

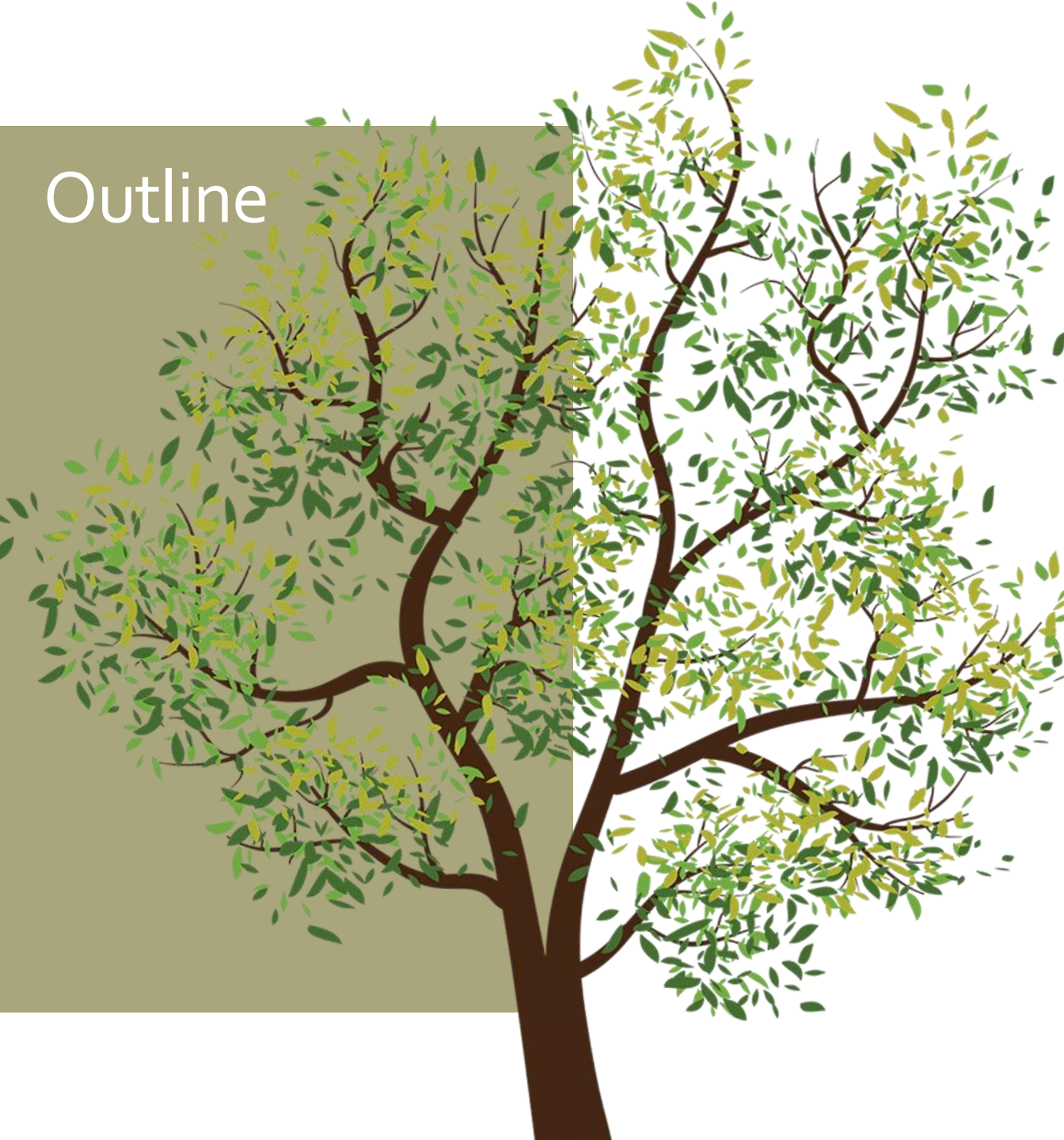
Glyphosate Residues in Forest Plant Communities

Dr. Lisa J Wood, RPF

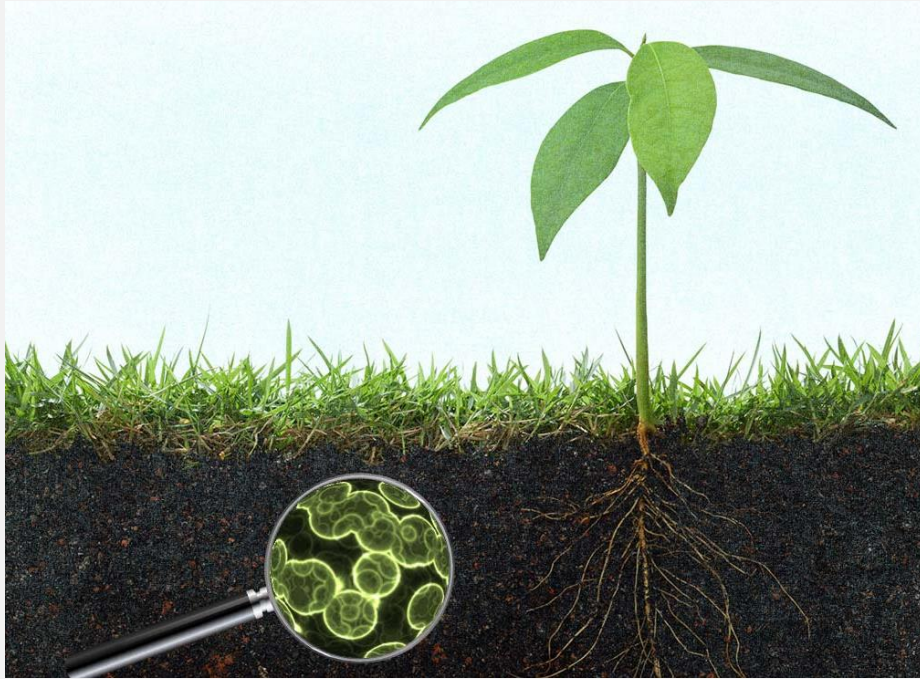
Assistant Professor, UNBC



Outline



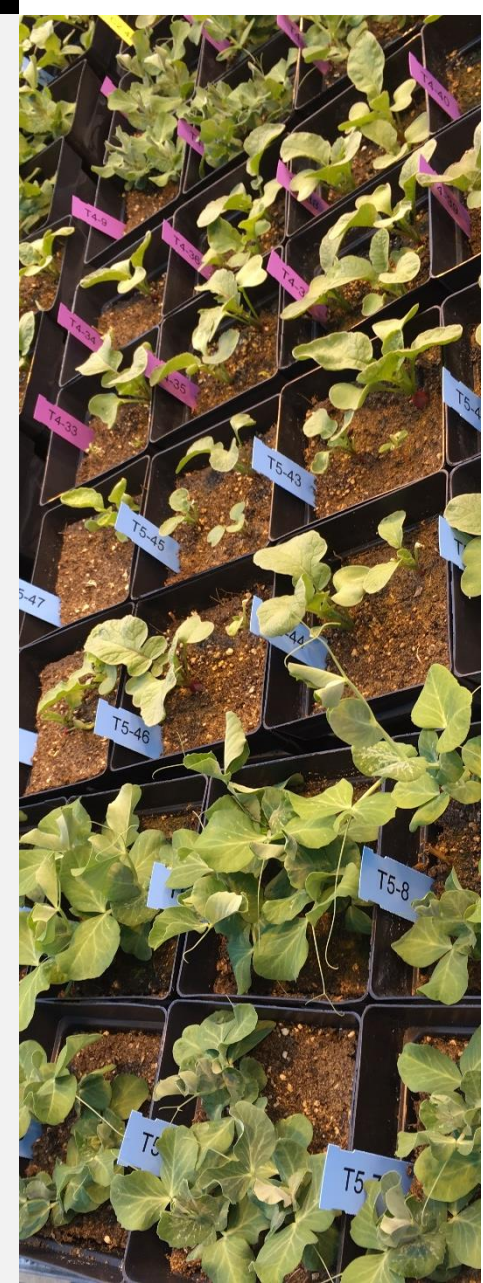
- Persistence timeline in plant tissues
- Observations and data from intervals post-application
- Trophic level considerations



DEGRADATION

*Degrades by microbial action **in soil***
Short Durations well researched

1. » Speed of break-down dictated by biological metabolism.



Events after application

Density of deciduous tree canopy dictates level of impact to shrub and herb layer



PLANT SURVIVAL

*Glyphosate doesn't
always kill the
plant*



Plants experience sub-lethal residues

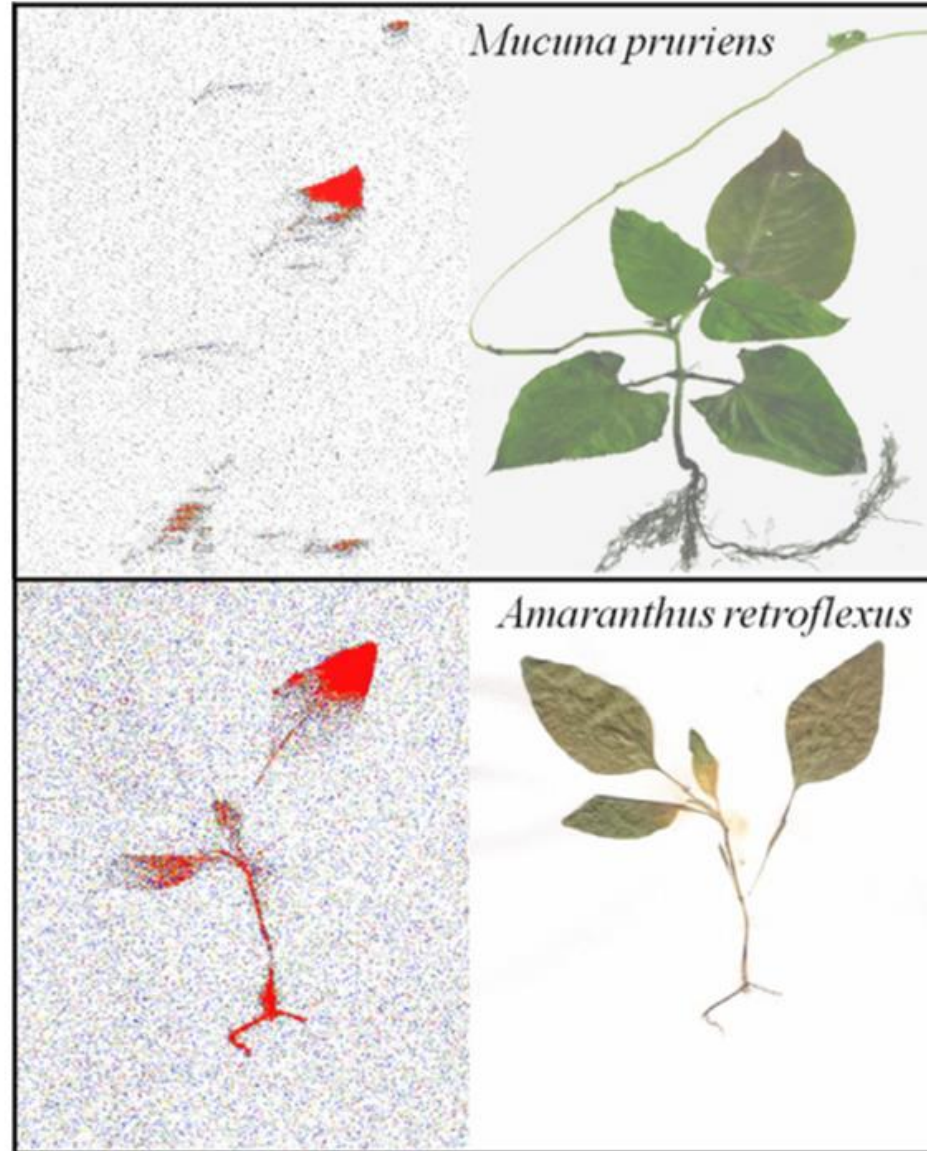


Fig. 5. Phosphor images of *M. pruriens* and *A. retroflexus* 96 HAT. *M. pruriens* plants retained more labeled glyphosate in treated leaves, and translocated less herbicide to the rest of the plant, than did *A. retroflexus* plants.

- Plants have different levels of tolerance for glyphosate.
- Mechanisms of tolerance and resistance:
 - localization
 - mutation
 - metabolism

So how much residue,
where does it go, and
what does it do?

Year of application

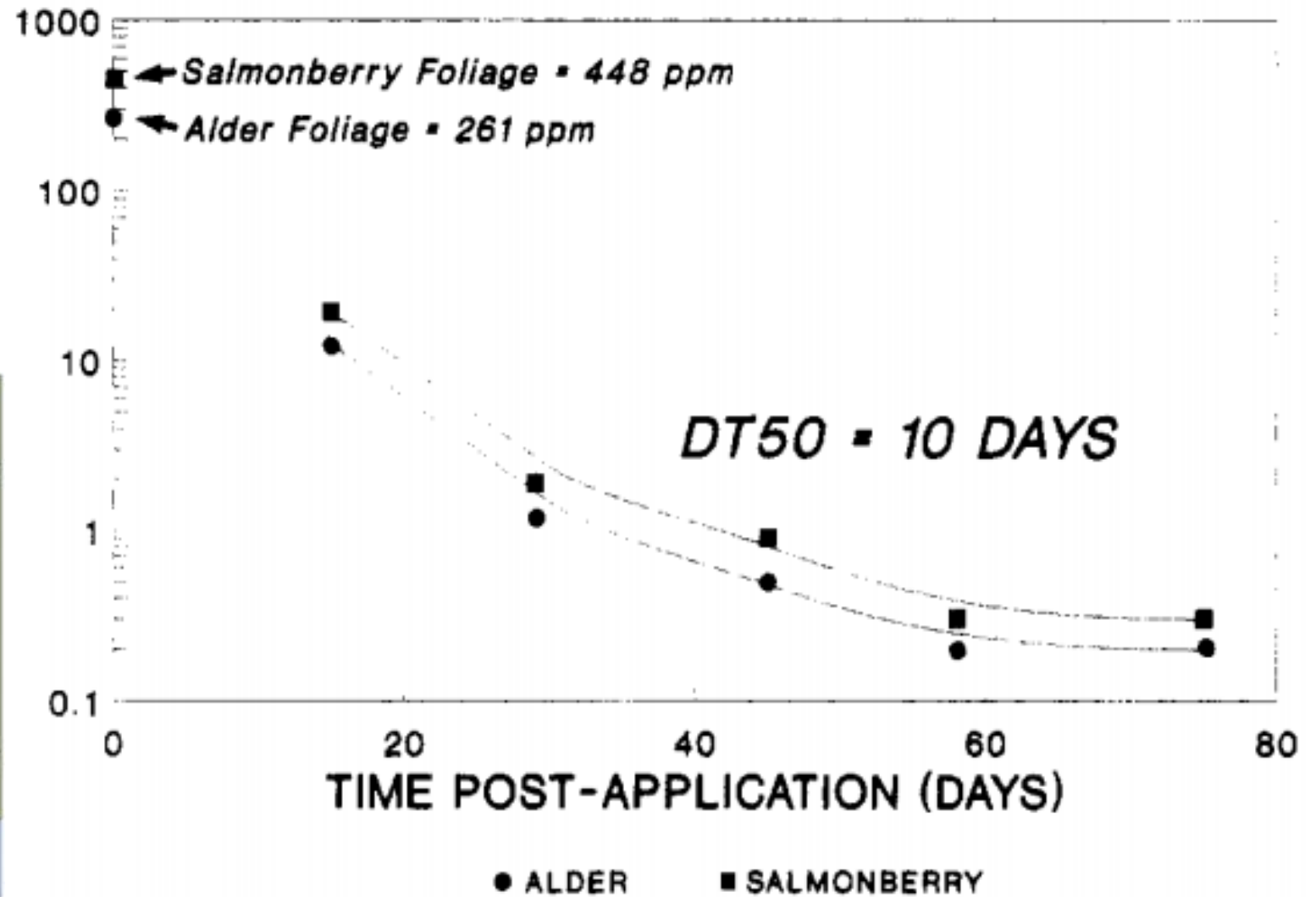
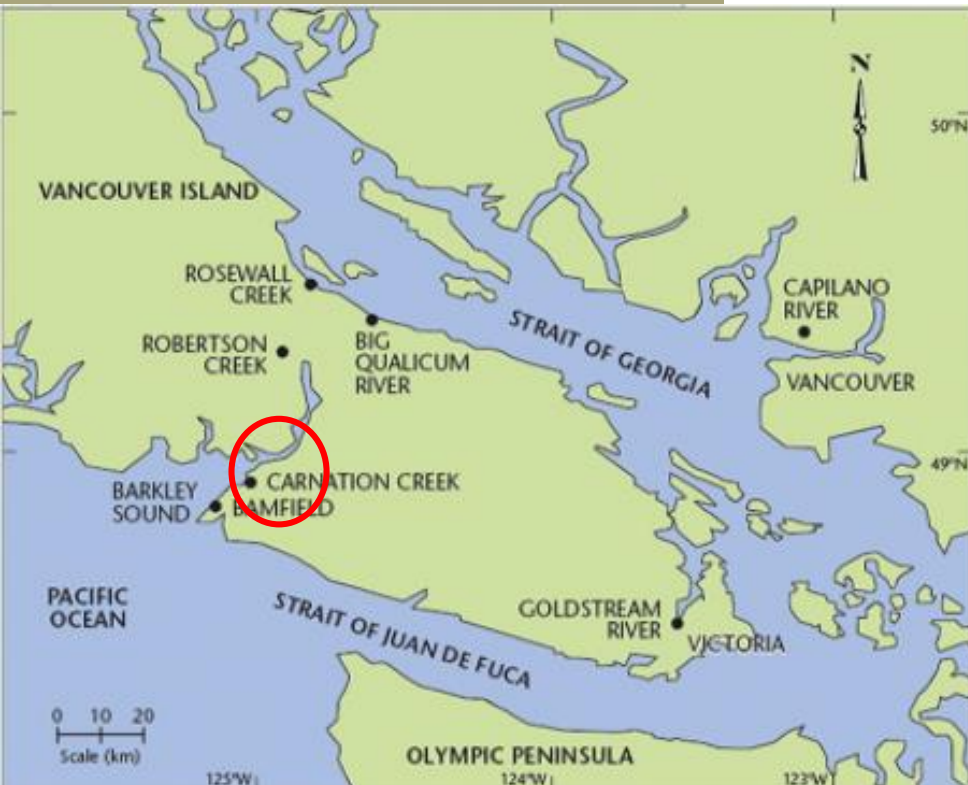
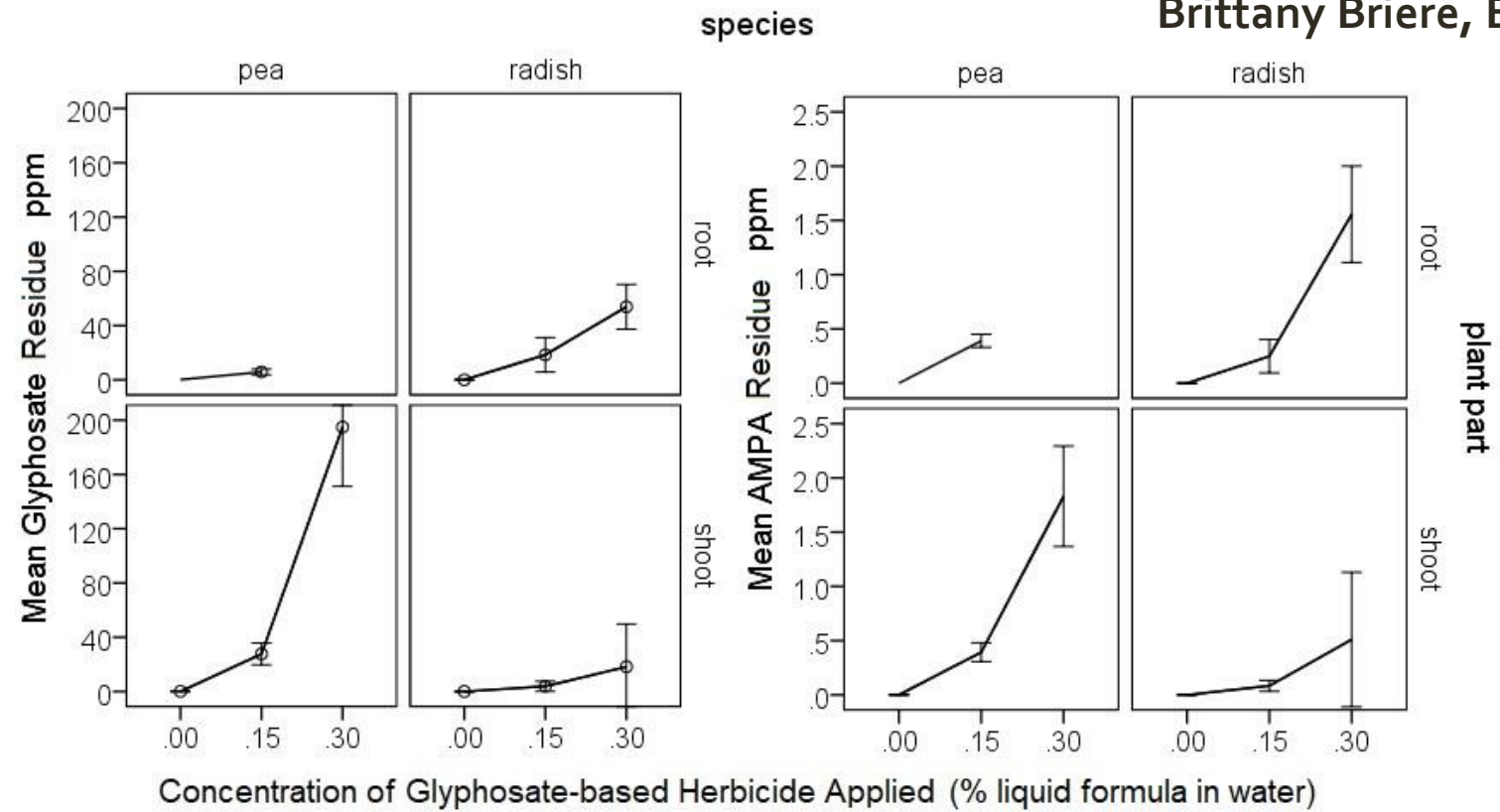


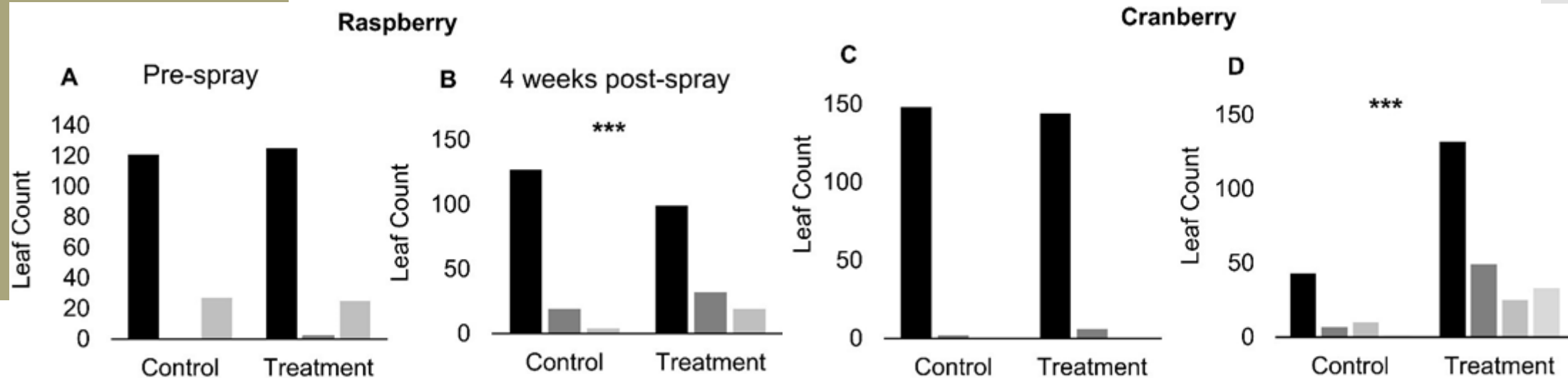
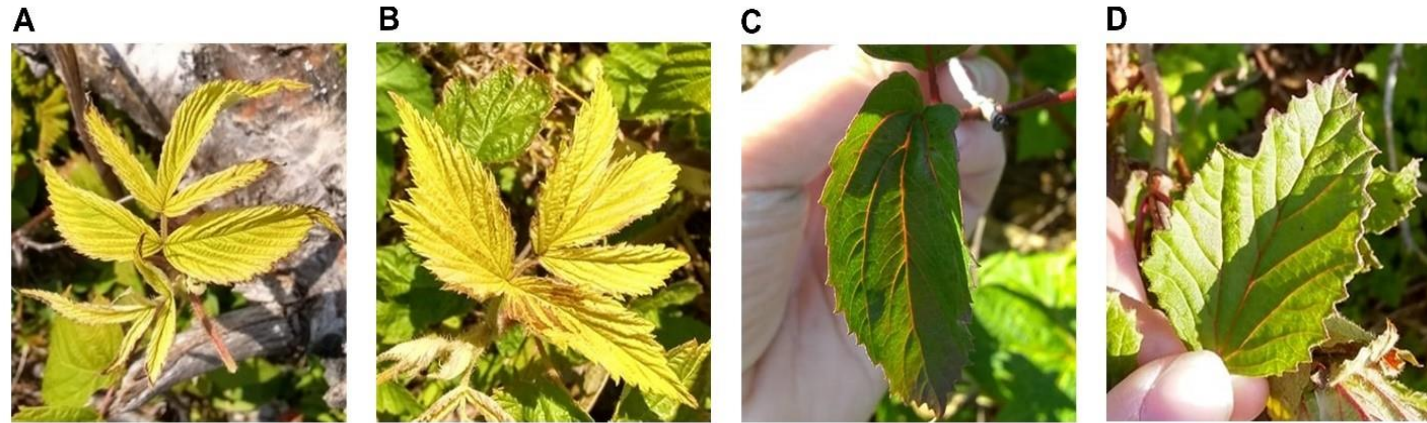
Figure 2. Dissipation of glyphosate residues in leaf litter of the Carnation Creek watershed.

Year of
application
(year 0)

Brittany Briere, BSc Candidate

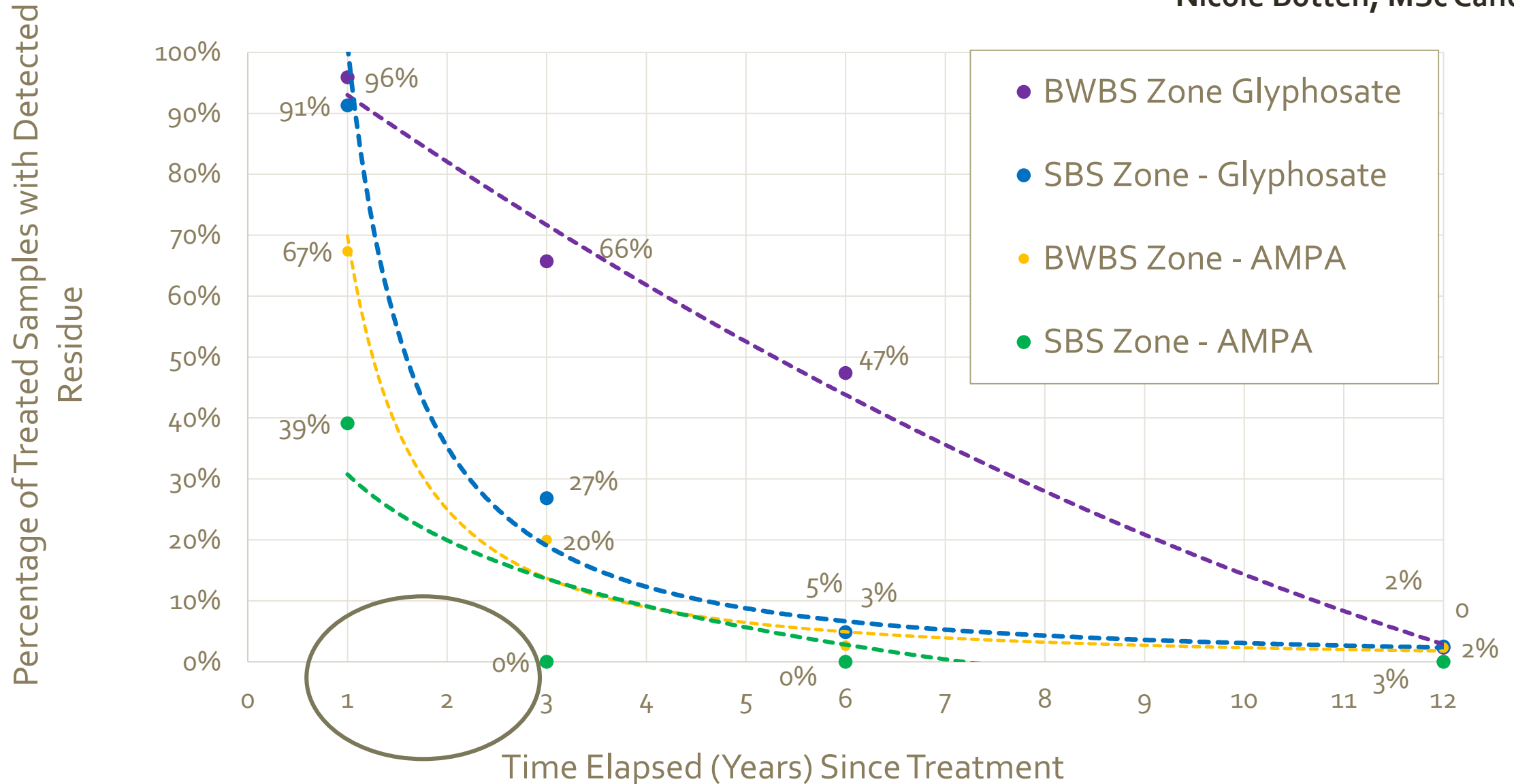


Year of
application
(year 0)



Proportion of Treated Samples With Detected Glyphosate and AMPA, by Time and Biogeoclimatic Zone

Nicole Botten, MSc Candidate



1-2 years after
application –
deformation

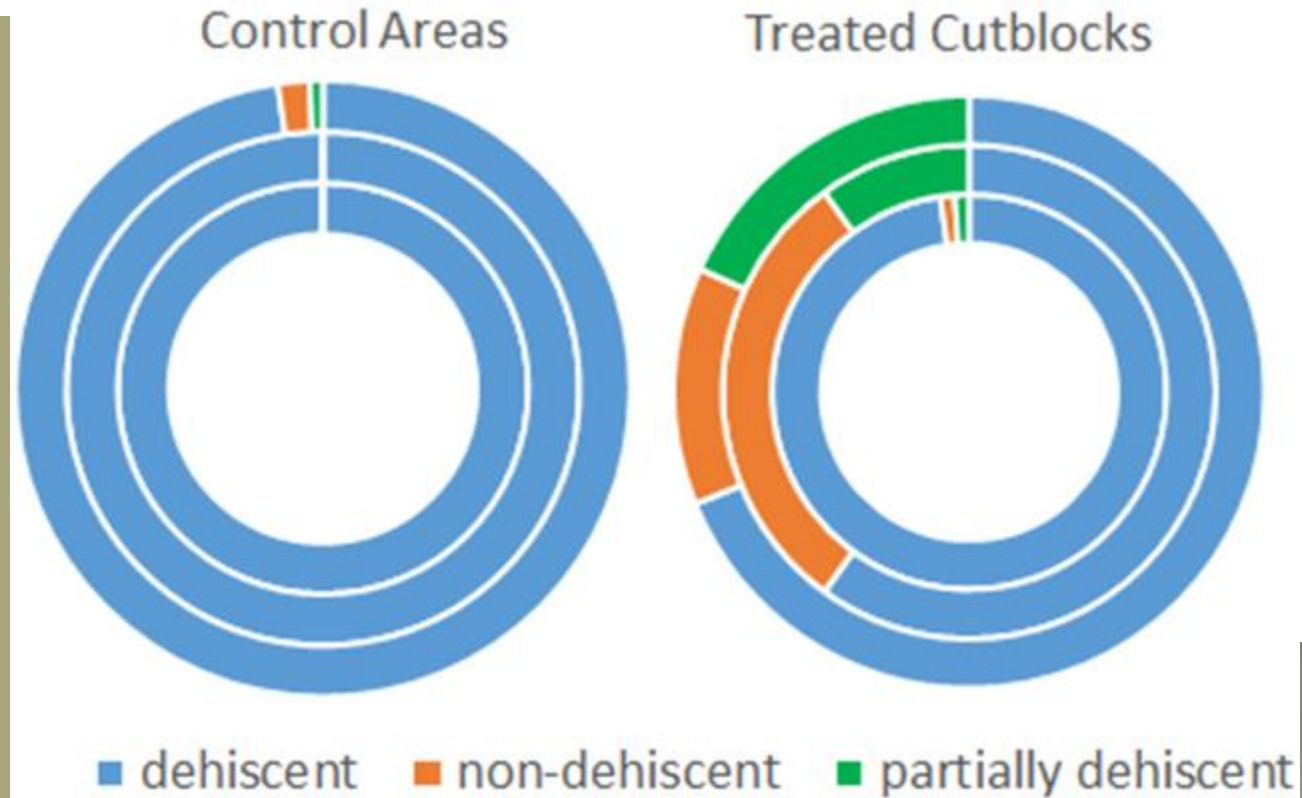




1-2 years after
application –
reproductive
viability

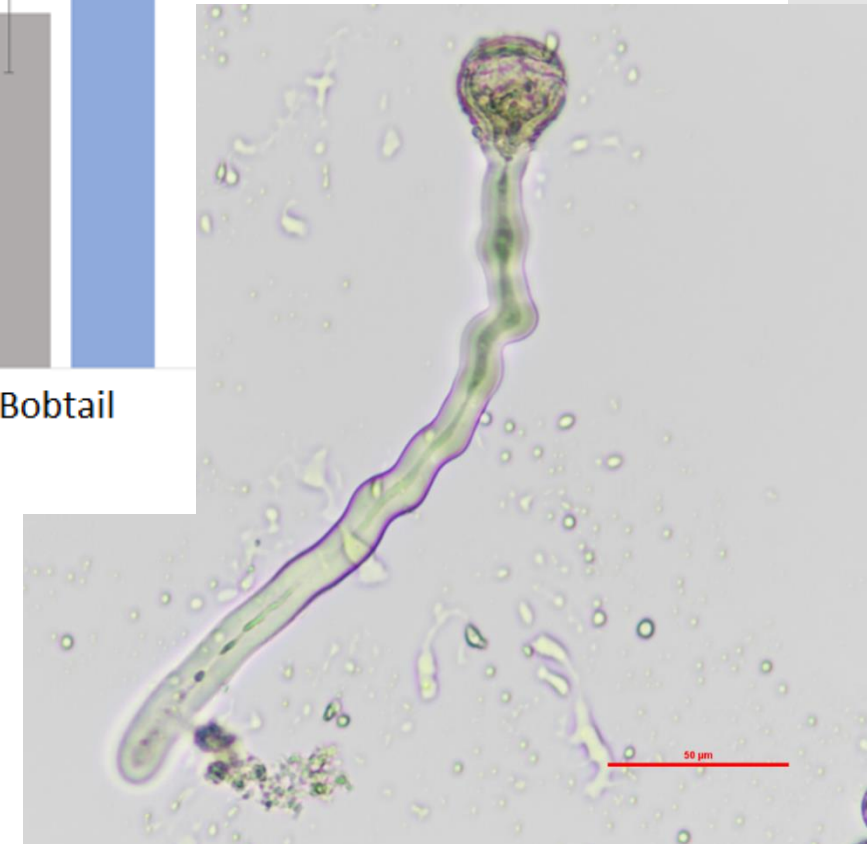
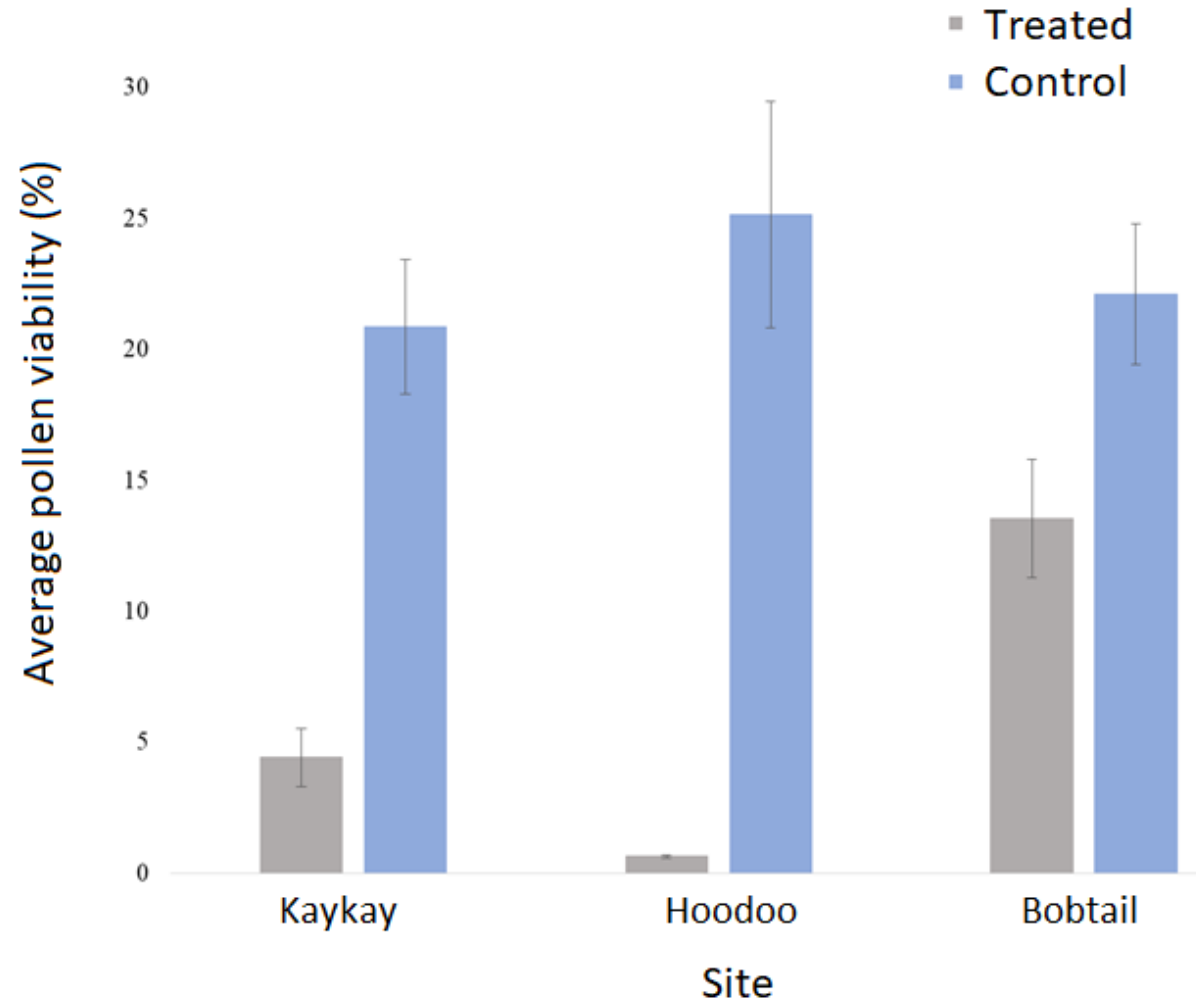


1-2 years after
application –
reproductive
viability



1-2 years after
application –
reproductive
viability

Allie Golt, BSc. Candidate



CHEMICAL INTERACTION

Ions, elements, and compounds like to attract or repel one another.

Contradictory evidence...species response?

Environ Sci Pollut Res

Table 1 Reported stability constants for various chelating agents and metals

Table 4
Effect of increasing glyphosate rates on the concentrations of mineral nutrients in mature grains of soybean plants grown under greenhouse conditions. The values represent means of six independent replications.

Glyphosate rate (% of recommended) ^a	N (g kg ⁻¹ DW)	P (g kg ⁻¹ DW)	K (g kg ⁻¹ DW)	Ca (g kg ⁻¹ DW)	Mg (g kg ⁻¹ DW)	Fe (mg kg ⁻¹ DW)	Mn (mg kg ⁻¹ DW)	Zn (mg kg ⁻¹ DW)	Cu (mg kg ⁻¹ DW)
0	46	5.9	14.1	3.9	2.4	71	56	44	11
0.3	46	6.0	14.0	4.0	2.4	65	46	43	10
0.6	46	6.2	13.8	3.7	2.4	76	43	43	9
0.9	50	6.1	14.0	3.1	2.3	61	33	48	12
1.2	62	6.1	14.7	2.9	2.1	36	31	58	13
LSD _{0.05}	3	NS	0.5	0.6	0.2	13	8	5	2

^a Glyphosate was applied to foliage at the concentrations of 0.3% (95 µM glyphosate), 0.6% (189 µM glyphosate), 0.9% (284 µM glyphosate) and 1.2% (379 µM glyphosate) of the recommended application rate (31.55 mM) for weed control.

1-12 years after application – nutrients

Nicole Botten, MSc. Candidate

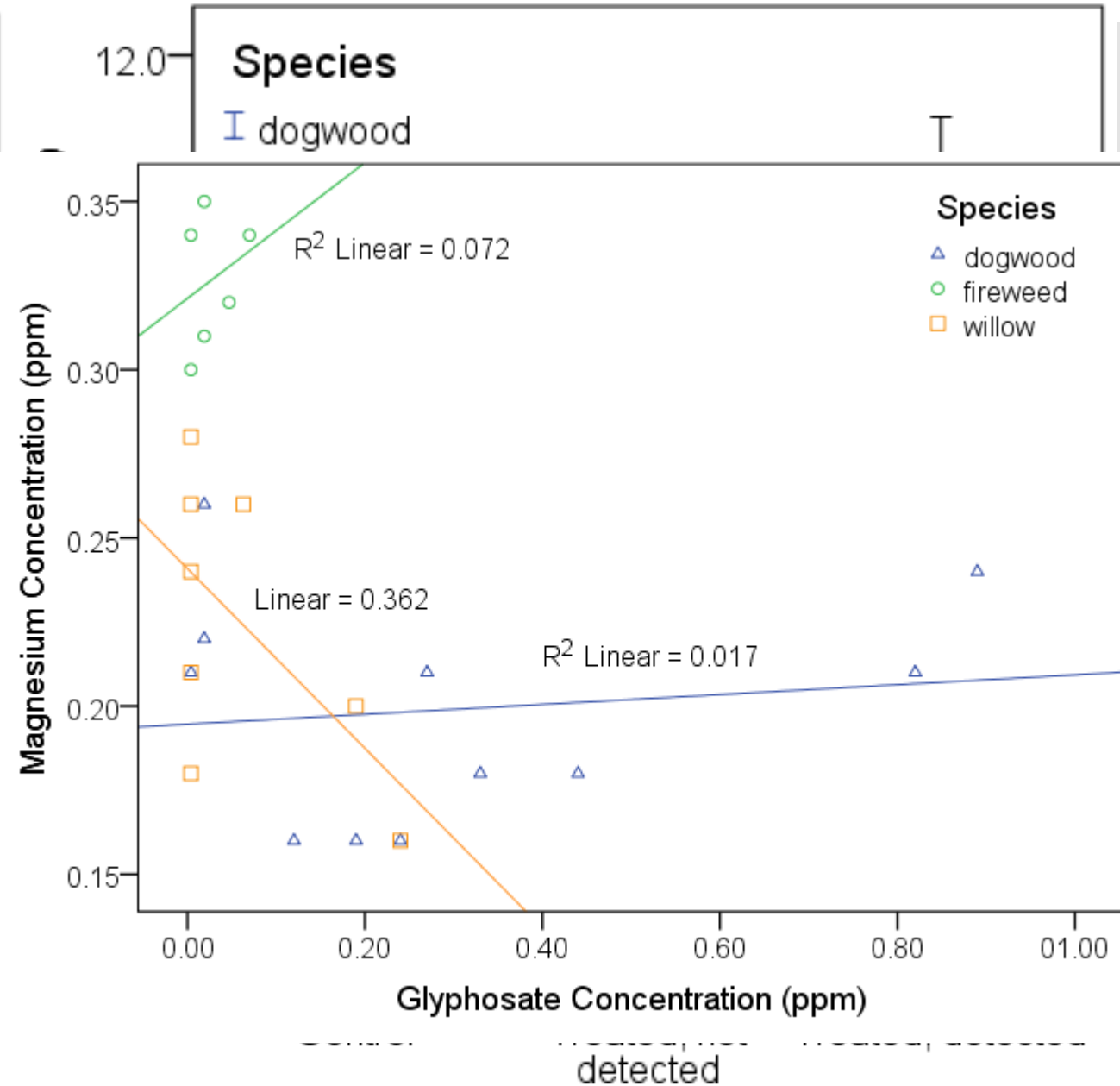
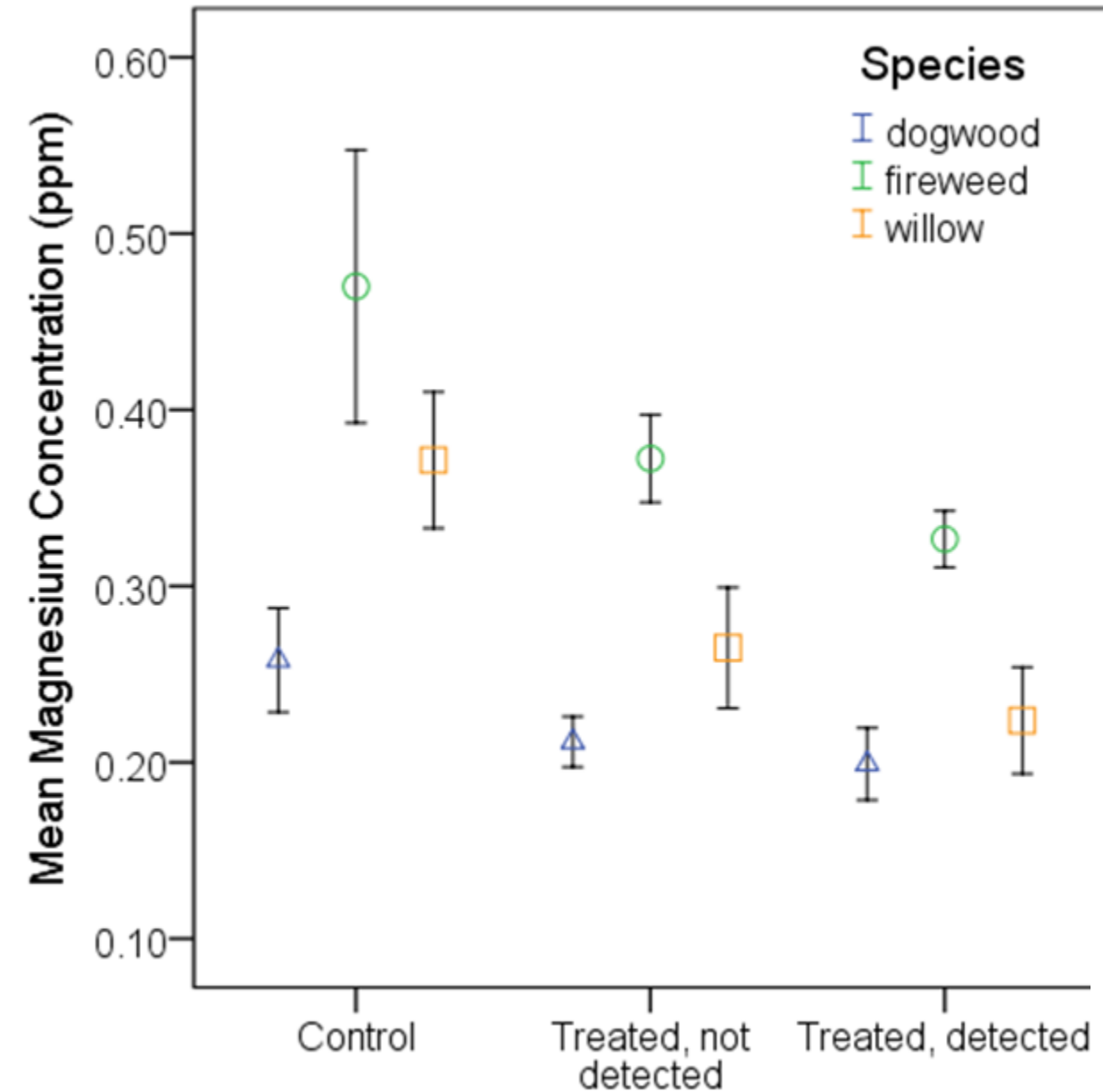
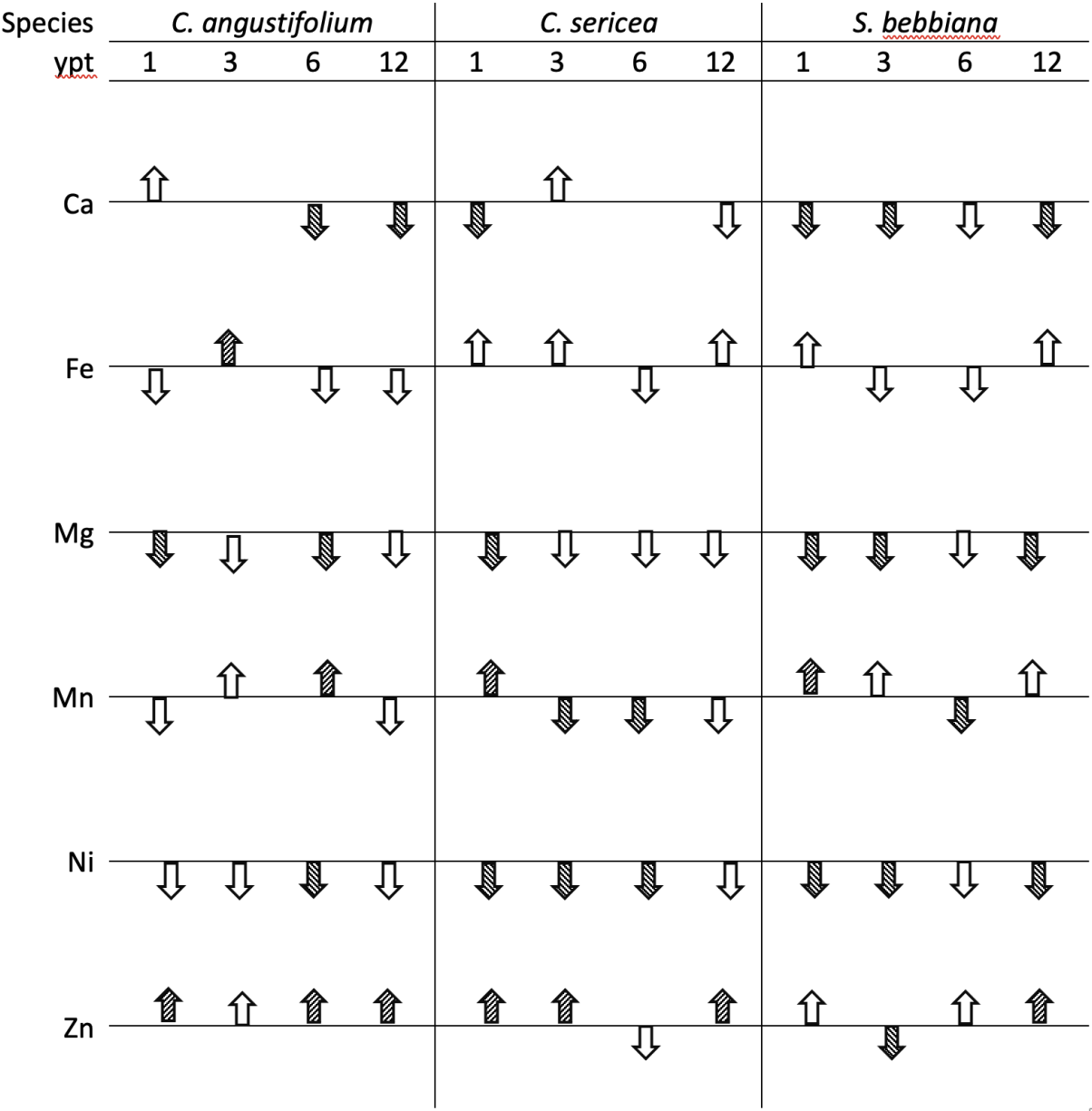


Figure 4: Effect of treatment on nutrient concentrations in *Chamaenerion angustifolium*, *Cornus sericea*, and *Salix bebbiana*

comparison of treated and control samples from each treatment year (1, 3, 6, and 12 years post-treatment)

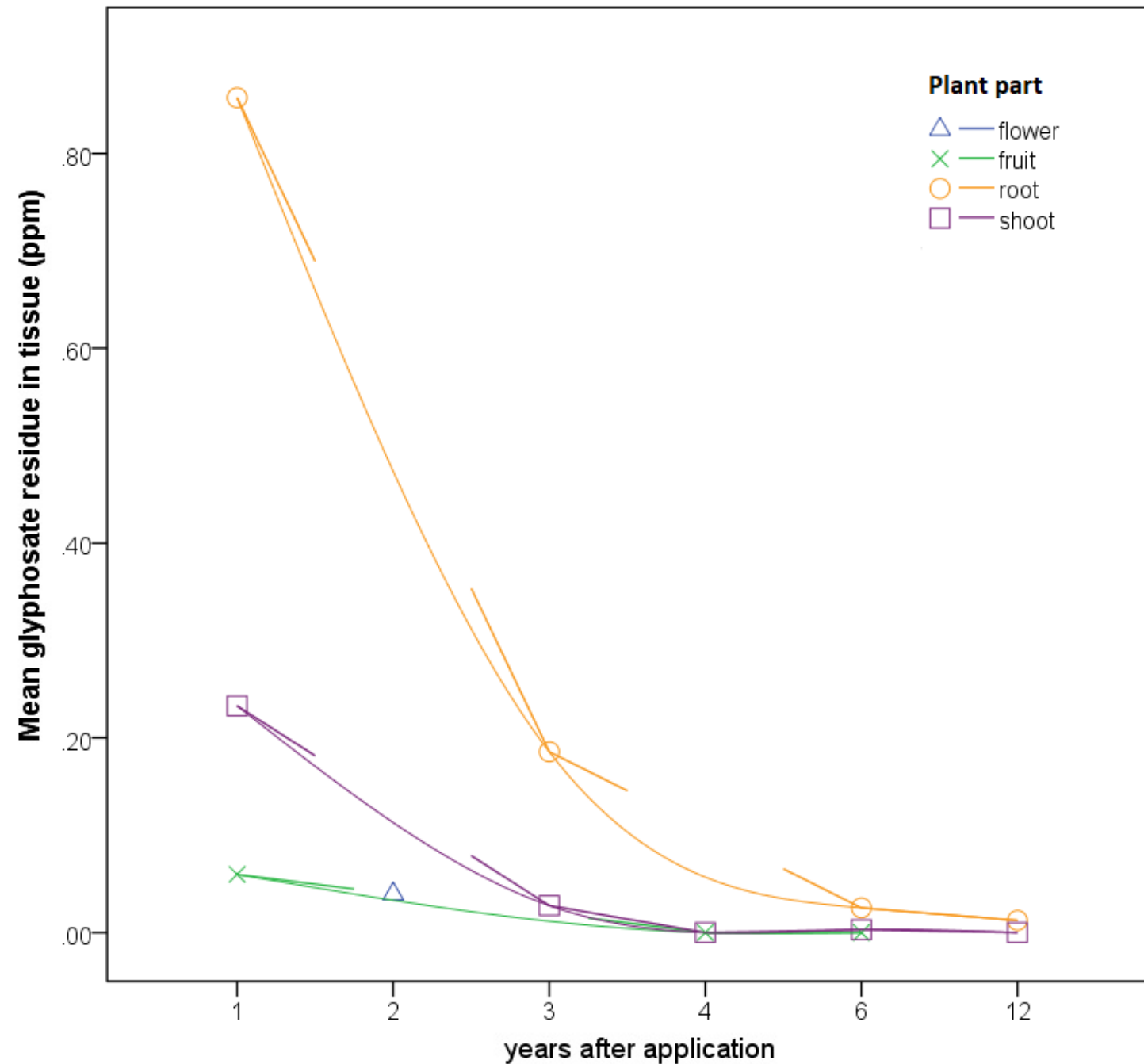
Increases in nutrient concentrations with treatment are indicated by upward-facing arrows, and decreases with treatment by downward-facing arrows.

Statistically significant trends are indicated with hatched arrows.



When do
residues actually
disappear?

16 different
species, including
samples where no
glyph detected



Potential implications?

"Understory plants often serve to regulate the successional trajectory of the forest itself"

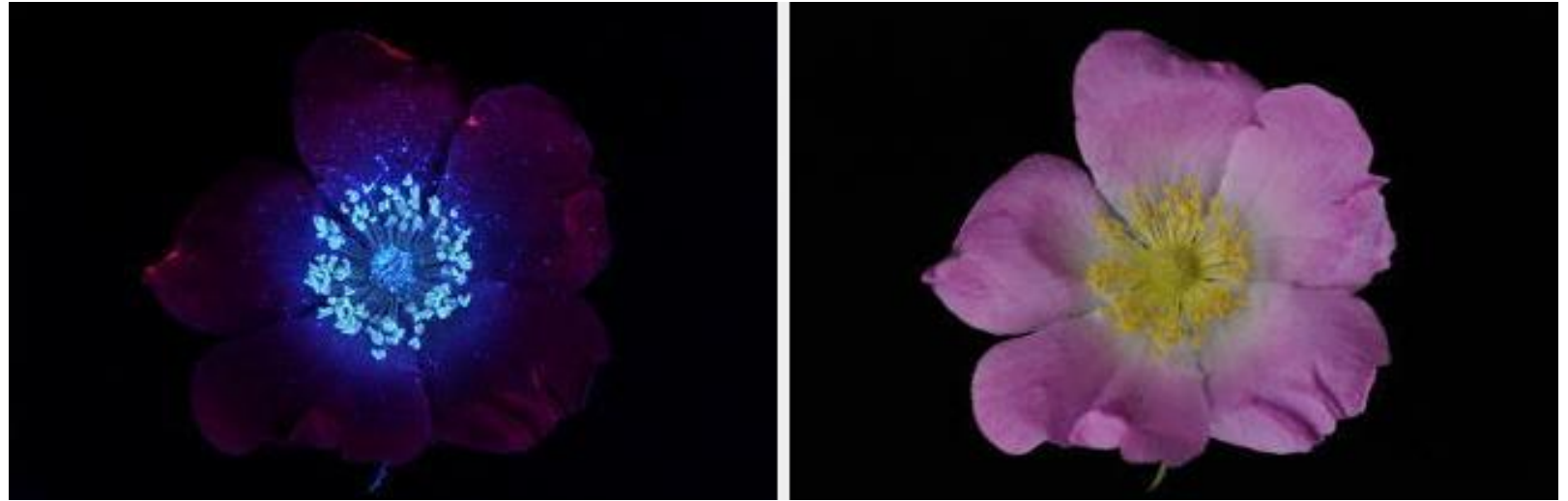
(George and Bazzaz 1999)



Two images of Chinese rose, *Rosa chinensis*, taken by Dr. Hiroshi Fukui.
Database: <http://labo.kyoto-phu.ac.jp/mpgkpu/ffd.html>

Trophic level
interactions:

Pollination/
pollinator
success?



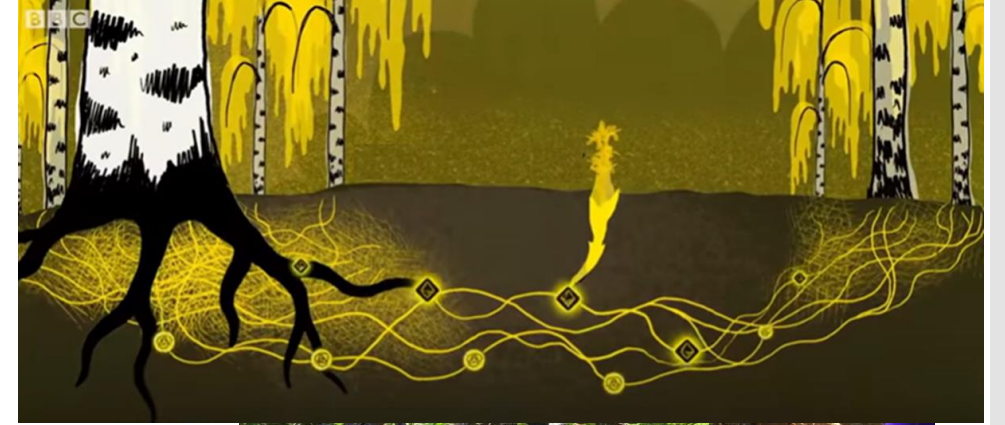
Trophic level
interactions:

Food quantity
and quality for
wildlife?



Other trophic levels:

- Fungi
- Insects
- Birds
- Mammals



- Assessment of fungal biomass and differences in fungal community
- Assessment of residue presence in hummingbirds





THANK YOU

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