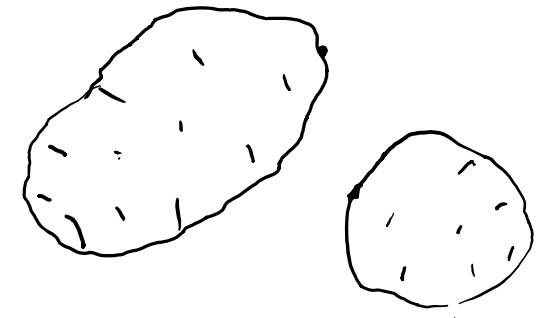


Recognizing Herbicide Injury in Potatoes

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@spudology



Introduction – Herbicide injury cases

- The number of herbicide injury problems seems to be increasing.
 - Is it really increasing, or becoming noticed more often?
 - Poor emergence
 - Chlorosis, necrosis, funky leaf growth and growth reduction
 - Tubers misshaped and malformed

Why is this a problem?

- Reduced stand
- Slow canopy closure
- Damaged leaves
- Malformed tubers
- Reduced yield and quality
- Unacceptable compounds



How does herbicide injury happen?

- Soil and/or plants are exposed in some form
- After injury is found, it can be difficult to determine the source.
 - We can test for herbicide residues sending a sample to a laboratory to determine the compound
- With positive confirmation, what do you do?

Exposure to herbicides

- Soil carryover
- Seed contamination
- Particle drift and inversions
- Contamination of spraying equipment
- Volatilization
- Misapplication
- And more...

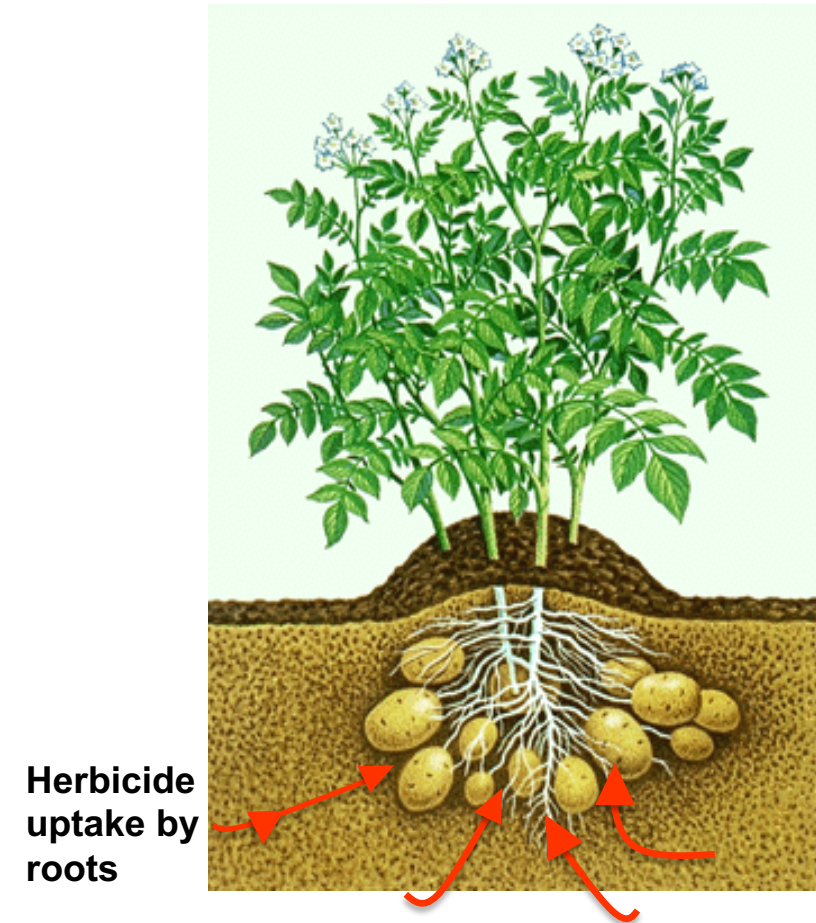


Soil carryover

- Follow the label
 - Pay attention to details, such as precipitation + irrigation and soil pH
 - For example: Raptor 9 months if >18 inch of R+I **AND** soil pH >6.2; 18 months if <18 inch of R+I **OR** soil pH <6.2
- If renting land, know the previous herbicides used.
- A contaminated tank can leave residual herbicides in soil
- NDSU Weed Guide has a list of plant back restrictions for herbicides on p. 104-105.

Herbicide movement from root uptake

- Herbicides taken up by roots can enter plant.
- Can be transported to leaves, root/tubers or all areas of plant.
- Some compounds can be stored in tubers.



Soil carryover: What to look for

- Wide swaths of area or whole field showing symptoms
 - Pass of a sprayer (overlap or tank contamination)
 - Change in soil type or irrigation regime
- Slow emergence
- Pruned, brown or bottle brushed roots
- Stunting of plants once emerged
- Shorten stolons
- Early tuber set and/or malformed tubers

Soil carryover





Imazapyr soil carryover

Imazapyr soil carryover





Imazamox soil carryover



Clopyralid soil carryover

Clopyralid soil carryover



Soil carryover or something else?



Root lesion nematodes. Left side was fumigated.



Soil carryover or something else?



Root lesion nematode damage

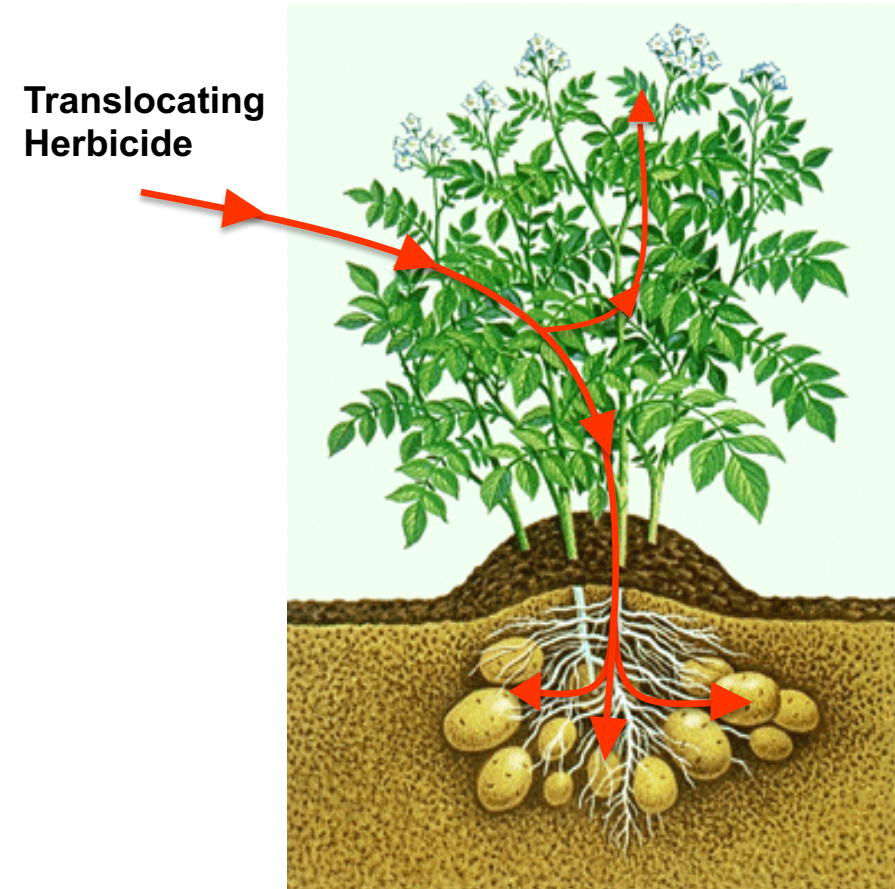


Exposure to foliage

- Can happen through sprayer contamination, drift, inversions, volatilization and misapplication.
- Follow tank cleanout instructions (p. 76 NDSU Weed Guide)
- Don't drift (p. 76 NDSU Weed Guide)
- Communicate with neighbors
- Train those spraying fields to properly clean spray systems and when not to spray

Herbicide movement from foliar contact

- Go to strongest sink
- ALS inhibitors (Group 2)
- Growth regulators (Group 4)
- EPSP synthase inhibitor (Group 9)



Exposure by foliage: Where to look

- Typically damages leaves, but can hurt tubers
 - Translocating herbicides will affect new growth (leaves/tubers)
 - Contact herbicides will affect what it touches (new & old leaves)
 - Stress from herbicide exposure can cause tuber cracking / malformations.

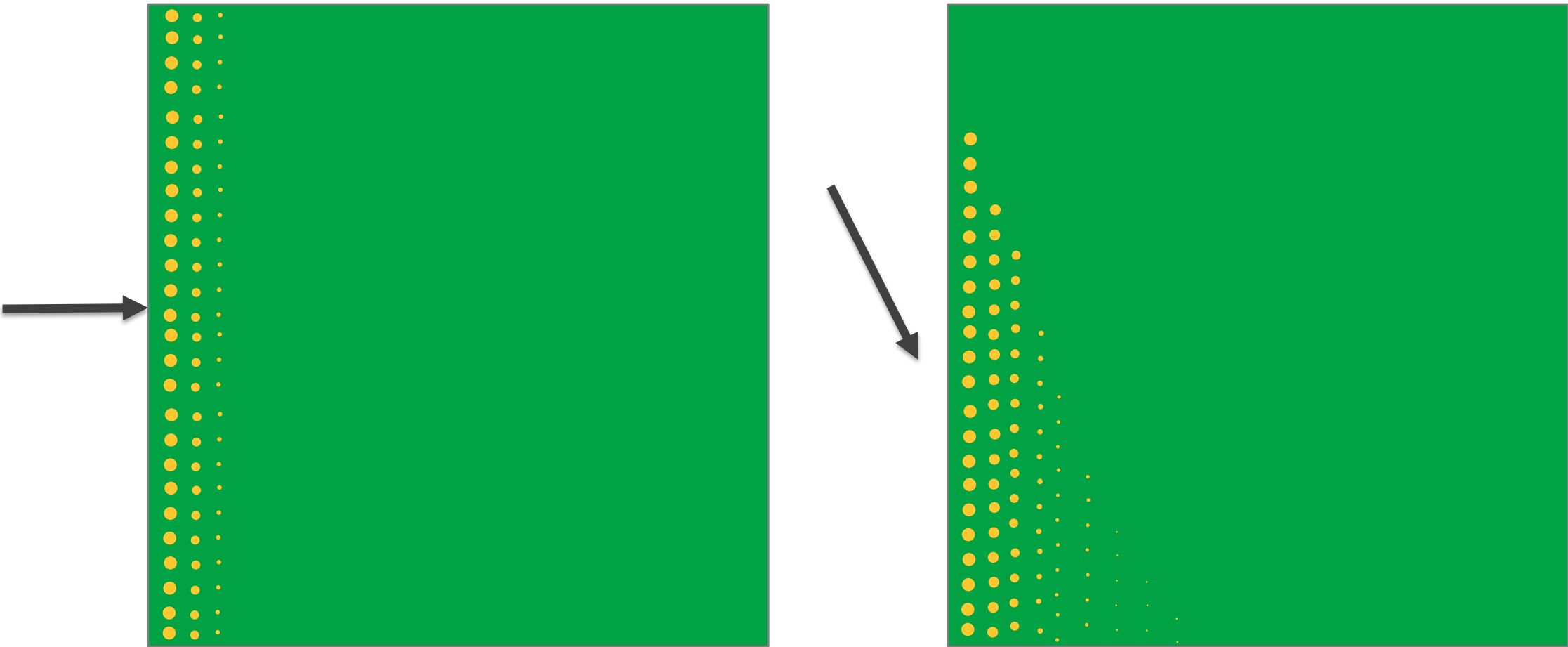
Symptoms of exposure

- Injury to leaves immediately to a few weeks after exposure
- Symptoms based on herbicide mode of action
 - PGR – twisting of leaves, stems, cupped leaflets, wrinkled leaflet margins, misshapen tubers (quick)
 - Glyphosate causes yellowing of youngest leaves, cracked tubers (slow)
 - ALS-inhibitors – yellowing of new growth, leaflets elongate and wrinkled, leaflet tips make boat shape, cracking of tubers (slow)

If herbicide damage found, act immediately

- Document suspected herbicide drift damage
 - NDSU Extension article WC751
- Check with State Department of Ag to determine steps needed to document herbicide misapplication and determine what may be needed for a formal complaint.
- Overtime injury symptoms lessen and herbicides are broken down, making it difficult to identify.

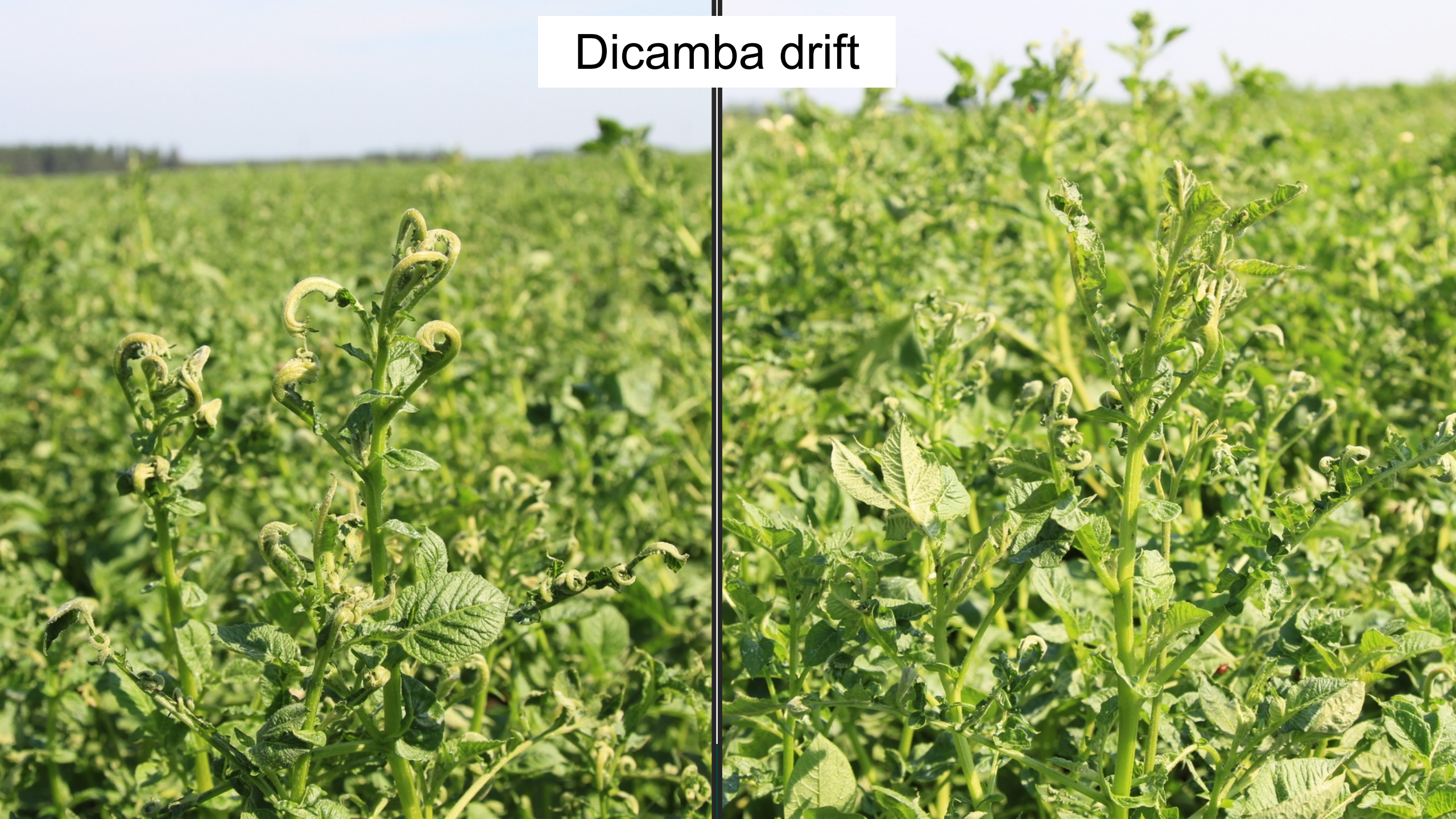
Drift: Field pattern example



Dicamba drift



Dicamba drift



Glyphosate drift



Glyphosate drift





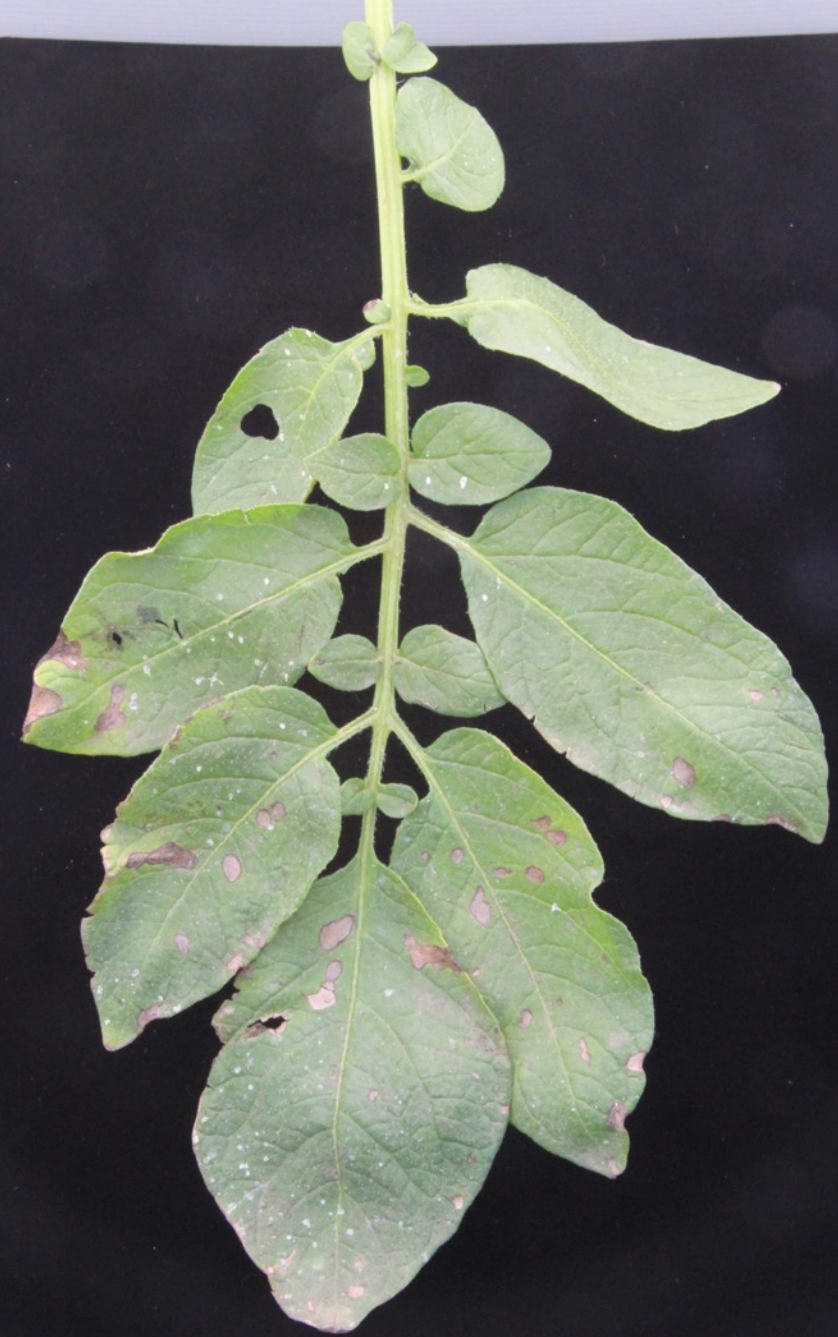
Glyphosate drift

Mimics

- Drought stress can cause reduced plant growth
- Fertility stress can cause discolored leaves
- PVY causes mosaic, small leaflets, wavy leaf margins
- Phosphorous acid



Phosphorous acid injury





PVY

Herbicide or Fertility stress?



Iron chlorosis



Glyphosate drift



Tank (& boom) contamination



Carboxylic acids effect on foliage

- Severely wrinkled and cupped leaves
- Curling of leaflets
- Bending and twisting of stems and petioles
- Stems and leaves may thicken



Picloram injury



Picloram injury





Picloram injury

Picloram injury



Imazamox



2,4-D





Red Norland



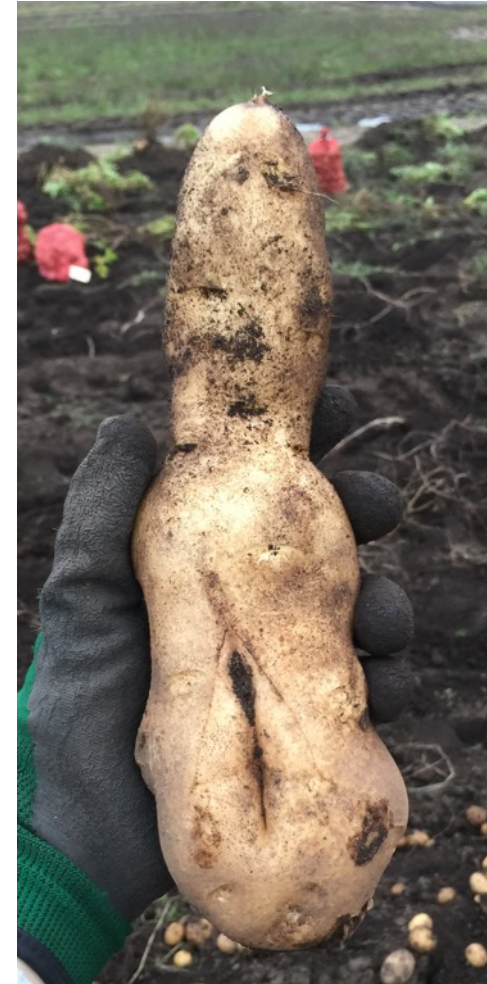
Ivory Crisp
Dicamba, mid-bulking



Russet Burbank

Mimics – Tuber cracking

- Many causes
 - Environmental stress, nutritional imbalance, disease or genetics.
- Results of high turgor pressure and rapid tuber growth
- Earlier cracking = larger cracks



Misapplication



Seed contamination

- Know where your seed comes from.
- Check seed field prior to purchasing seed.
- If tubers look malformed:
 - A lab test for herbicide residues could save a lot of money and headache.
 - Grow out seed to determine if it is okay to plant.
- A great crop starts with high quality seed.

Symptoms of herbicide contaminated seed

- Erratic and slow emergence pattern
- No dominate stem, causing multiple stems, 'candelabra' or 'cauliflower' formation of stems
- Malformed leaves
 - Twisted, wavy margins, small, yellow or purple leaves
- Enlarged stems
- Shortened internodes and reduced plant height
- Unnatural growth

Glyphosate in seed tubers



**Glyphosate in
seed tubers**





**Glyphosate in
seed tubers**

Glyphosate in seed tubers on left side



Dicamba residues in seed

- Slow emergence
- Twisted, bent stems
- Leaves often crinkled, twisted, cupped and malformed.




Dicamba in seed



A photograph showing several young green plants growing in dark, clumpy soil. The plants are at various stages of growth, with some having larger, more developed leaves and others being smaller seedlings. The soil is dark and appears to be a heavy, moist type. There are some small twigs and debris scattered on the surface of the soil.

Dicamba in seed



Dicamba in seed

Dicamba in seed



How to sample for herbicide injury

- Use clean gloves & bag
- Multiple plant samples
- If seed-borne – sample tubers underground
- Wash away soil and dry
- Label and take picture of symptoms
- Place bags on ice
- Ship overnight on ice
- Use a reputable laboratory

What to do about this?

- Know field history
- Start with high quality seed
- Use good spray techniques
 - Consider a separate sprayer for potatoes
- If something looks suspicious, document it!
 - Call or send me a picture if in question

QUESTIONS?

