions and crop injury
- **ROTATIONAL CROPPING PRECAUTIONS**, 0 to 12 months depending on crop and rate; Region and soil pH specific
- Cover crops, however, may be planted anytime but **stand reductions may occur in some areas**

Suggestion: Encourage stand reduction and sensitive plants statements in both the cover crop and rotational interval sections of the label

\(^{(1)}\) FMC, 2014, Command 3ME, Clomazone 31.1% ME (3 lbs/gal), EPA# 279-3158
SUMMARY AND CONCLUSIONS

- Define cover crops as nonfood, require this description on labels
- Differentiate between guidelines for rotational intervals for cover crops (by plant type sensitive to carryover) and restrictions for rotated food/feed crops (illegal residues)
  - Update PR notice 2000-5 (1) regarding mandatory and advisory label language
  - Add a section to the Label Review Manual (2) on cover crop language
- Encourage bioassays as a means of assuring growers that their cover crops will grow
- Standardize regions of the country; listing states with or without subdivisions

(1) EPA 2000e, PRN 2000-5: Guidance for Mandatory and Advisory Labeling Statements
(2) EPA 2014j, Label Review Manual