Glyphosate and Potatoes Just Don't Mix

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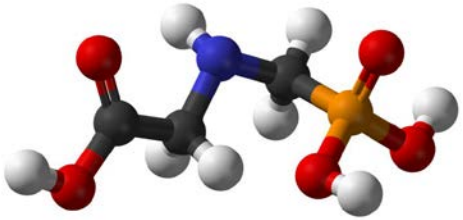
Today's Agenda

- Review of glyphosate
- Off-site movement of glyphosate
- Symptoms of glyphosate in plants
- Symptoms of glyphosate residues in seed
- How to manage glyphosate problems

Glyphosate



- Herbicide introduced in 1974 by Monsanto
- “Once in a lifetime herbicide”
  - Activity on grasses and broadleaf plants
  - Low mammalian toxicity
- Registered in 130+ countries and approved for weed control in 100+ crops
- In most cases does not carryover in soil

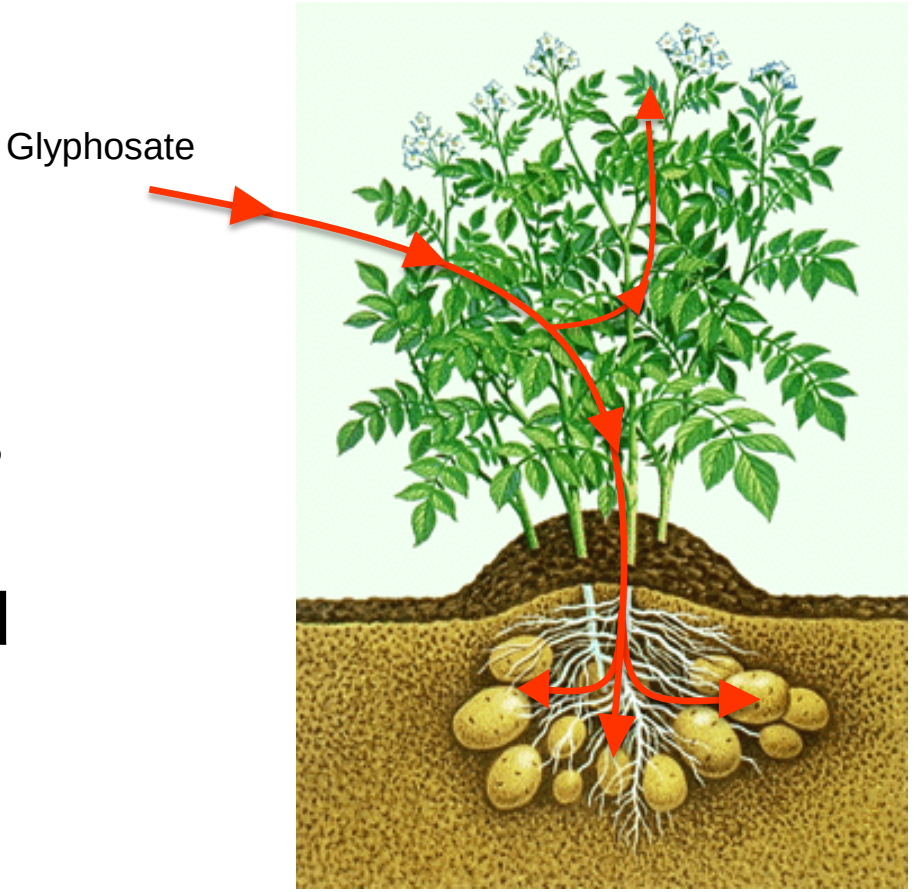
Glyphosate Carryover in Soil

- Glyphosate binds rapidly in soil and is degraded by soil microbes.
- Glyphosate has been reported to carryover in the soil, but under specific conditions:
  - Applications were ≤ 35 before planting
  - 10x the labeled rate applied pre-emergence reduced yield in wheat
  - Sandy soils with low pH and high P-levels injured soybean and tomato plants

(Bott et al., 2011; Cornish, 1992; Moechnig, et al., 2012)

Movement of Glyphosate

- Translocates throughout the potato plant
- Reaches highest concentration levels in potatoes within four days (Smid and Hiller, 1981)



Glyphosate Uses

- Glyphosate-resistant alfalfa, canola, corn, soybean, and sugarbeets
- Pre-harvest treatment on small grains and canola
- Spot treatments around or within fields
- Rights-of-way, roadsides, railways, and around homes

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How Seed Potatoes can be Exposed to Herbicides

- Particle drift (including inversions)
- Contamination of spraying equipment
- Misapplication
- Volatilization

Particle Drift

Influence of droplet size on potential distance of drift			
Droplet diameter (microns)	Type of droplet	Time required to fall 10 feet	Lateral distance droplets travel in falling 10 feet in a 3 mph wind
5	Fog	66 minutes	3 miles
20	Very fine spray	4.2 minutes	1,100 feet
100	Fine spray	10 seconds	44 feet
240	Medium spray	6 seconds	28 feet
400	Coarse spray	2 seconds	8.5 feet
1,000	Fine rain	1 second	4.7 feet

Plant Response to Glyphosate

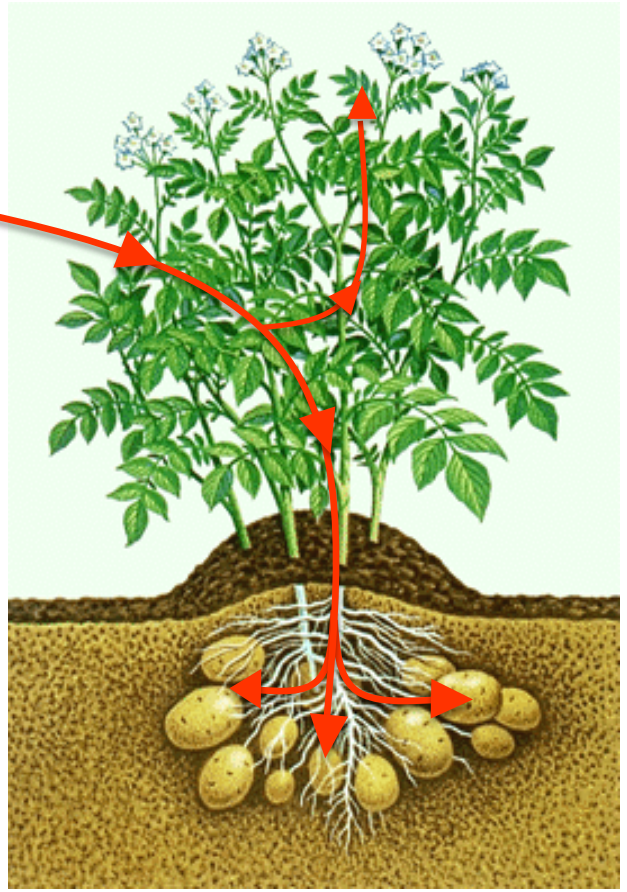
- Upper leaves may become yellow or necrotic
- Reduction in plant height, leaf size, and internode length
- Tubers can exhibit cracks and folds, or become misshaped
- **Low levels of glyphosate may not cause visible injury in the foliage or tubers**

High Concentrations of Glyphosate

Glyphosate in Seed Potatoes

Movement of Glyphosate

- **Glyphosate will move to tubers and residues accumulate in the eyes causing sprouting problems the next year.**



If Seed Looks Suspect to Herbicide Damage

- Sprout the seed in a dark room
- Grow out in a pot
- Send samples to lab for detection

Effects of Glyphosate Residues in Seed Potatoes

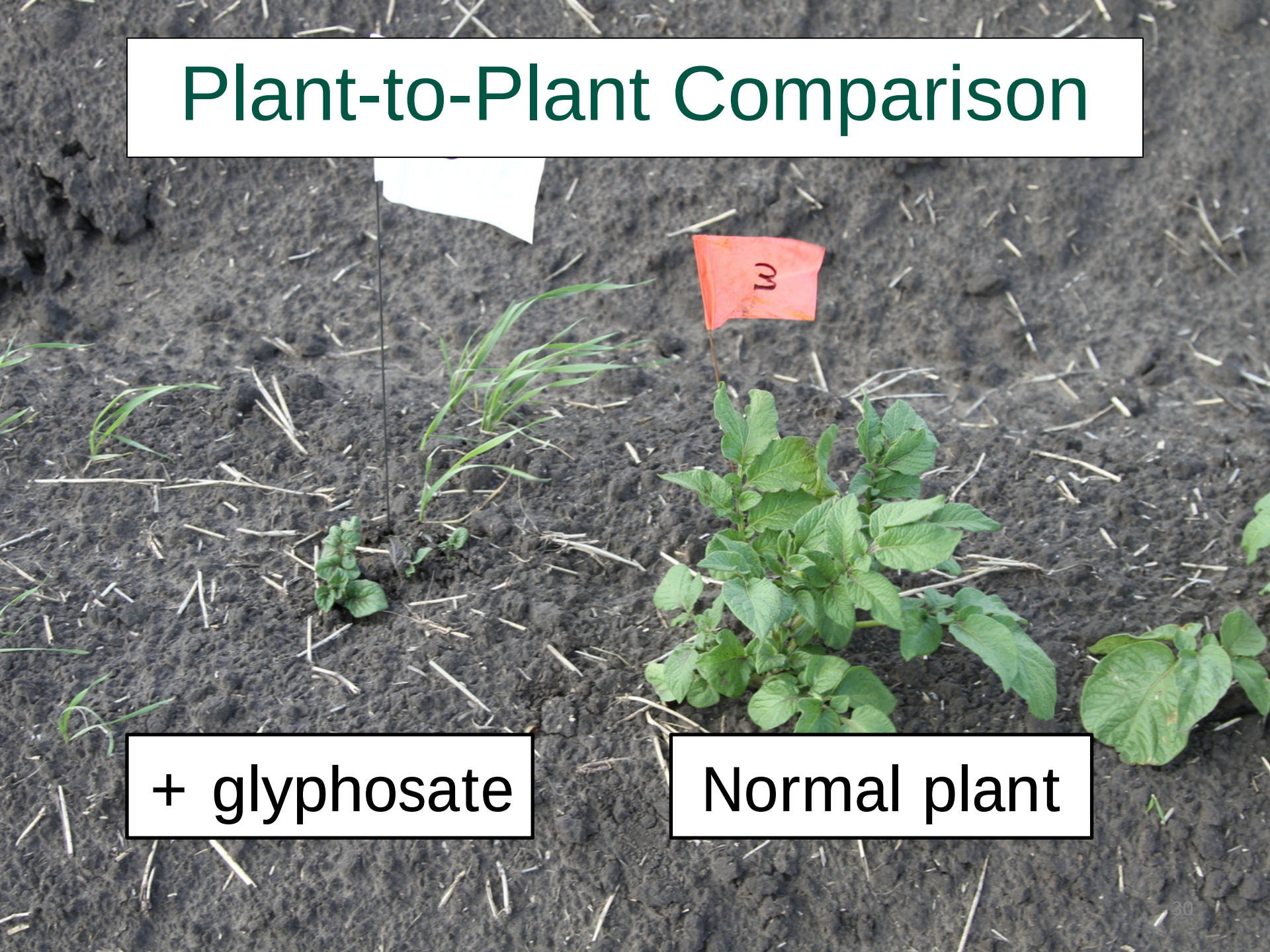
Symptoms of Glyphosate Residues in Seed Potatoes

- Erratic and slow emergence pattern
- Bending, twisting, and yellowing of leaves
- Multiple shoots from an eye
- Cauliflower or candelabra formation of shoots
- Enlarged shoots
- Prolific roots or reduced rooting

Glyphosate Levels

- Amount: 0.007 to 0.036 ppm glyphosate

Plant-to-Plant Comparison



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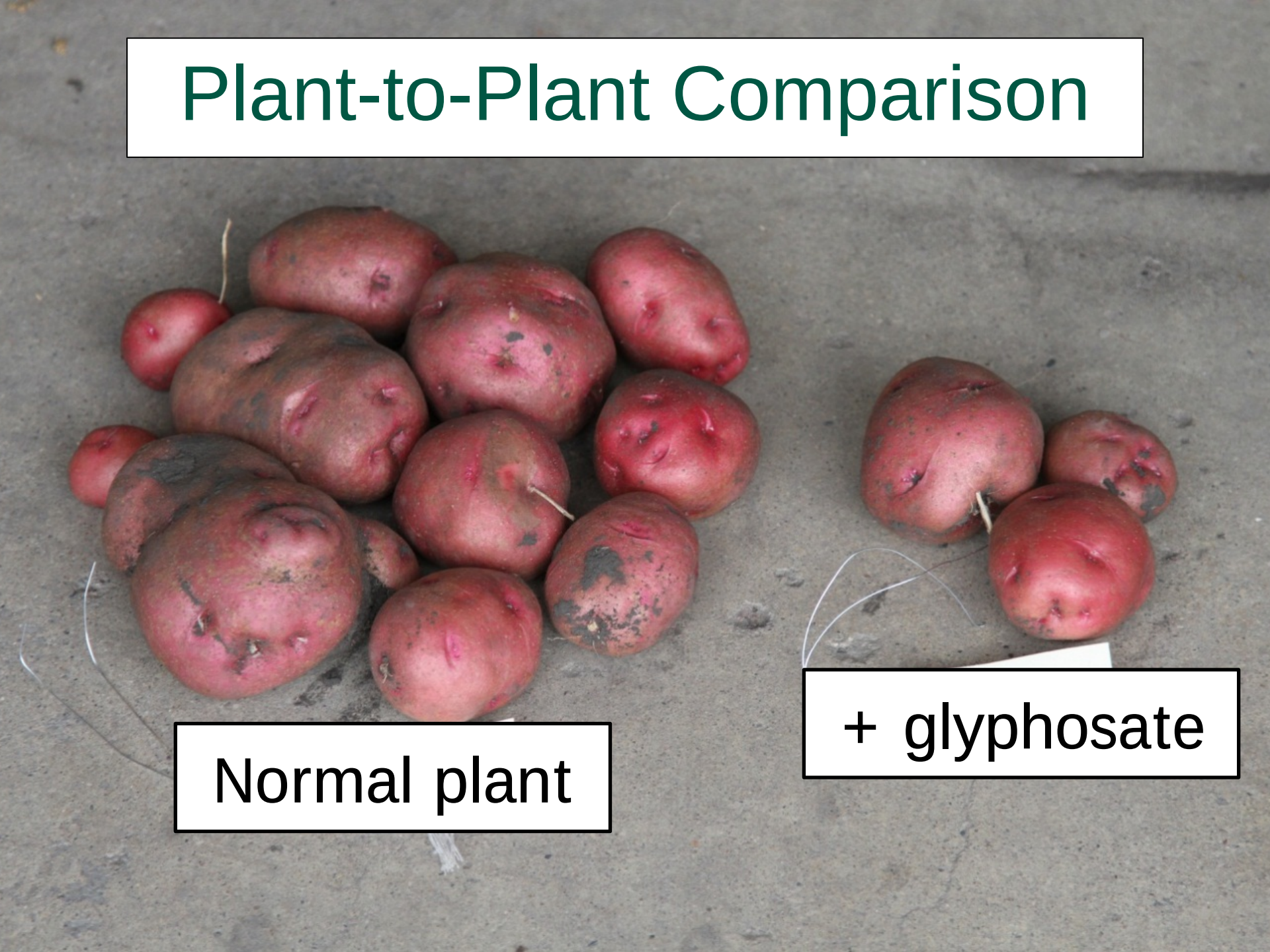
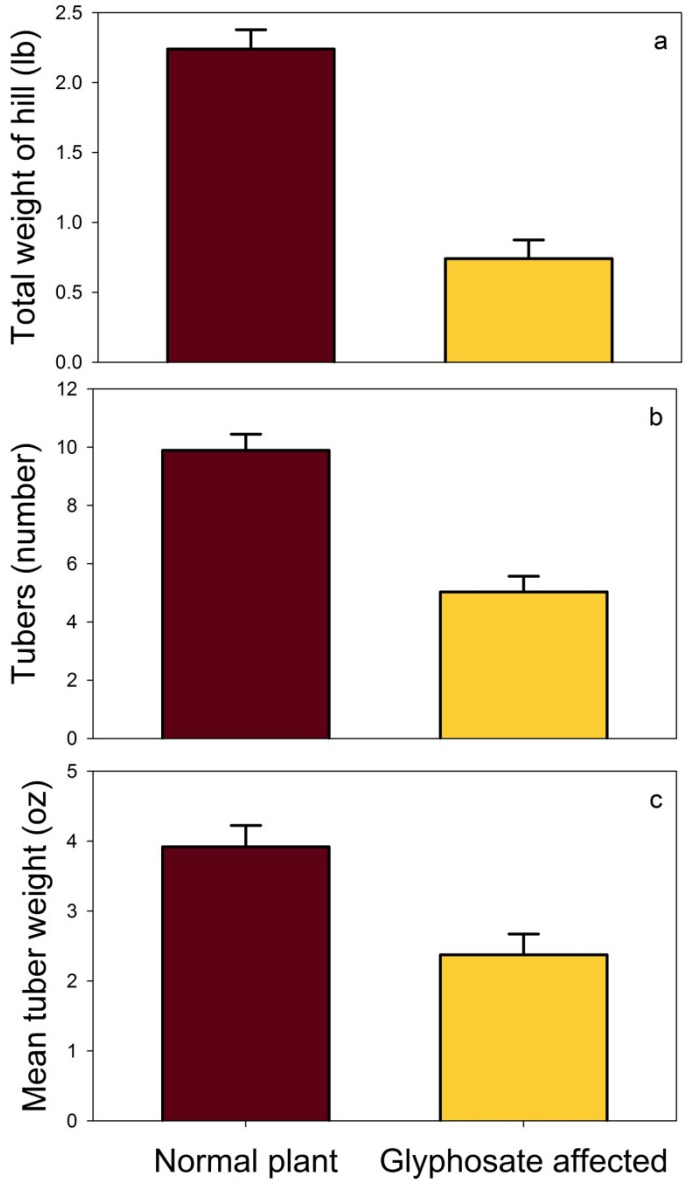


Glyphosate Residues in Seed Potato

Seed pieces with glyphosate residues had a:

- 67% reduction in total yield (from 2.25 to 0.75 lb/hill)
- 50% reduction in tuber number (10 to 5 tubers/hill)
- 38% reduction in mean tuber weight (3.9 to 2.4 oz/tuber)



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Do Glyphosate Residues Carryover to Granddaughter Tubers?

NO

Management Options

- **Communication** with your staff, neighbors, and local contractors.
- Consider having a **dedicated** sprayer for seed potatoes & ensure that custom applicators are using clean sprayers.
- Avoid planting field edges and leave suitable headland or plant **boarder** crops around potatoes.

REMEMBER!

SPRAYING GLYPHOSATE?
WATCH OUT FOR SEED POTATO CROPS!

POTATO COUNCIL

More info in the Potato Council's leaflet:
"Advice on the safe use of Glyphosate"

www.potato.org.uk

Potato Council is part of the Agricultural Horticultural Development Board (AHDB)

USE PESTICIDES SAFELY - READ THE LABEL EVERY TIME

NDSU

Herbicide Injury Checklist

- ☐ Document potato injury symptoms and patterns.
- ☐ Check pesticide application history.
- ☐ Contact the applicator or chemical representative.
- ☐ Photograph injury symptoms.
- ☐ Send samples to lab for confirmation.
- ☐ Checking growing points to determine plant recovery potential.
- ☐ Count damaged plants to determine the extent of injury.
- ☐ Map areas of the field damaged.
- ☐ Keep records of crop yield losses.

ND and MN Laws

- ND: notify the applicator within 28 days or prior to 20% of crop is harvested.

- MN: file complaint within 45 days of suspected incident.

QUESTIONS?

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