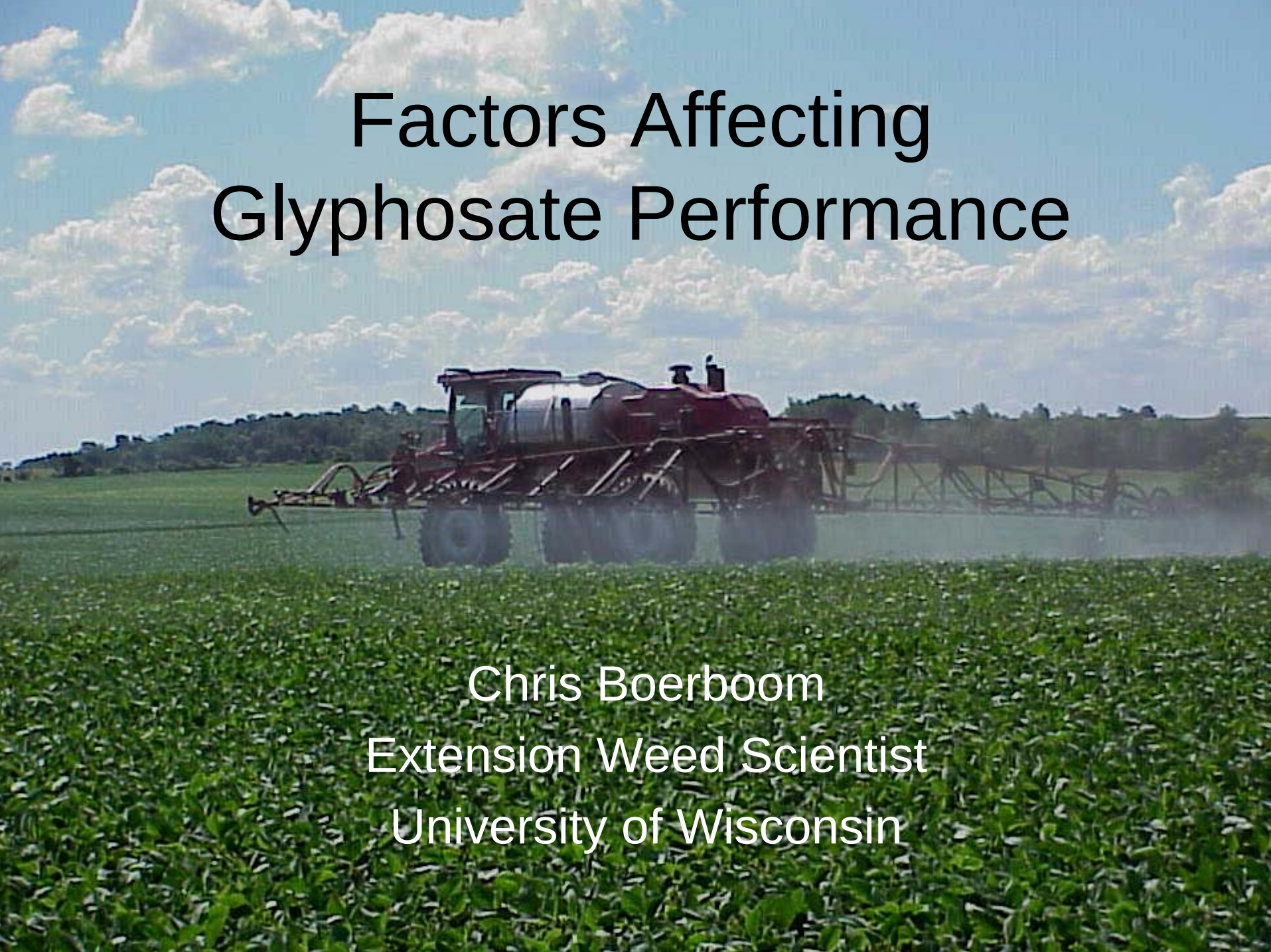
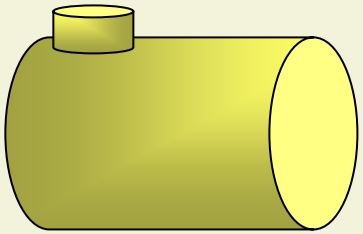


Factors Affecting Glyphosate Performance

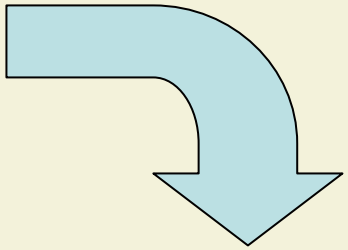
Chris Boerboom
Extension Weed Scientist
University of Wisconsin

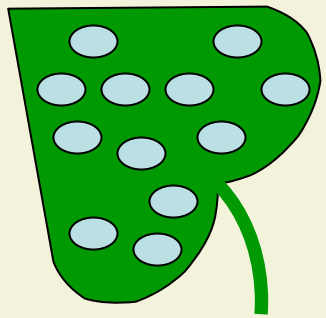
Questions on Consistency of Glyphosate Performance

Factors affecting Glyphosate Performance

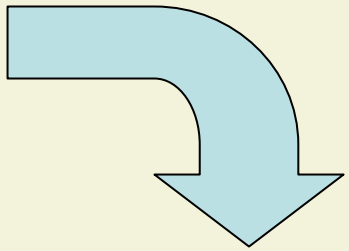


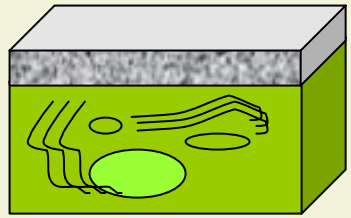
Spray tank





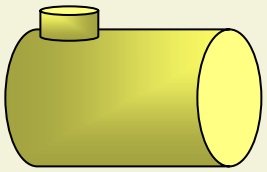
Leaf surface





Within weed

Spray Tank Interactions



Hard water

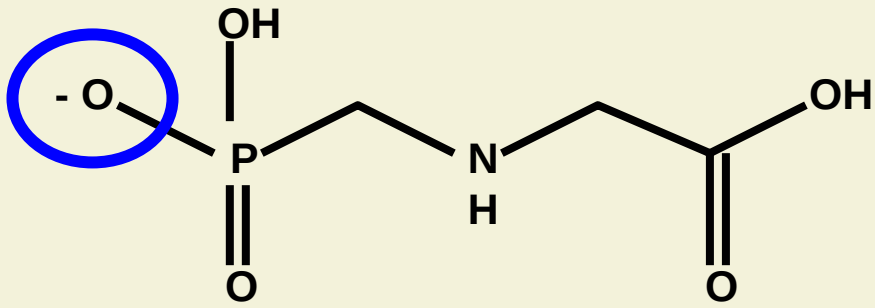
- Ca++
- Mg++
- Na+

Micro-nutrient fertilizers

- Fe++
- Mn++
- Na+

Clay-formulated herbicides

- dry flow, flowables



Form complexes with glyphosate that are less readily absorbed

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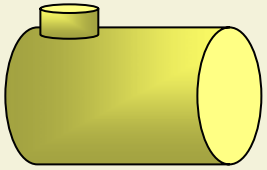

Spray Tank Interactions

Solution:

Add and dissolve ammonium sulfate PRIOR to glyphosate

Hard water

1. AMS (lb/100 gal) = 0.005 x (Na ppm) + 0.002 x (K ppm) + 0.009 x (Ca ppm) + 0.014 x (Mg ppm) source: NDSU
2. Follow label - 8.5 to 17 lb AMS/100 gal (about 1 lb/a)

Micro-nutrient fertilizers

Add AMS and micro-nutrients in proper order

Clay-formulated herbicides

Add AMS before adding tank-mixed herbicides

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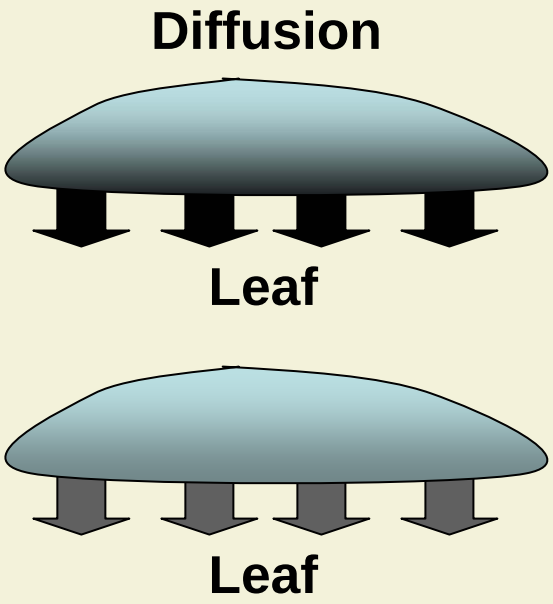
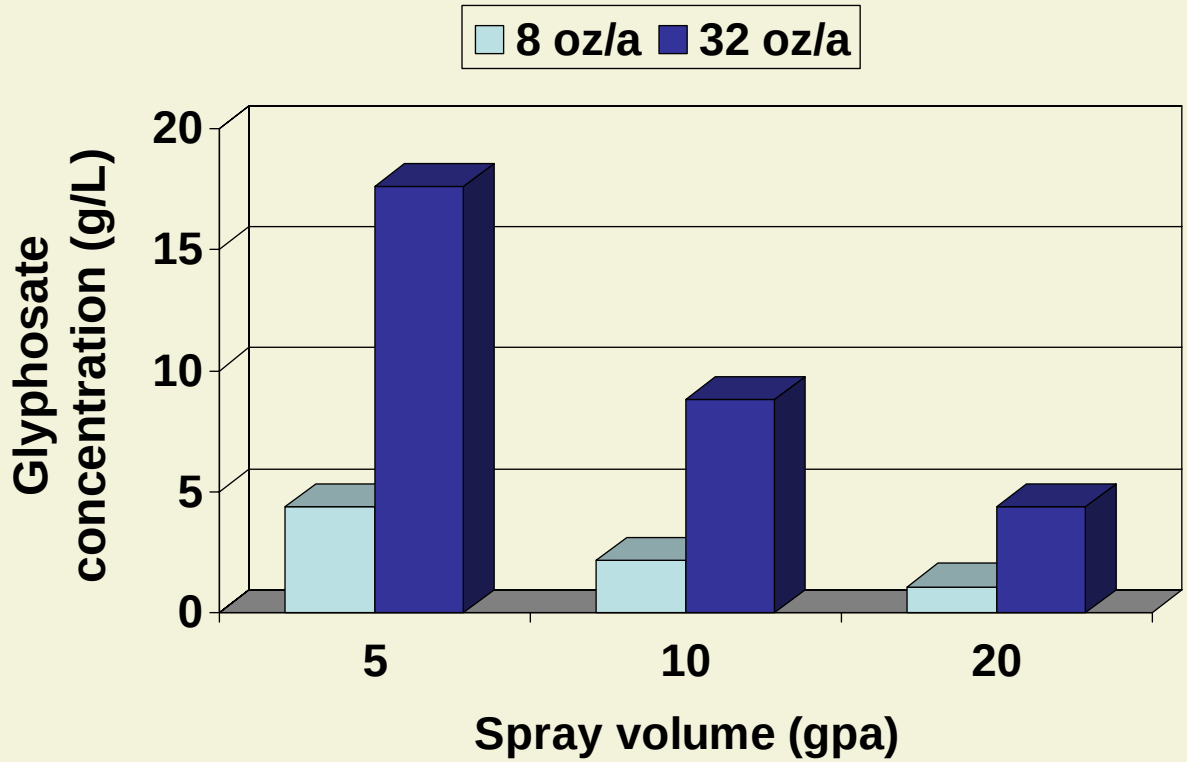
Leaf Surface Interactions

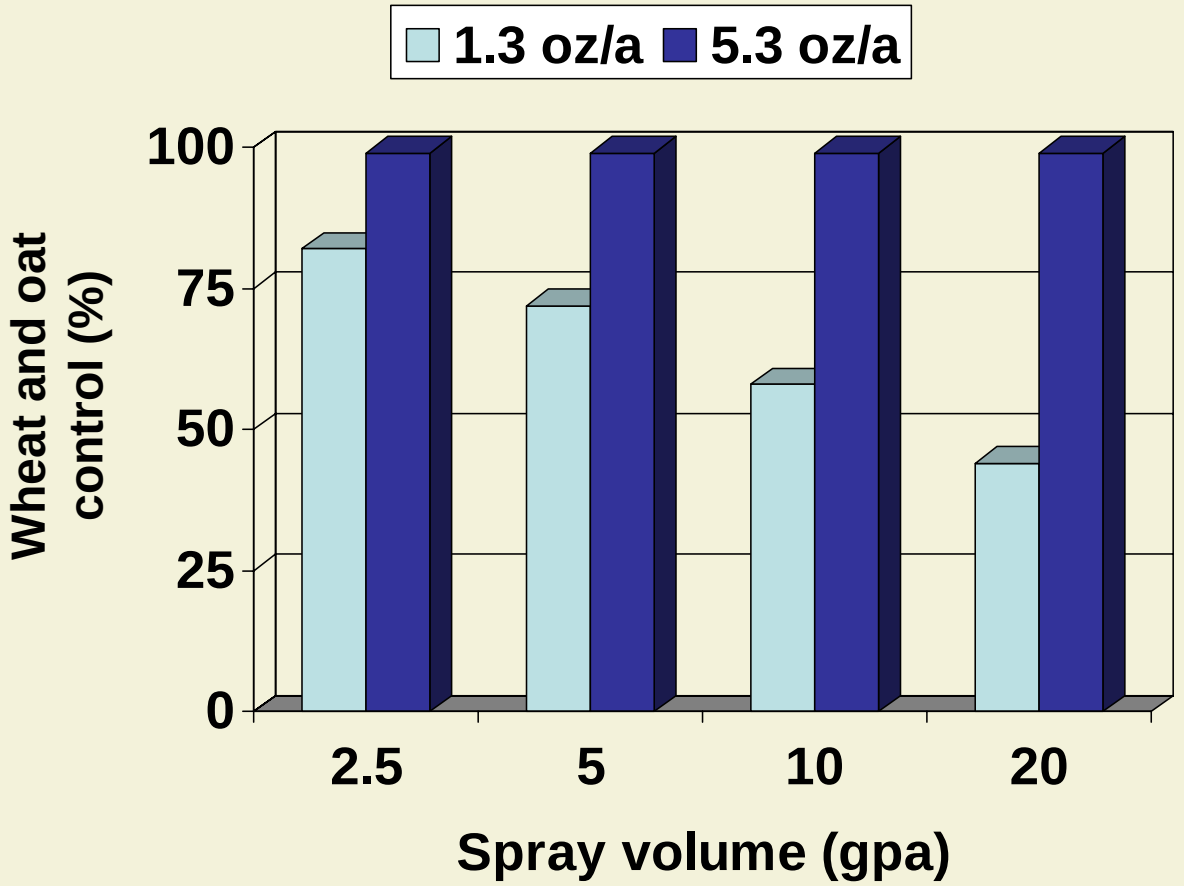
Spray volume – affects glyphosate concentration in the spray droplets





Leaf Surface Interactions

Spray volume – Does it really matter?



(Ramsdale et al. 2003)

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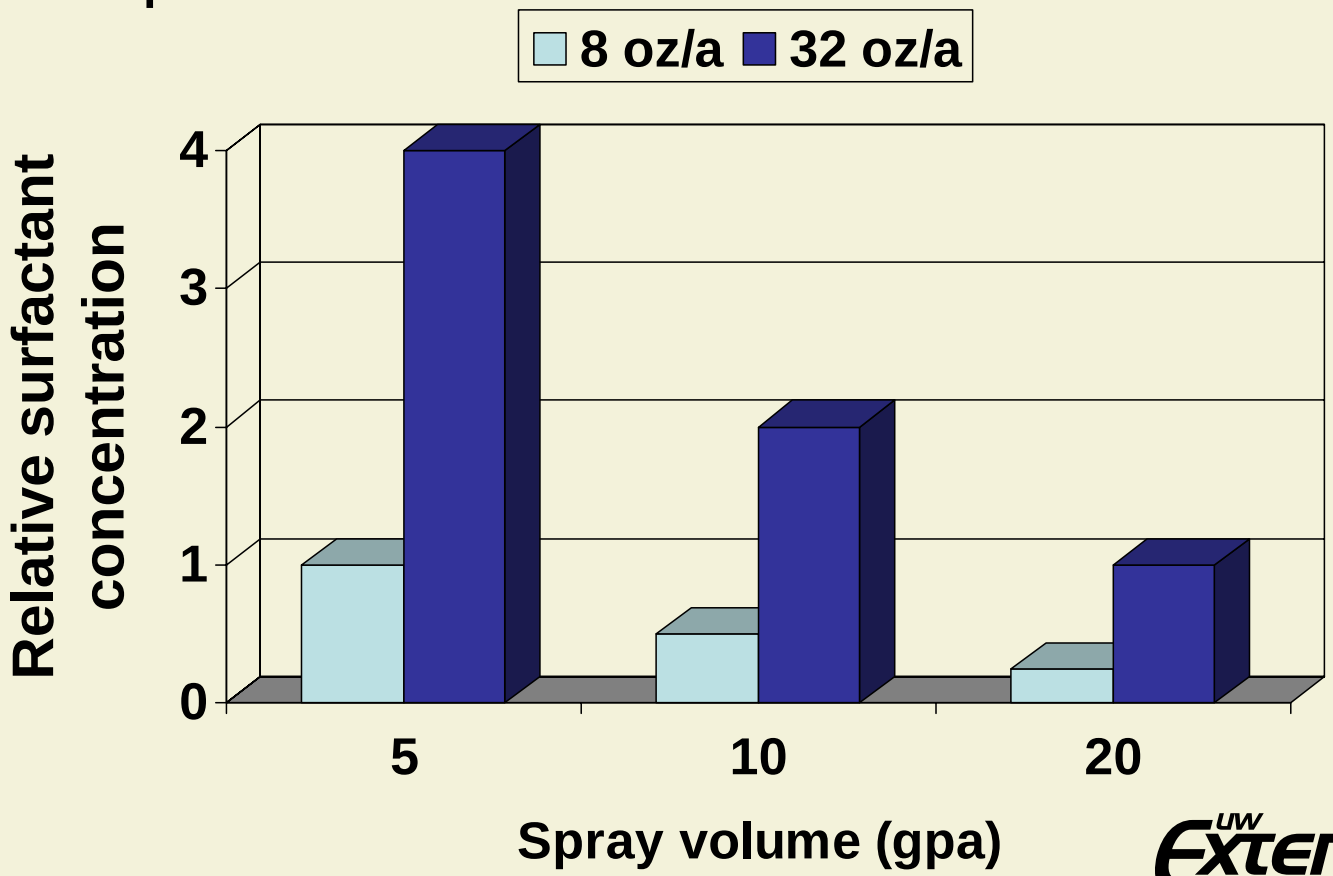
Leaf Surface Interactions

Spray volume – also affects surfactant concentration in spray droplet



Leaf Surface Interactions

Ammonium sulfate – depends on weed species (even without hard water antagonism)

	Lambsquarters		Velvetleaf	
	-AMS	+AMS	-AMS	+AMS
Glyphosate rate (50% stunting)	0.24 lb	0.3 lb	0.4 lb	0.08 lb
Absorption	33%	31%	26%	31%
Translocation	42%	44%	21%	47%

(Young et al. 2003)

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Leaf Surface Interactions

Spray volume – high weed densities may require higher volumes for spray coverage

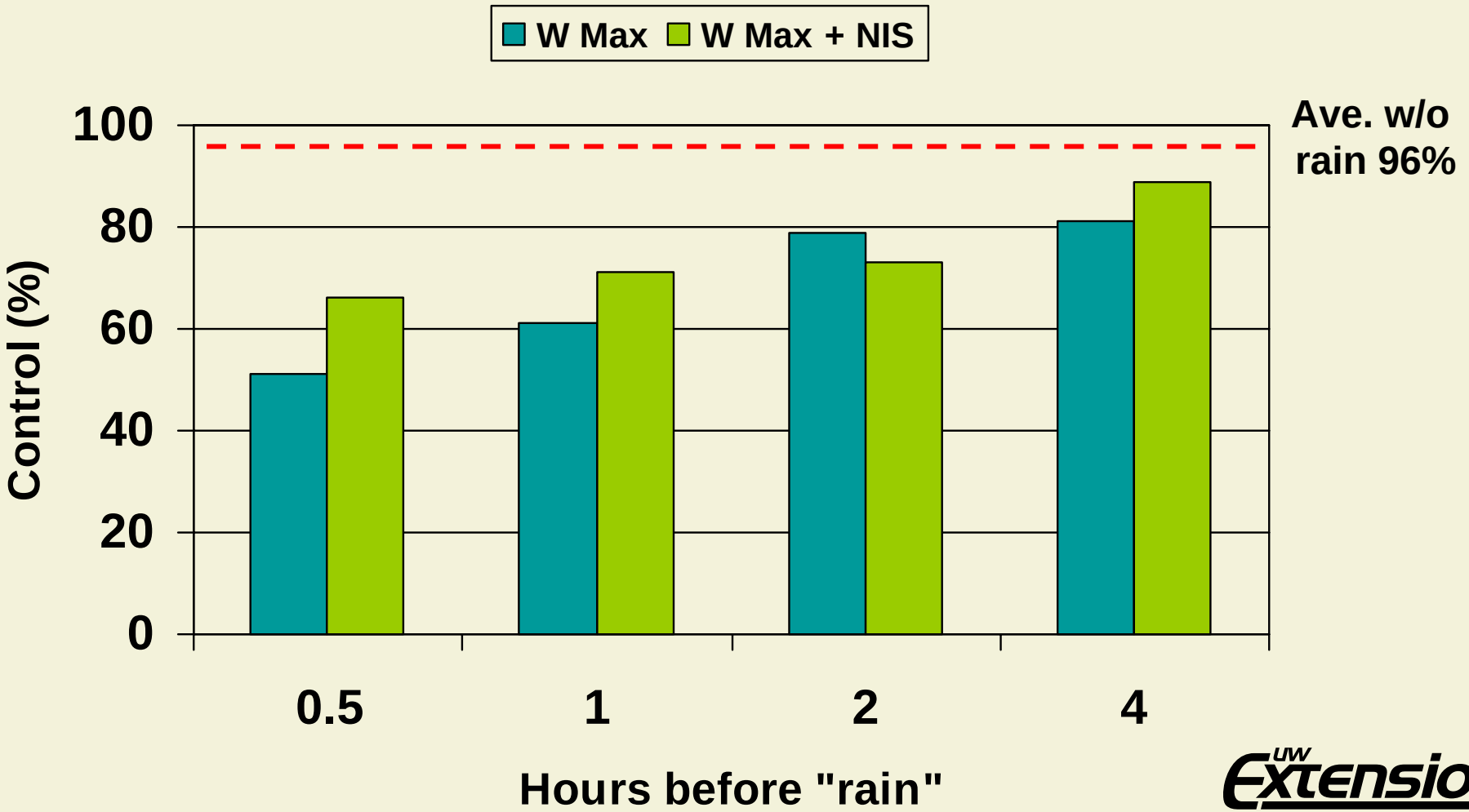
Leaf Surface Interactions

Rain – glyphosate may require more than 30 minutes to be rainfast

Simulated Rain

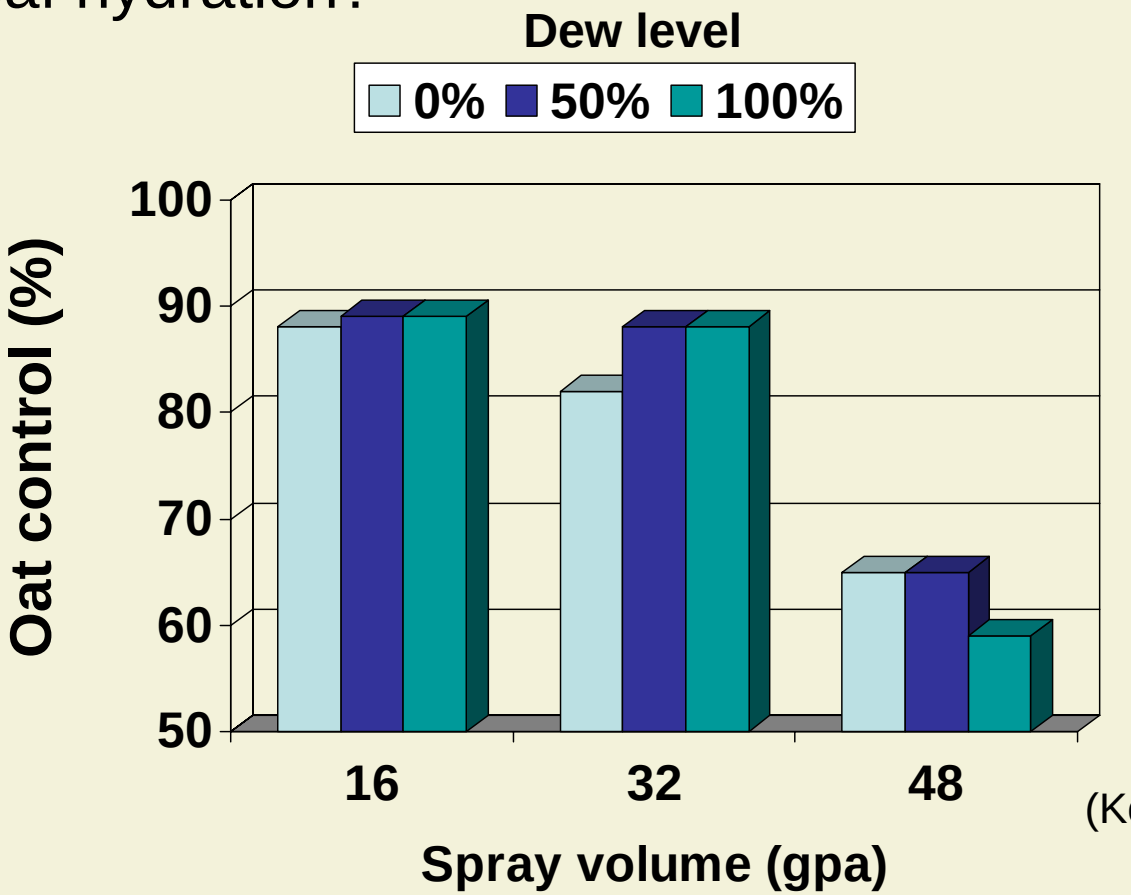
Leaf Surface Interactions

Lambsquarters Control



Leaf Surface Interactions

Dew: Is the risk of run-off or dilution greater than the benefit of leaf hydration?



(Kogan and Zunigan 2001)

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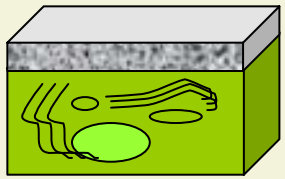
Leaf Surface Interactions

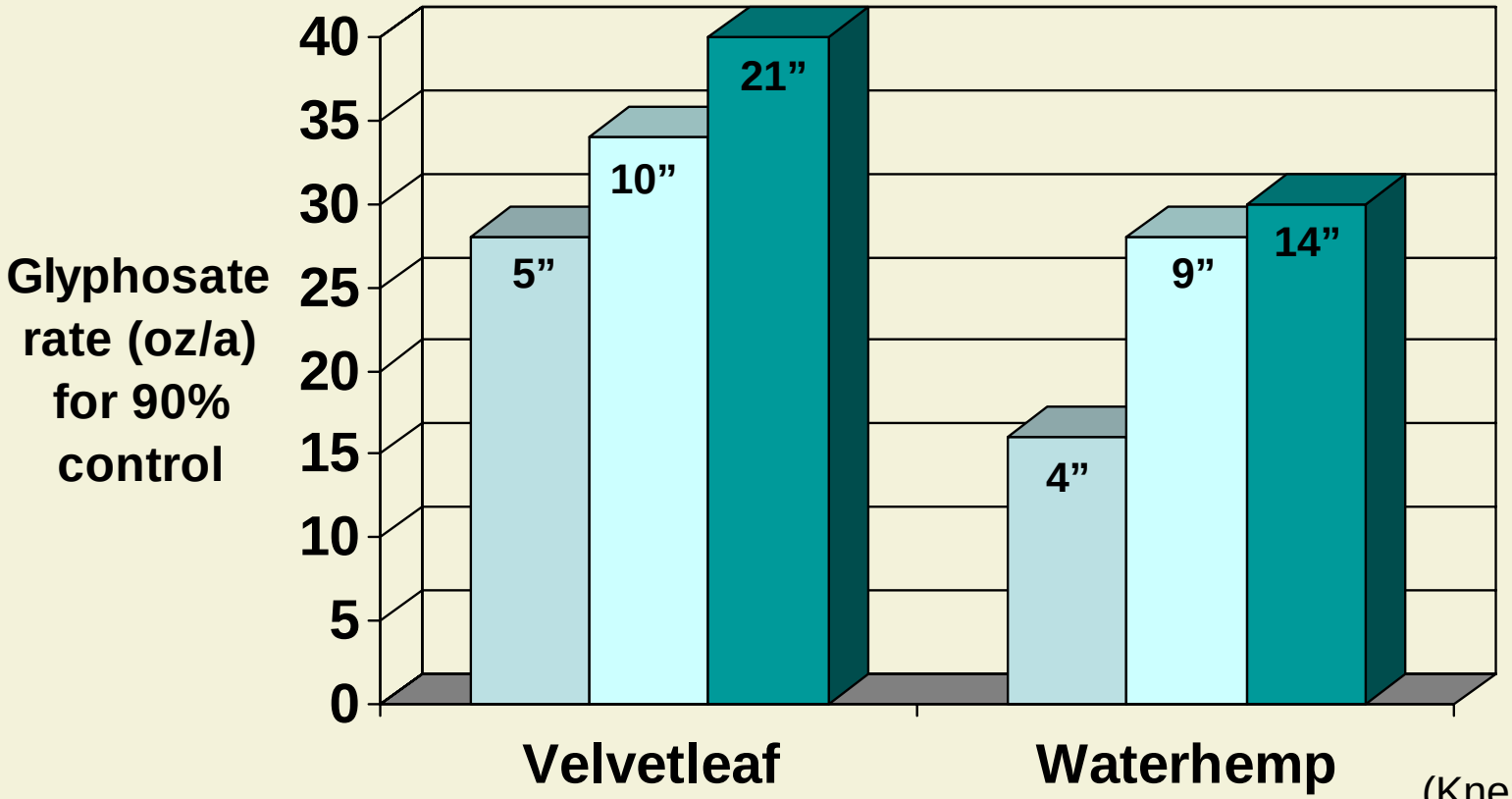
Dust – inactivates glyphosate

dust equal to 7 lb/a reduced nightshade control by glyphosate (Zhou and Messersmith 2005)



Plant Interactions

Weed species and size matters



(Knezevic 2005)

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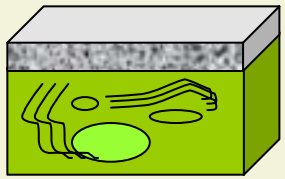
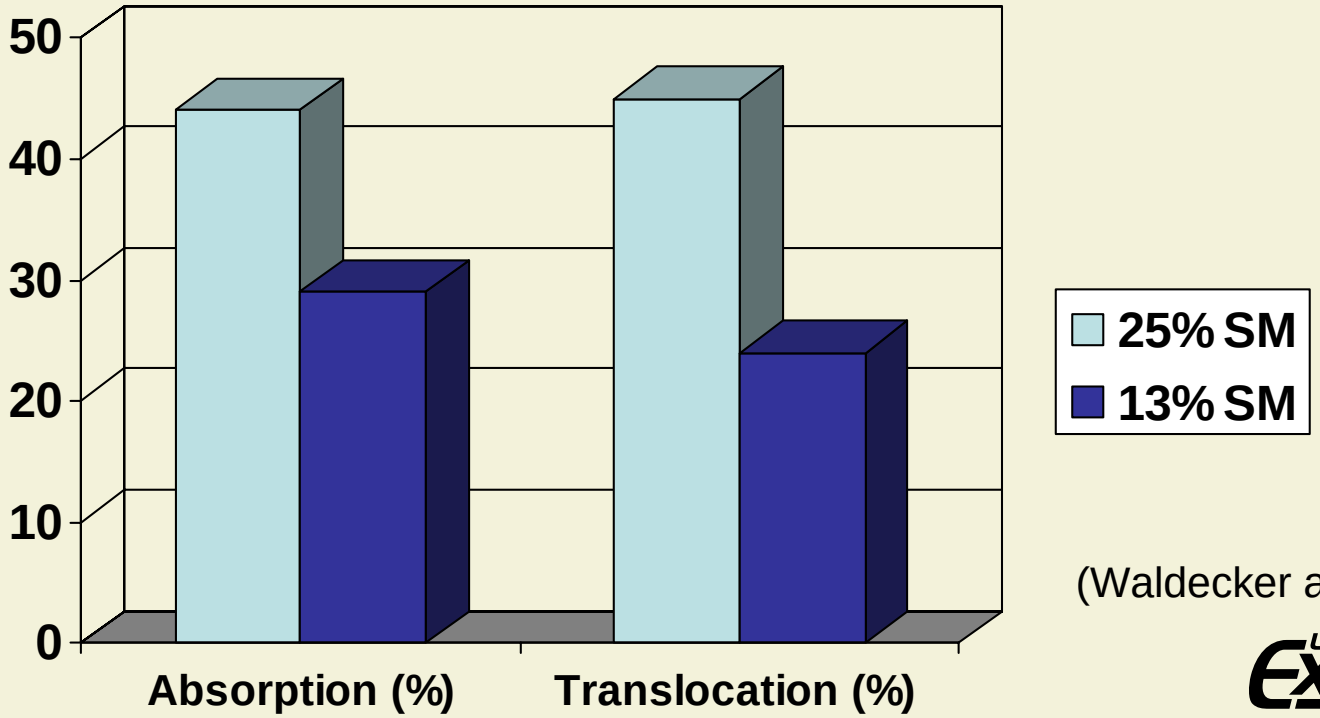


Plant Interactions

Drought – reduces absorption, translocation, and plant metabolic activity

Common milkweed treated with glyphosate with good soil moisture (25%) and plants that were not watered for 2 days (13% soil moisture at treatment)



(Waldecker and Wyse 1985)

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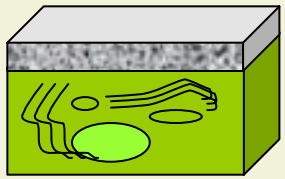
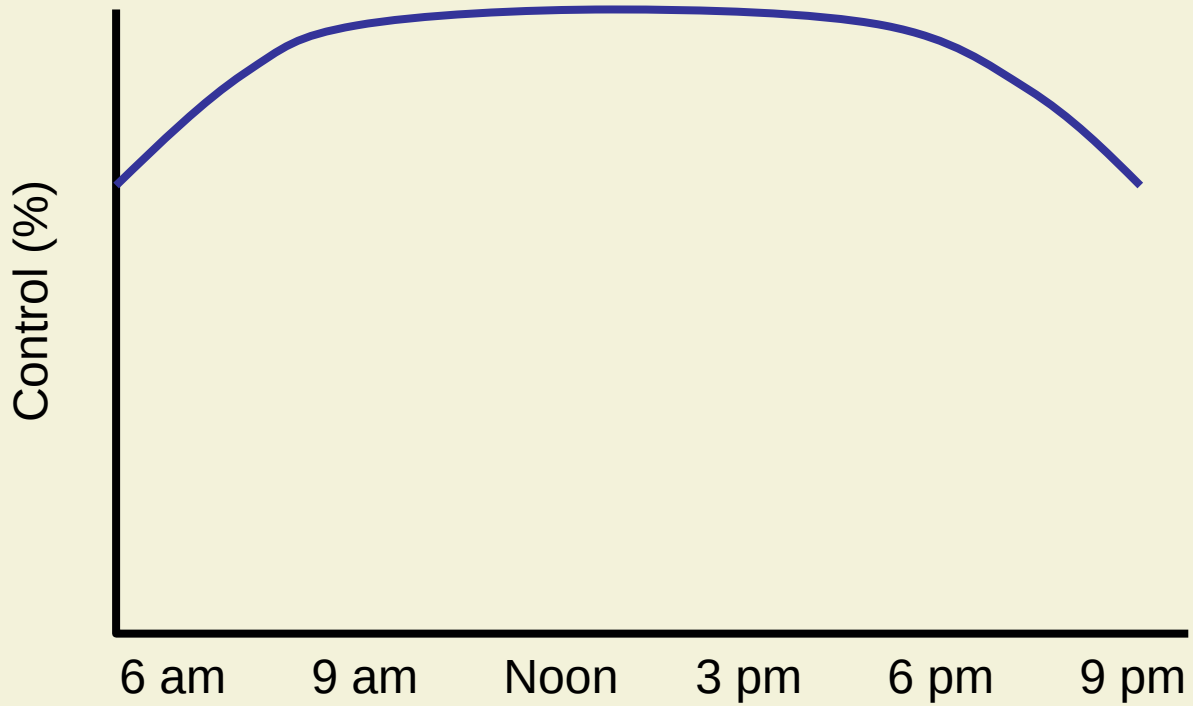


Plant Interactions

Time of day – reduced activity in early morning and late evening



Factors Affecting Glyphosate Performance

Many factors can limit glyphosate's activity

- Spray tank – antagonism can be managed with AMS
- Leaf surface – many environmental factors cannot be managed; spray volume can be adjusted or AMS added
- Plant – many environmental and plant factors cannot be managed; but should be acknowledged

Spraying glyphosate on smaller weeds can minimize the potential effect of most of these factors