

Potential impacts of dicamba and 2,4-D off-target movement on specialty crop injury and yield

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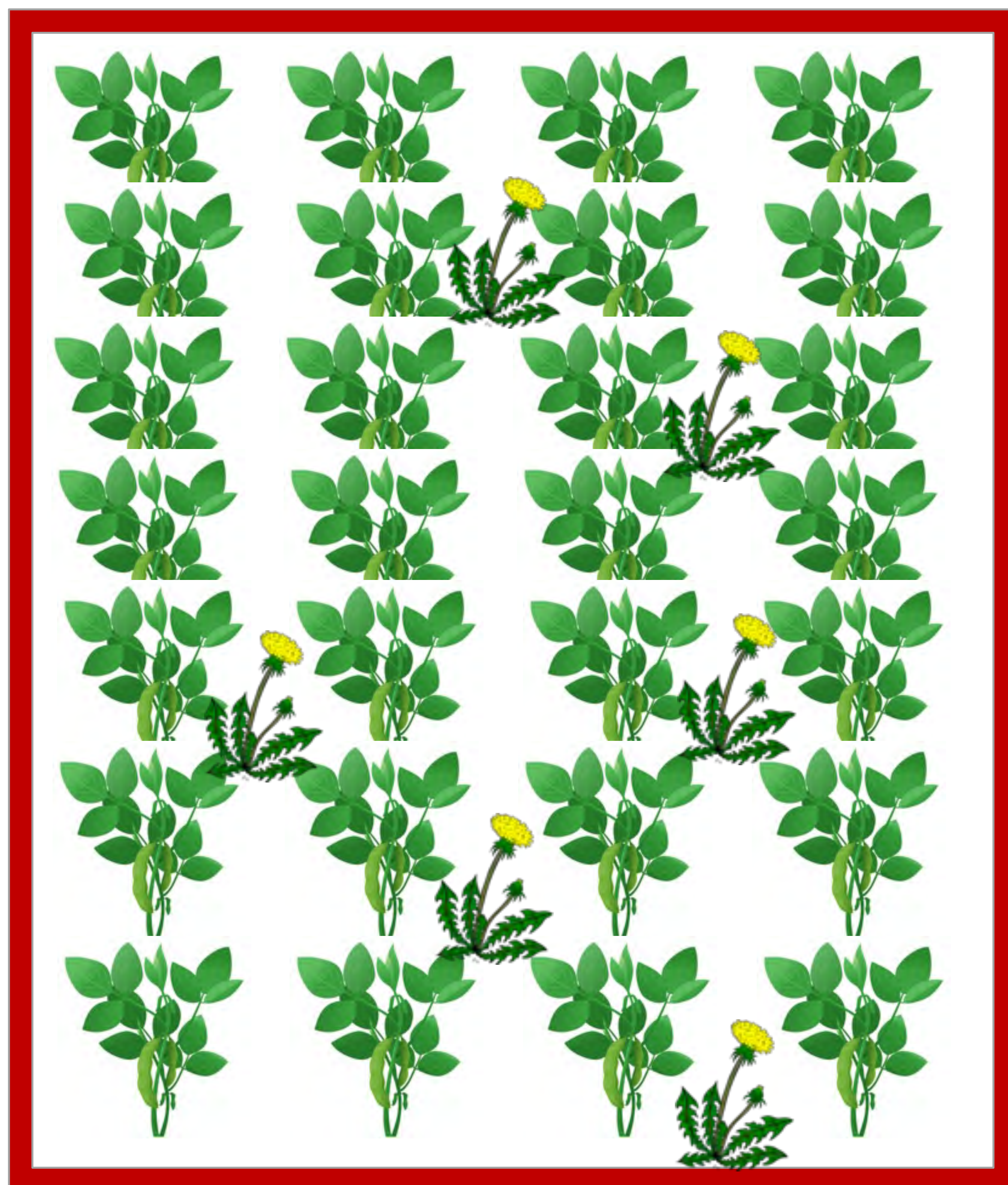
Sam Wortman

Session Goals

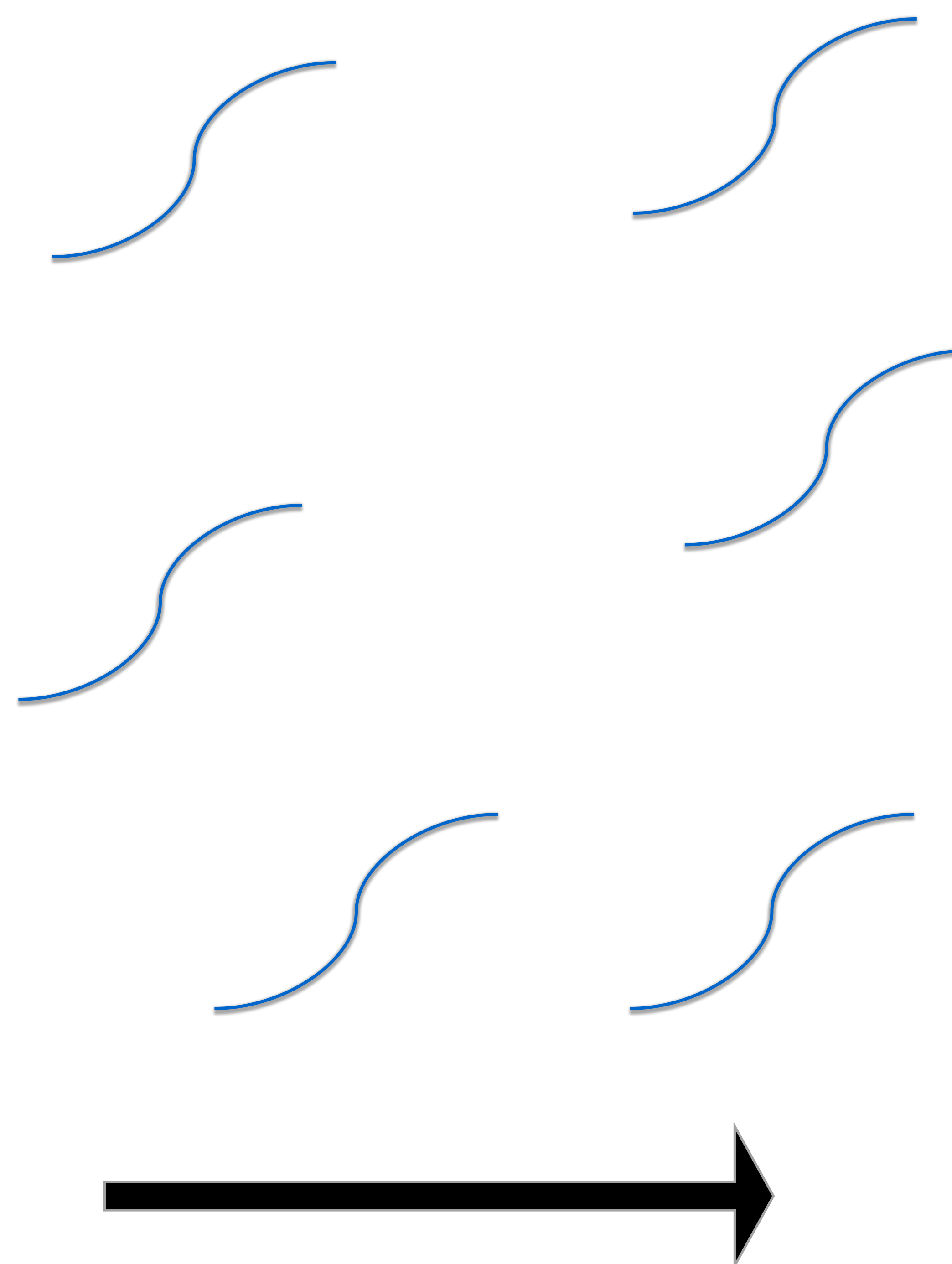
At the end of this session participants will be able to:

- Describe specialty crop injury and yield loss potential from off-target herbicide movement
- Explain the relationship between drift rate, herbicide residue, and food safety
- Appreciate the importance for observing herbicide labels to protect sensitive plants

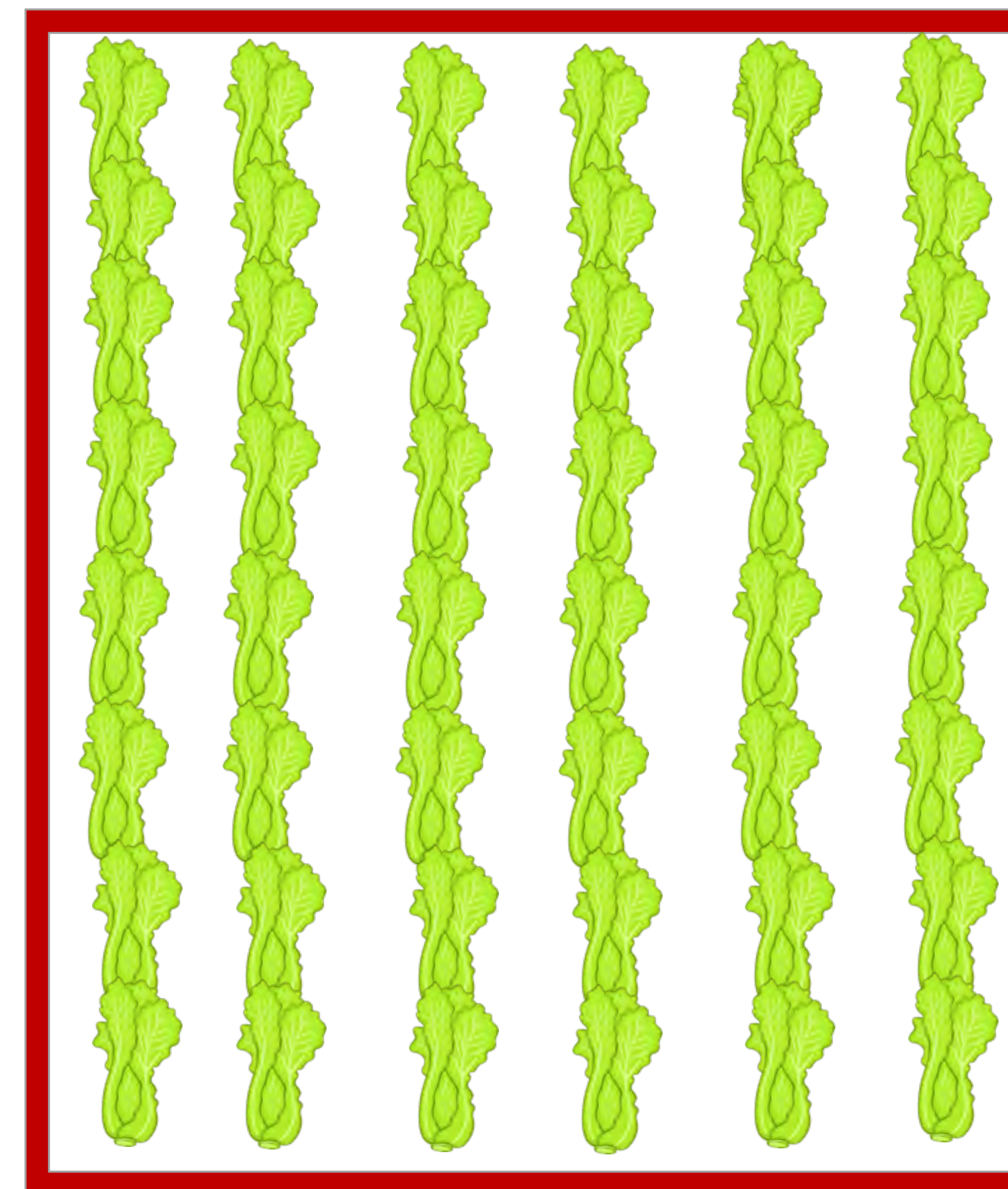
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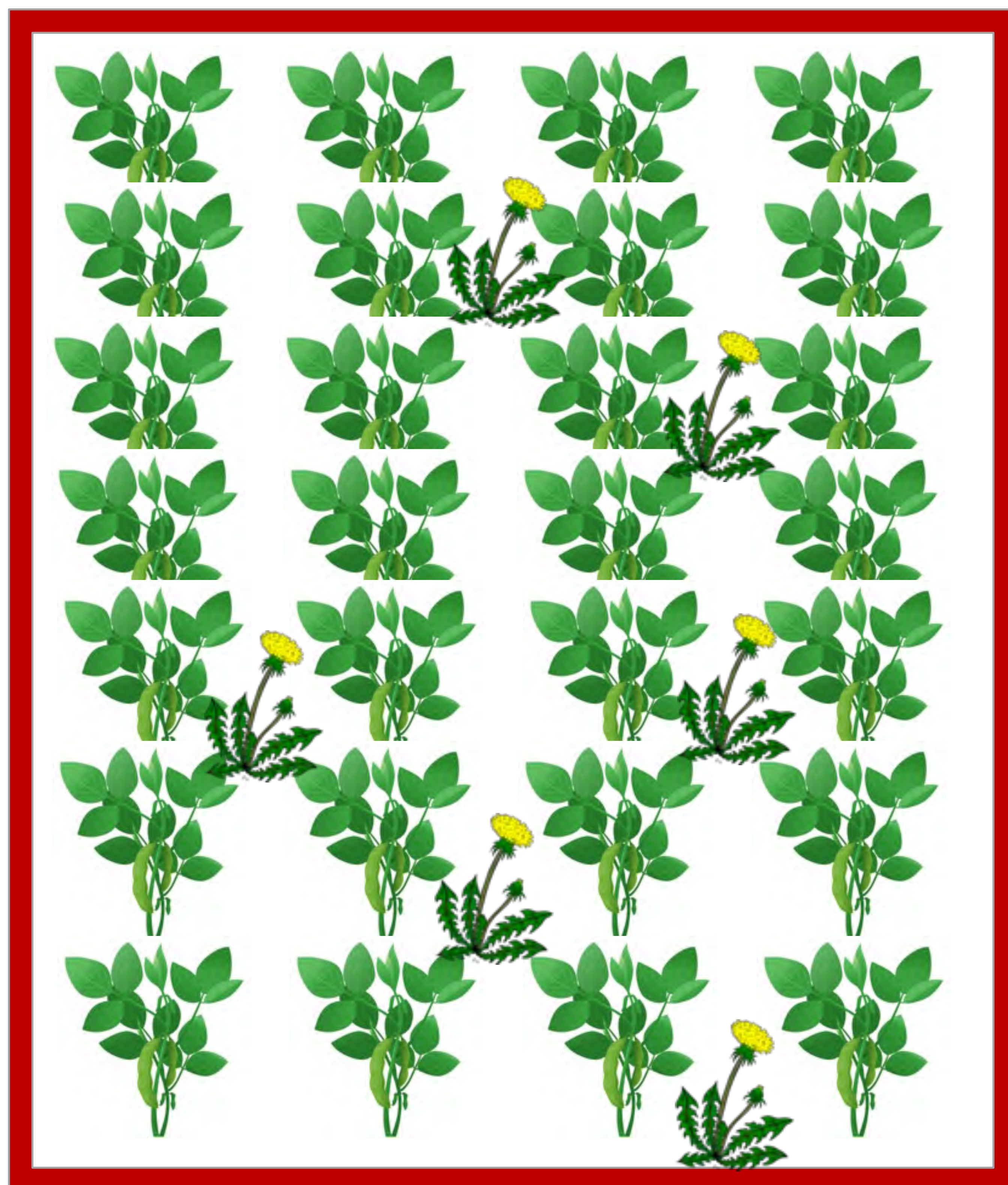
Dicamba tolerant soybean



Wind speed > 9mph



Susceptible crops (lettuce)



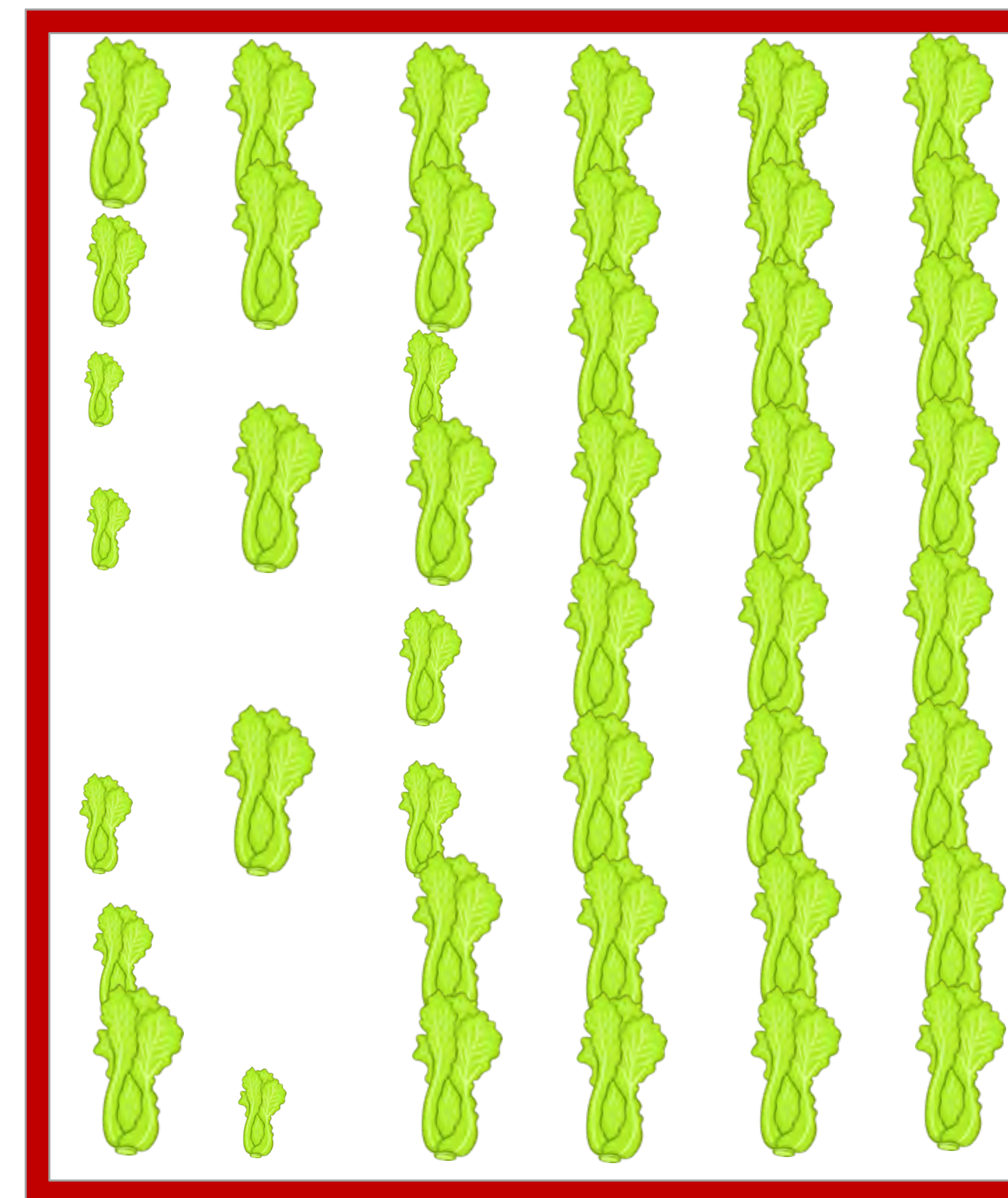
Dicamba tolerant soybean

Environmental factors

- Temperature
- Relative humidity
- Wind speed

Application factors

- Boom height
- Nozzles selection
- Travel speed



Susceptible crops (lettuce)

Common symptoms of dicamba and 2,4-D injuries



Background

- Specialty crops are high value
- Most are broadleaf and susceptible to synthetic auxin growth regulator herbicides
- The use of dicamba and 2,4-D tolerant crops is increasing

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HERBICIDE

Background

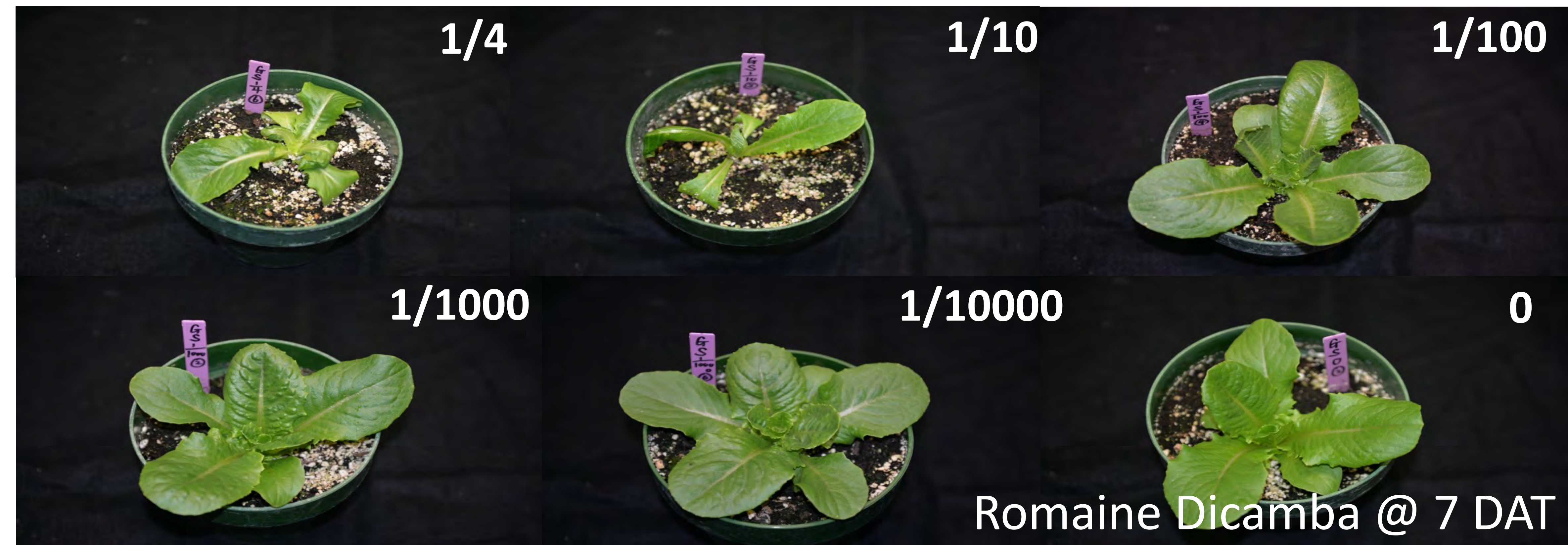


Full Rate dicamba:
2.9 lbs ae/gal
22 Fl oz/acre
560 g ae/ha

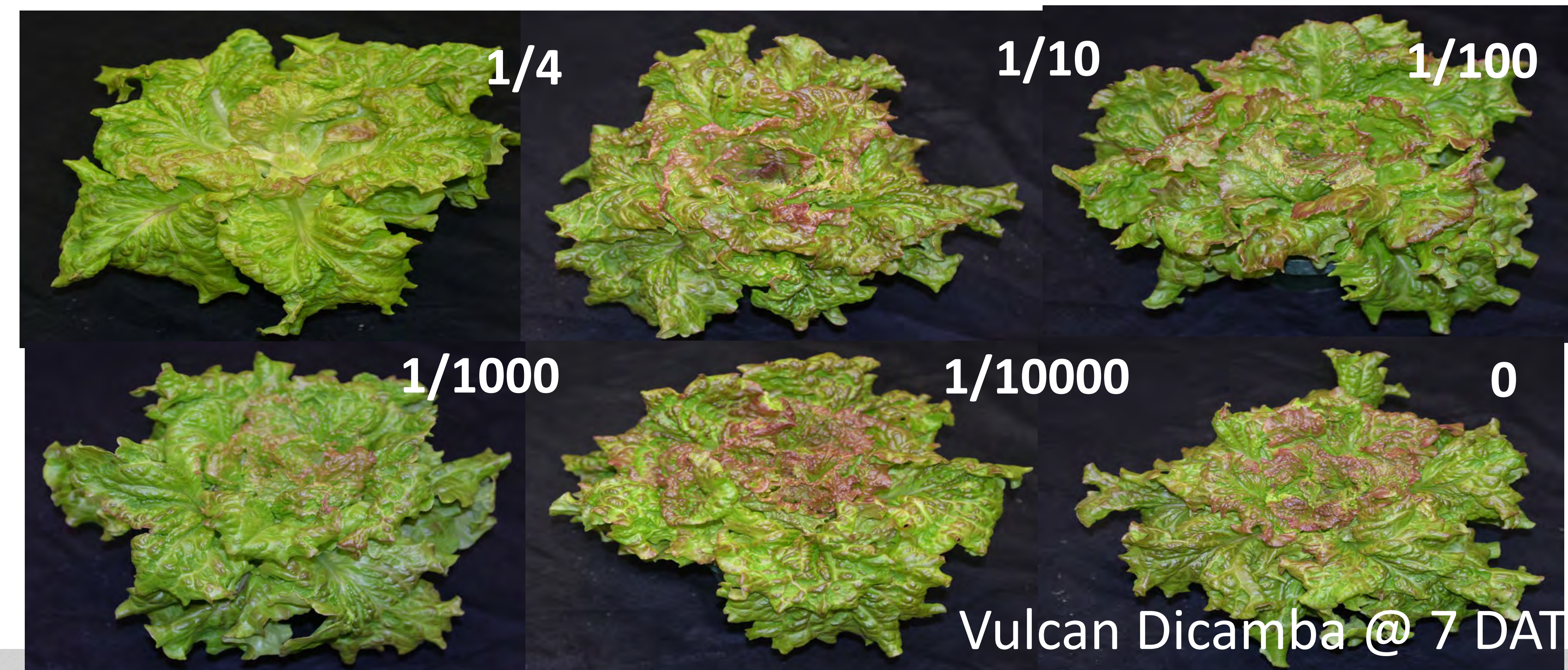


Full Rate 2,4-D:
3.8 lbs ae/gal
32 Fl oz/acre
1066 g ae/ha

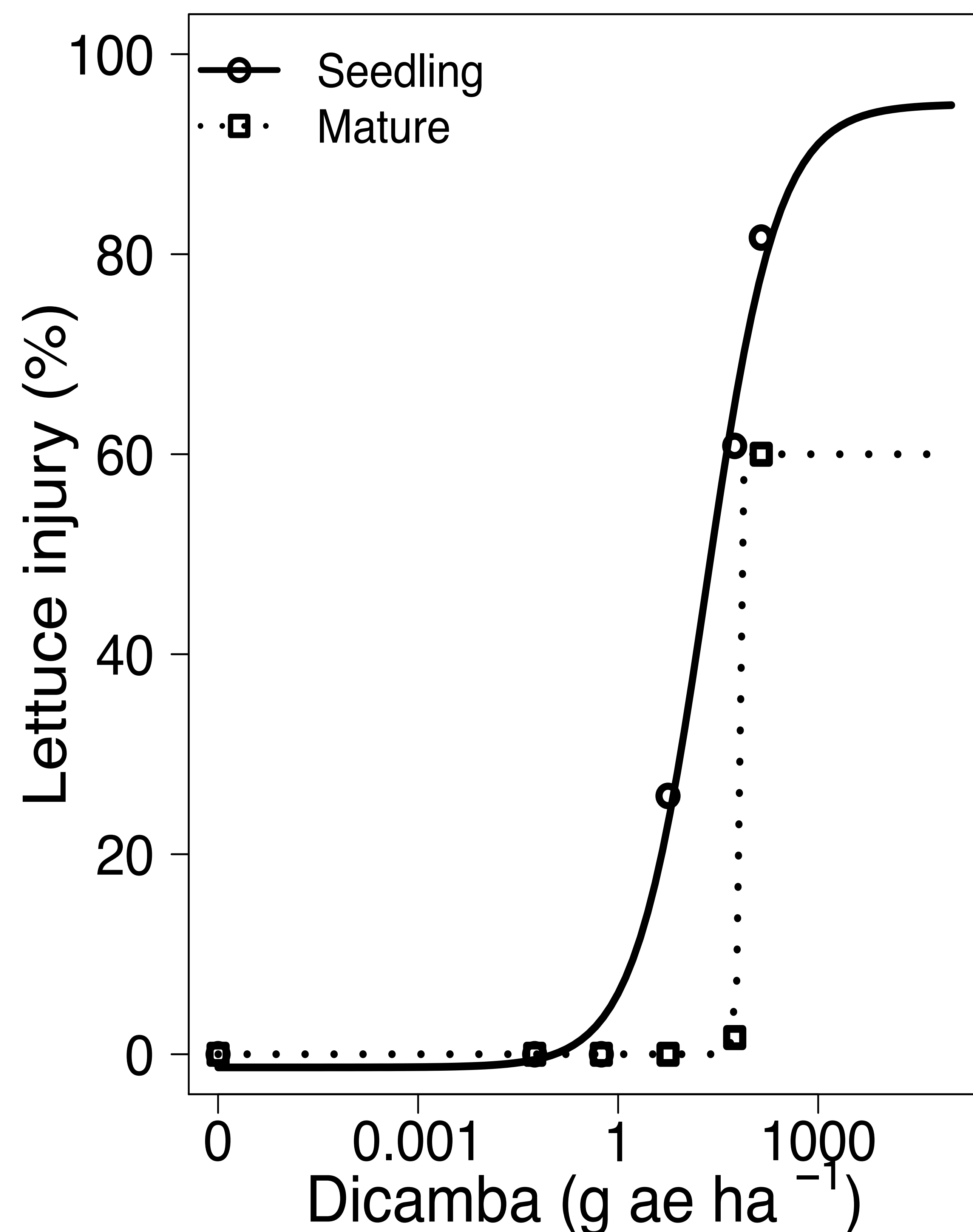
dicamba drift on seedling lettuce



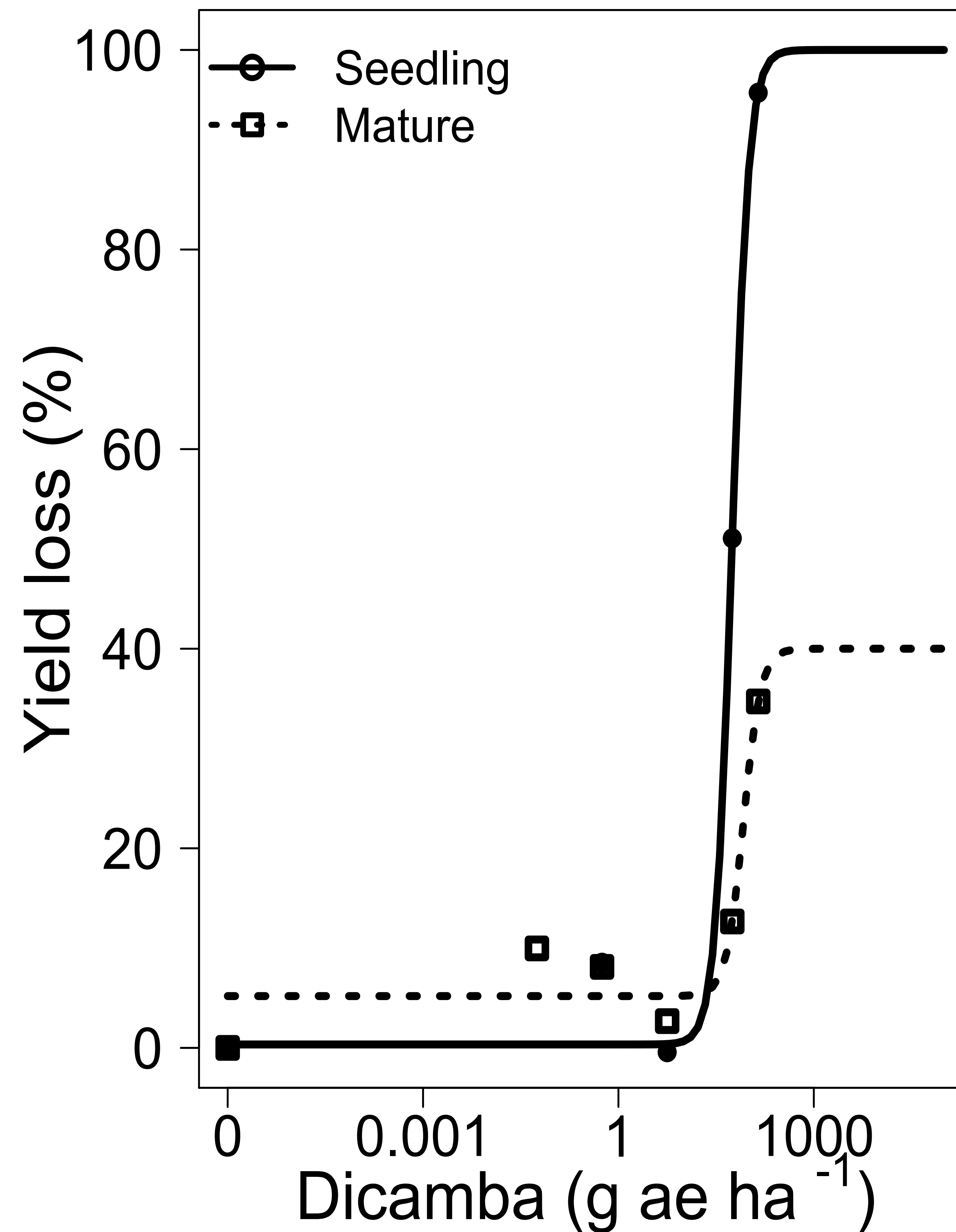
dicamba drift on mature lettuce



Vulcan Lettuce



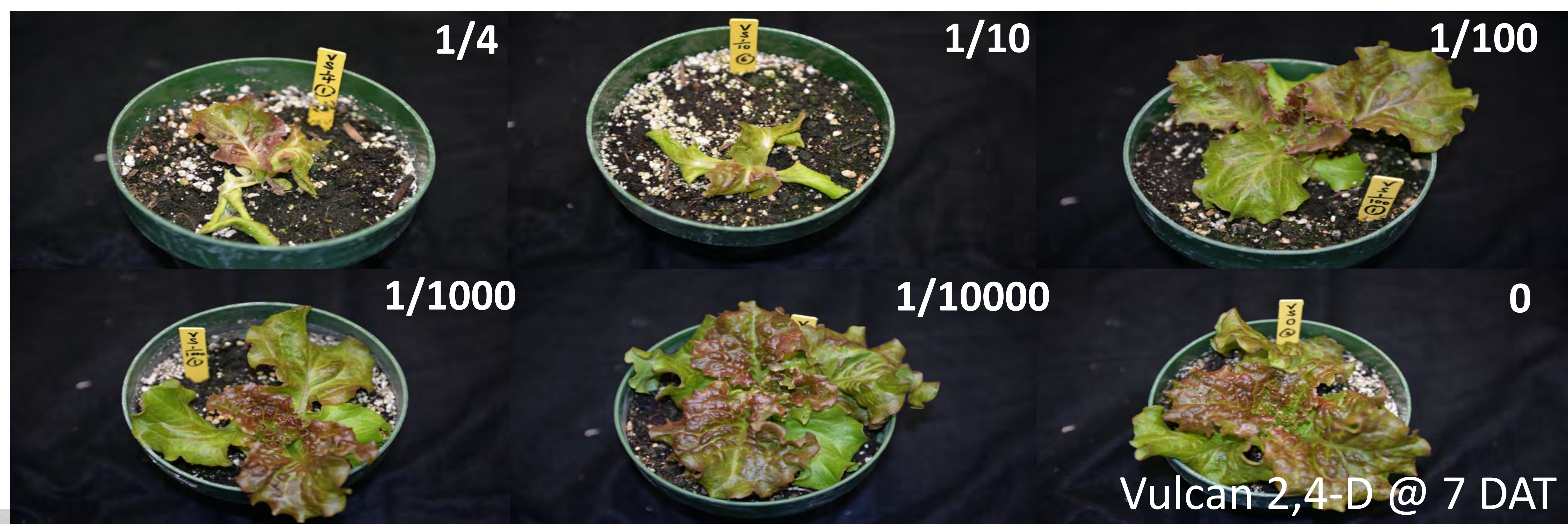
Vulcan Lettuce



Dicamba drift on seedling Vulcan lettuce:
5% of labeled rate = 50% visual injury 7
DAT = 10% yield loss

Dicamba drift on mature Vulcan lettuce:
10% of labeled rate = 10% yield loss
25% of labeled rate = 35% yield loss

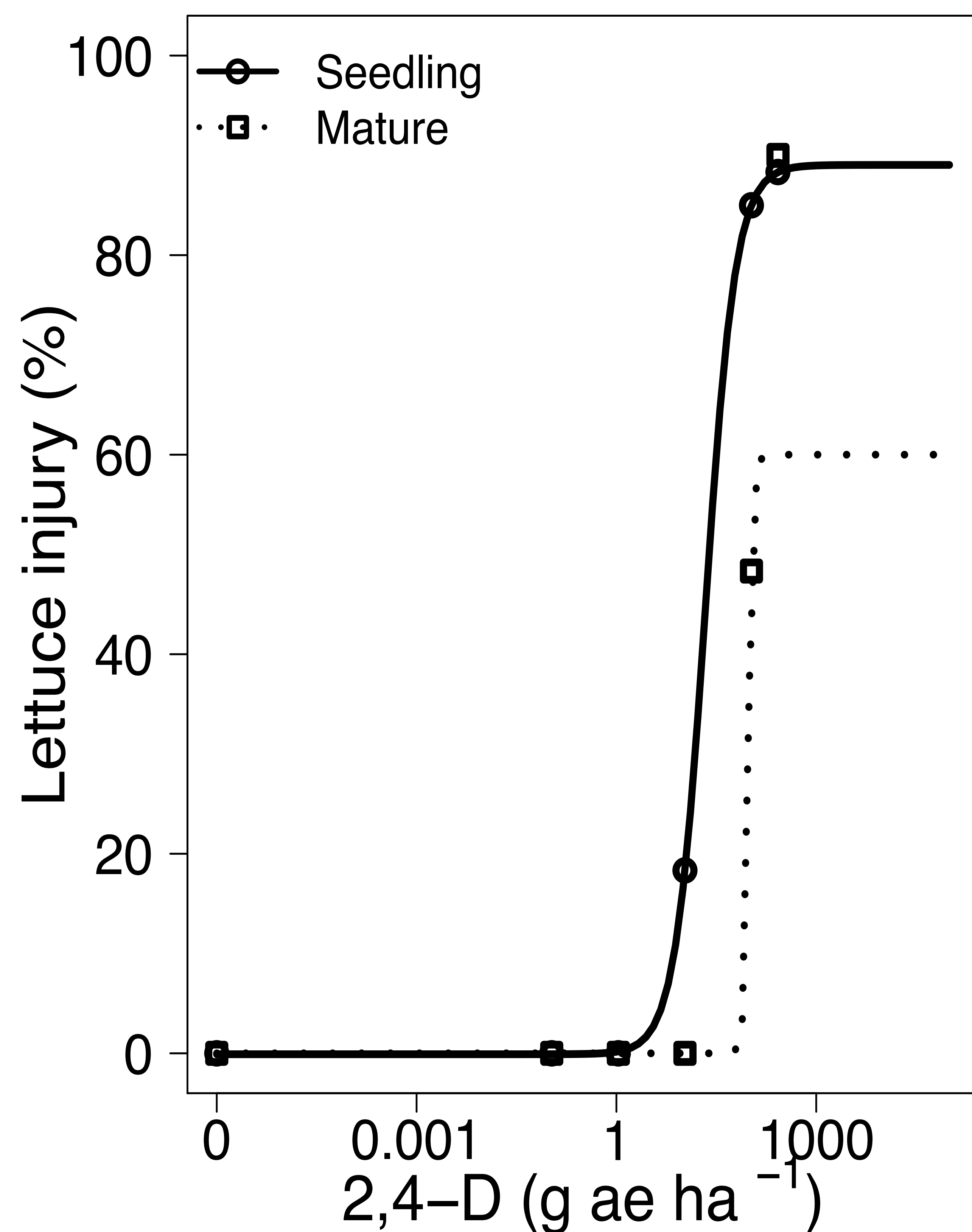
2,4-D drift on seedling lettuce



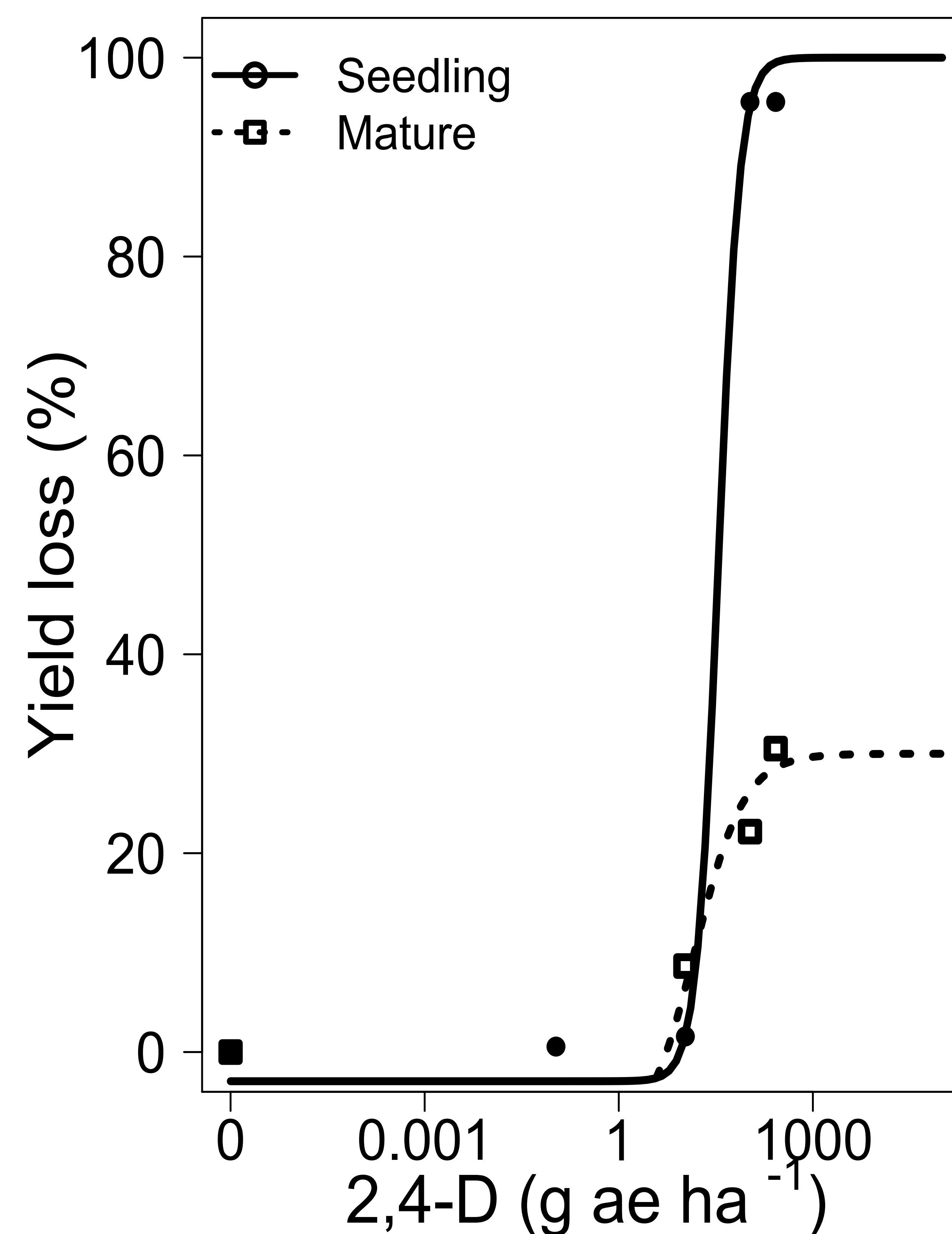
2,4-D drift on mature lettuce



Vulcan Lettuce



Vulcan Lettuce

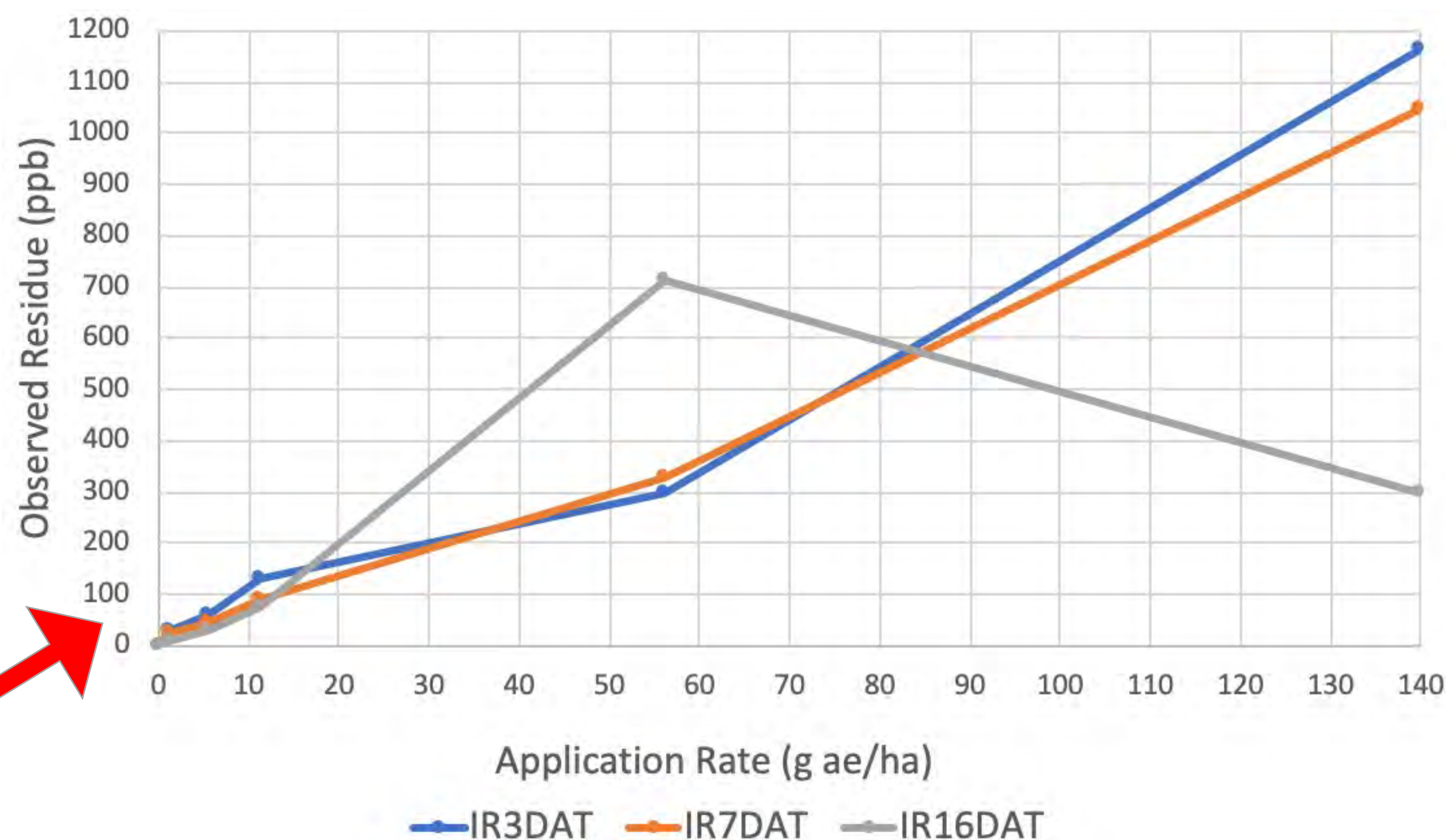


2,4-D drift on seedling Vulcan lettuce:
2% of labeled rate = 50% visual injury
7 DAT = 10% yield loss

2,4-D drift on mature Vulcan lettuce:
8% of labeled rate = 10% visual injury
7 DAT
0.2% of labeled rate = 10% yield loss

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- Herbicide residue test is key for demonstrating cause of crop injury and potential for yield loss
- dicamba residue is stable in first week and highly correlated with drift rate



1/500 drift rate =
12 ppb at 16DAT



U.S. EPA sets tolerance thresholds for pesticide residues in food for human consumption

§ 180.142 by EPA sets 2,4-D tolerance for indirect residues

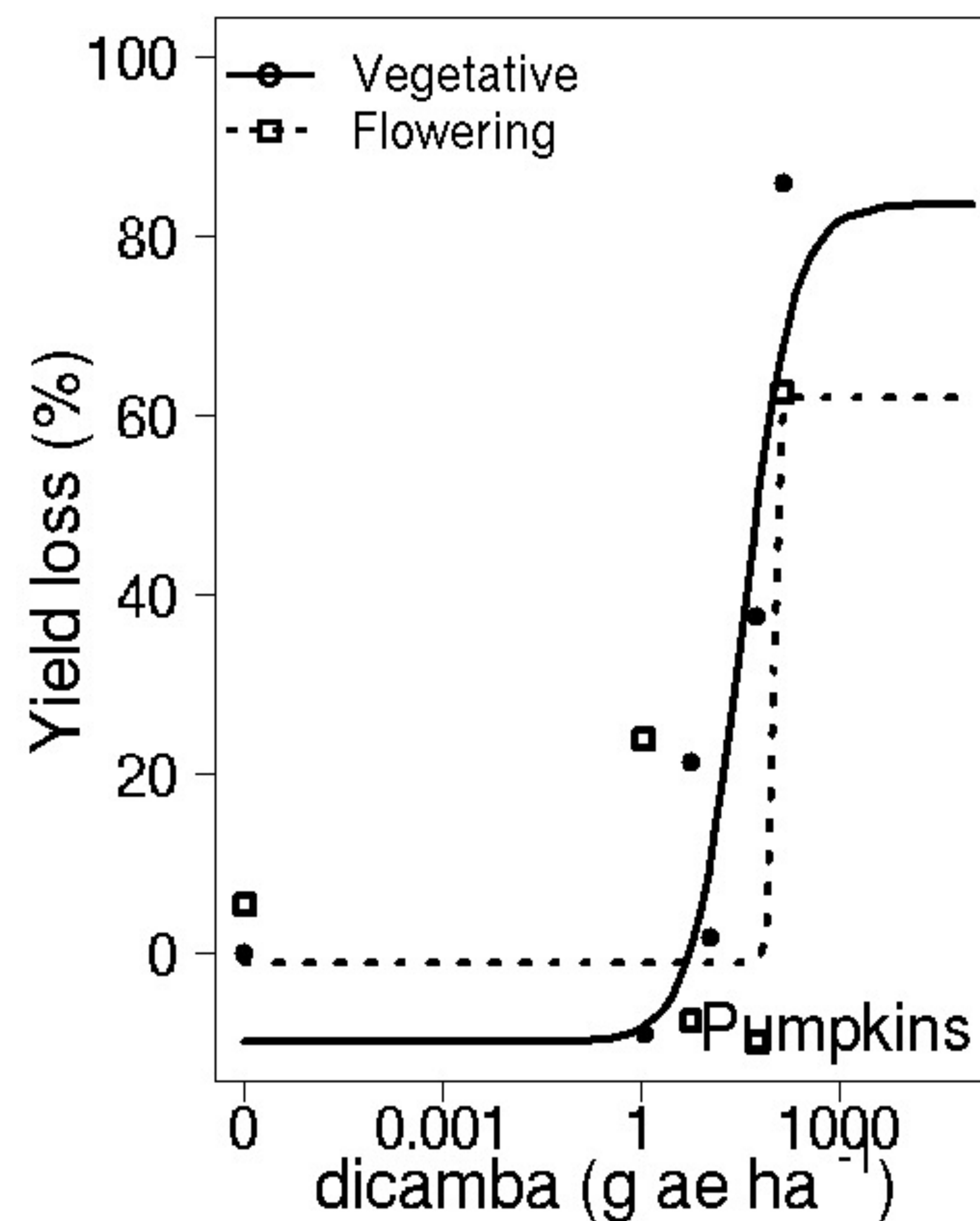
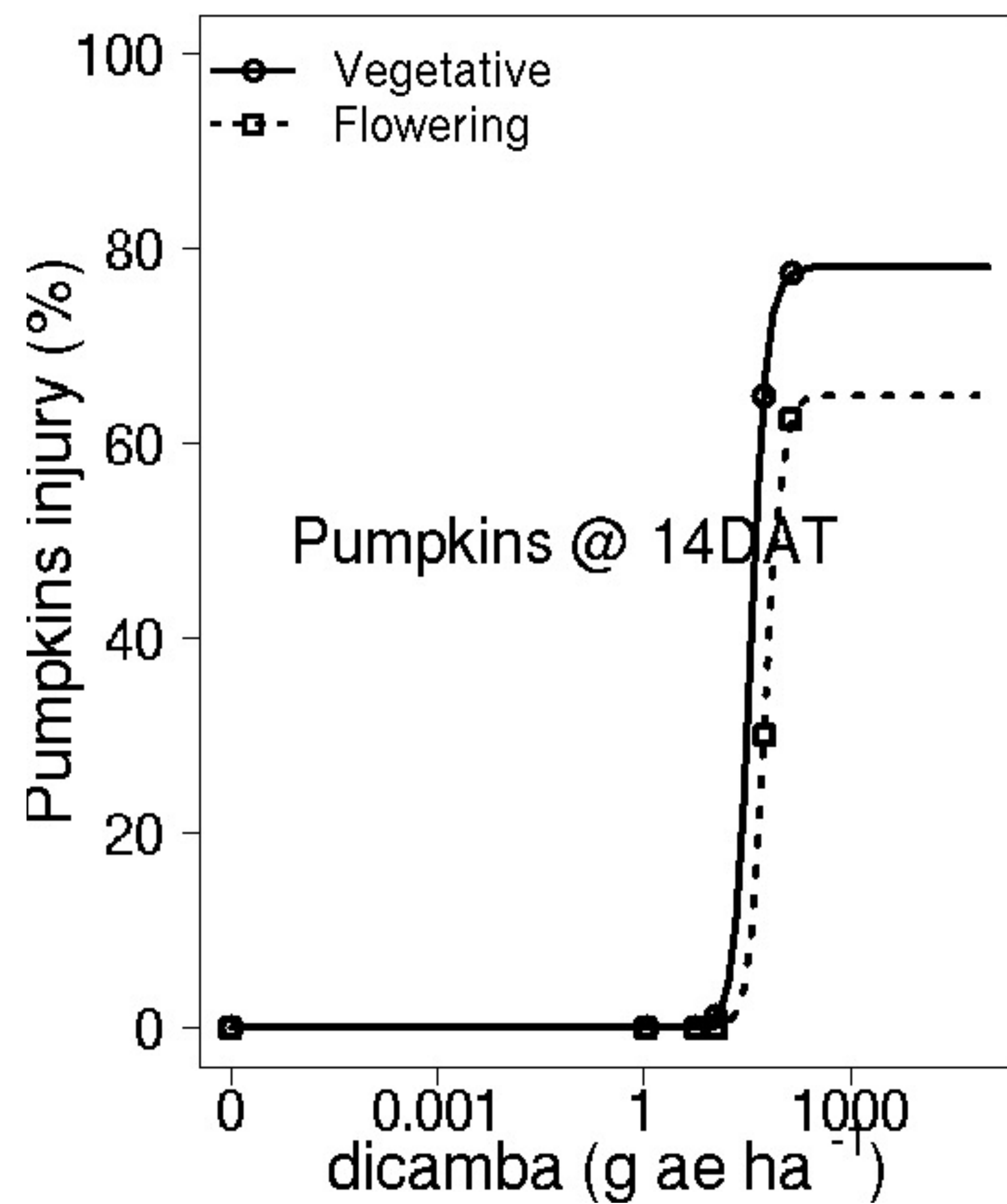
- <50 ppb for pumpkins and other fruiting vegetables
- <400 ppb for lettuce

§ 180.227 by EPA sets dicamba tolerance for residues

- <40 ppb for sweet corn
- <4,000 ppb for asparagus

Even in the absence of significant injury or physical yield loss, off-target herbicide movement can compromise food safety and marketability

dicamba drift on pumpkins



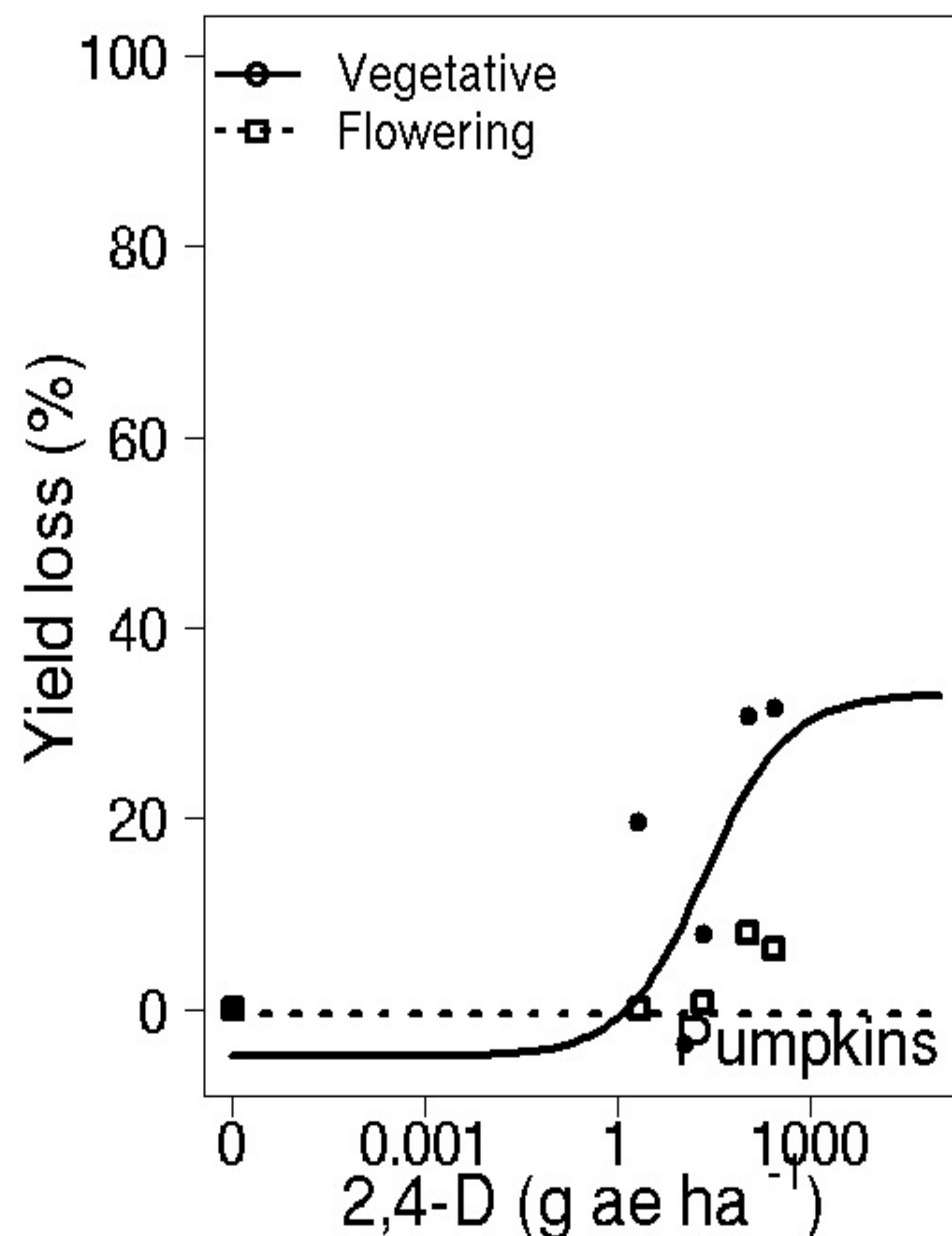
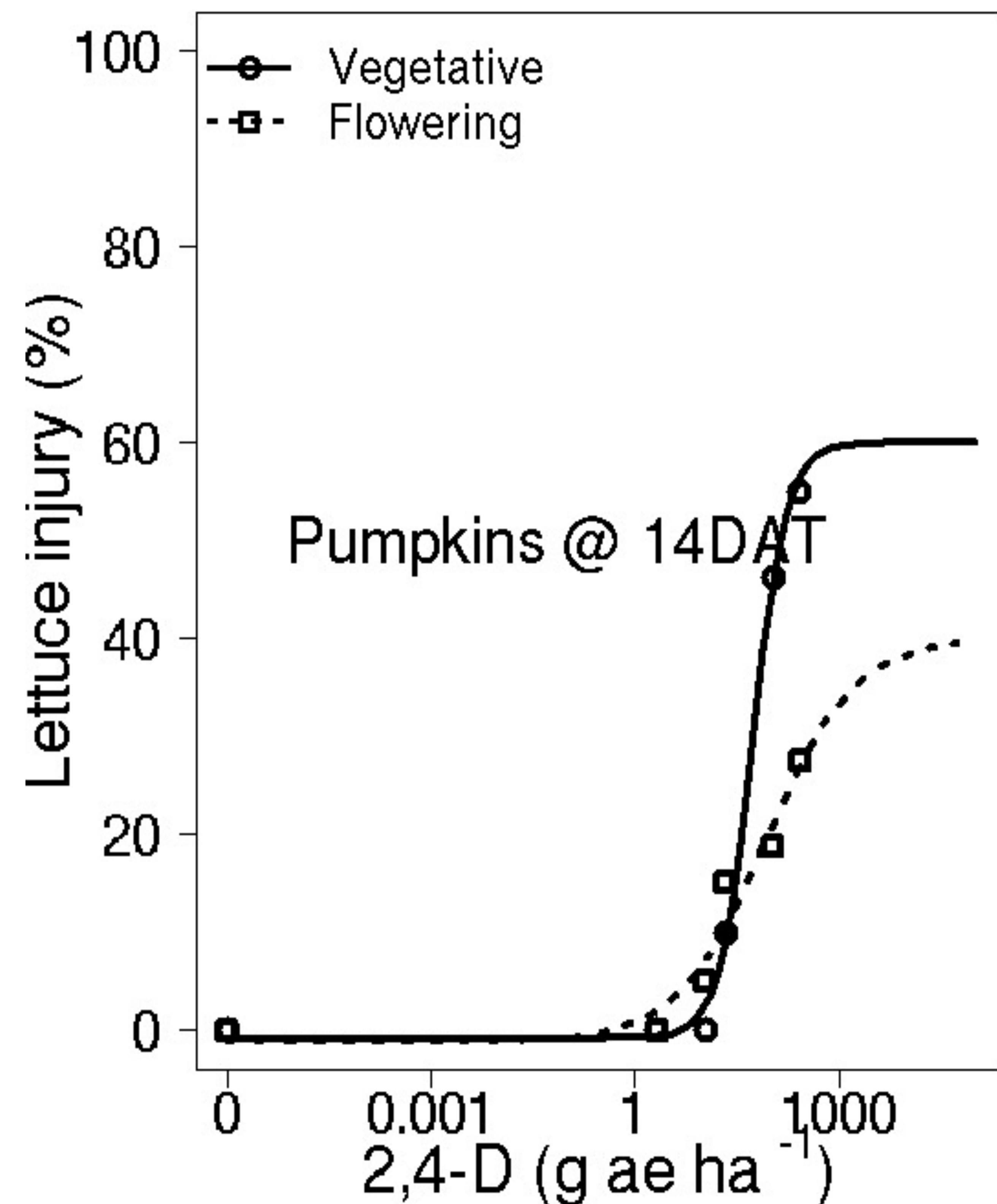
Dicamba drift on vegetative pumpkins:
6% of labeled rate = 50% visual injury 14 DAT = 50% yield loss

Dicamba drift on flowering pumpkins:
20% of labeled rate = 50% yield loss

dicamba drift on seedling pumpkins 7DAT



2,4-D drift on pumpkins



2,4-D drift on vegetative pumpkins:
5% of labeled rate = 50% visual injury
14 DAT = 20% yield loss

2,4-D drift on flowering pumpkins:
8% of labeled rate = 50% visual injury
14 DAT = no estimate on % yield loss

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2,4-D drift on seedling pumpkins 7DAT



Take Home Points

- Lettuce and pumpkin are very susceptible to dicamba and 2,4-D off-target injury
- The growth stage at time of drift event is critical for estimating yield loss
- Herbicide residue analysis should be conducted in the first week after drift event for best estimates of inadvertent rates and yield loss
- Occasionally very low rates of dicamba and 2,4-D can increase “yield,” but injury symptoms and residue will likely compromise marketability of vegetables
- Follow the label and **communicate with specialty crop neighbors**

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<https://ne.driftwatch.org/map>

The screenshot displays the website ne.driftwatch.org/map. The page features a navigation bar with the **driftwatch** logo and the text "NEBRASKA SPECIALTY CROP SITE REGISTRY". A search bar labeled "My FieldWatch" is present with fields for "Username" and "Password", and a "Log In" button. Below the navigation is a "SUBMIT NEW SITE" button and a "Go To My Location" button. The main content area is a map of Nebraska and surrounding regions, showing numerous colored pins representing specialty crop sites. A left-hand sidebar contains filter options:

- Filter Growing Conditions:**
 - All
 - Organically Grown (in states permitted)
 - Certified Organic
 - Conventionally Grown
- Filter Crop Types:** (Buttons: ALL STATES | NE)
 - All
 - Beehives
 - Fish Farm
 - Fruits
 - Grapes
 - Greenhouse - High Tunnel
 - Hops
 - Industrial Hemp
 - Non-specialty Certified Organic
 - Non-specialty Transition to Certified Organic
 - Nursery Crops
 - Orchard (Nuts, Fruit, Trees)
 - Vegetables
 - Other
- Toggle Map Overlays:**
 - State Apiary Distance
 - County Lines

At the bottom of the page, there are links for "Disclaimer & Terms of Use", "Privacy Policy", and "Support". A copyright notice at the bottom right reads "Copyright © 2020 FieldWatch, Inc and Purdue Research Foundation".

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<https://ne.driftwatch.org/map>

The screenshot displays the 'driftwatch' website interface for the 'NEBRASKA SPECIALTY CROP SITE REGISTRY'. The main map shows a satellite view of Nebraska with numerous colored pins (green, purple, orange) indicating the locations of specialty crop production clinics. The left sidebar contains filter options:

- Filter Growing Conditions:**
 - All
 - Organically Grown (in states permitted)
 - Certified Organic
 - Conventionally Grown
- Filter Crop Types:**
 - All
 - Beehives
 - Fish Farm
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- Toggle Map Overlays:**
 - State Apiary Distance
 - County Lines

The top right of the page features a 'My FieldWatch' login section with fields for 'Username' and 'Password', and a 'Log In' button. A search bar at the top right contains the zip code '68502'. The bottom of the page includes a 'Disclaimer & Terms of Use' link, a 'Privacy Policy' link, and a 'Support' link. Copyright information at the bottom right reads: 'Copyright © 2020 FieldWatch, Inc and Purdue Research Foundation'.

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<https://ne.driftwatch.org/map>

The screenshot shows the website ne.driftwatch.org/map. The page features a search bar with the value '68502' and a 'My FieldWatch' login section. A sidebar on the left contains filters for growing conditions and crop types. The main map area shows a satellite view of Nebraska with numerous colored markers representing specialty crop sites. A pop-up window is open over a specific site, providing the following information:

- Specialty Crop Area NE-7404**
- Approximately 4.07 acres
- Conventionally Grown
- Submitted 12/14/2014 Approved 12/15/2014
- Updated 03/18/2020
- Site expires from map after **03/31/2021**
- Category: **VEGETABLES**
- Producer: Ryan Pekarek
- Company: Pekareks Produce
- Email: pekareksproduce@hotmail.com
- Address: 2447 Road O Dwight NE 68635
- Phone: 402.641.3305

At the bottom of the pop-up, there is a link to 'Report a problem with this site' and a 'Close' button.