

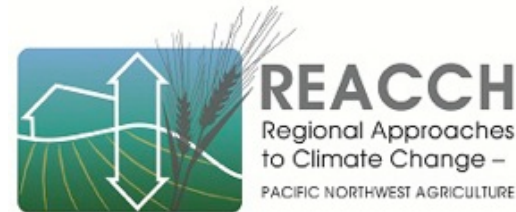
Aphid Research

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REACCH 2017 Summer Intern

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Assisted by Taylor Murphy



University
of Idaho

“This work was supported by the National Institute of Food and Agriculture (NIFA), USDA Award Number:2016-67032-25012”



Photo by Taylor Murphy 2017

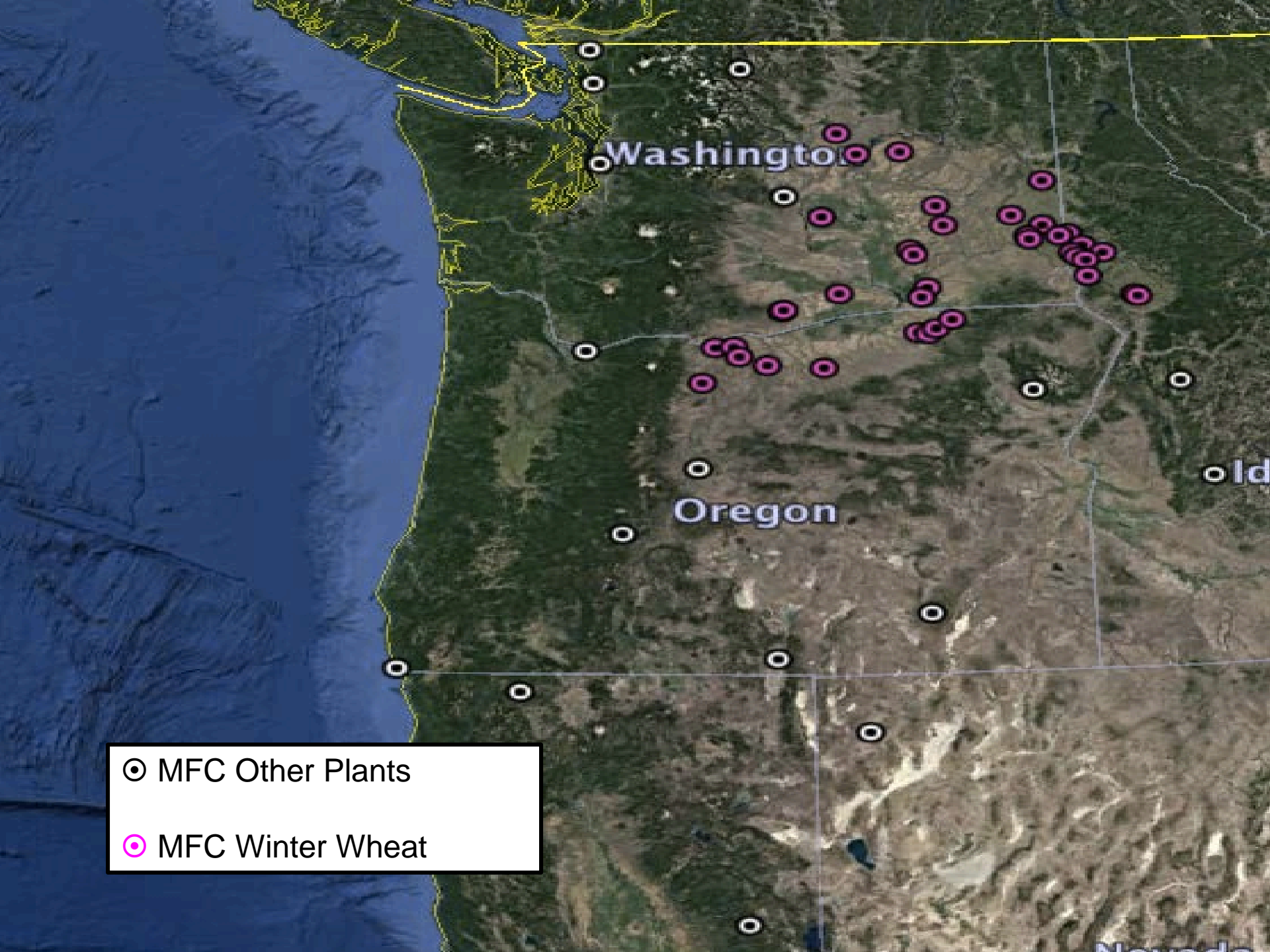
Metopolophium festucae cerealium

“MFC”

MFC Information

- MFC have salivary toxins – red “staining”
- As injurious as Russian wheat aphid per capita
- NOT a vector of *Barley yellow dwarf virus*





- ⦿ MFC Other Plants
- ⦿ MFC Winter Wheat

Research Questions

1. What is the relationship between MFC population density and crop yield of spring wheat?
2. Can plant “staining” be used as an accurate indicator of aphid population?
3. Are different varieties of wheat more tolerant to MFC feeding?

Research Question 1 & 2

1. What is the relationship between MFC population density and crop yield of spring wheat?
2. Can plant “staining” be used as an accurate indicator of aphid population?

Methods 1

- 48 Cages
- 12 Replications/Groups
- 4 Treatments
 - Treatments 1 [0 aphids]
 - Treatments 2 [25 aphids]
 - Treatments 3 [75 aphids]
 - Treatments 4 [150 aphids]

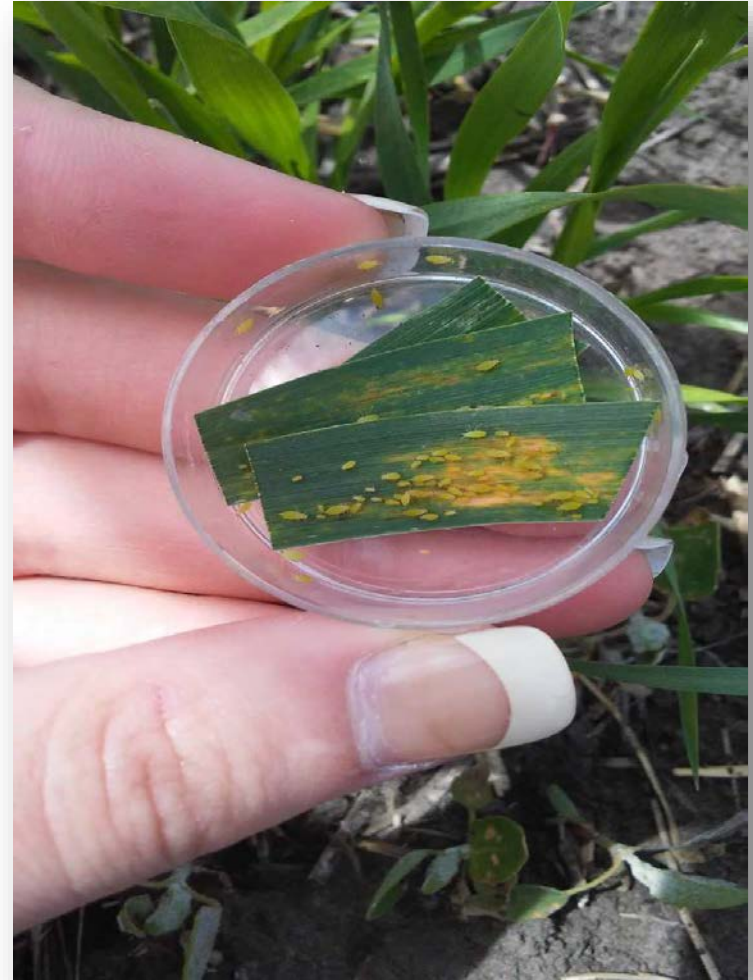
Methods 2

- Took Photos of Each Cage
- Counted MFC
- After 32 Days we Processed Six Random Plants from each Cage for:
 - Biomass
 - Leaf Staining
- Remaining Wheat will be Processed Once Harvested

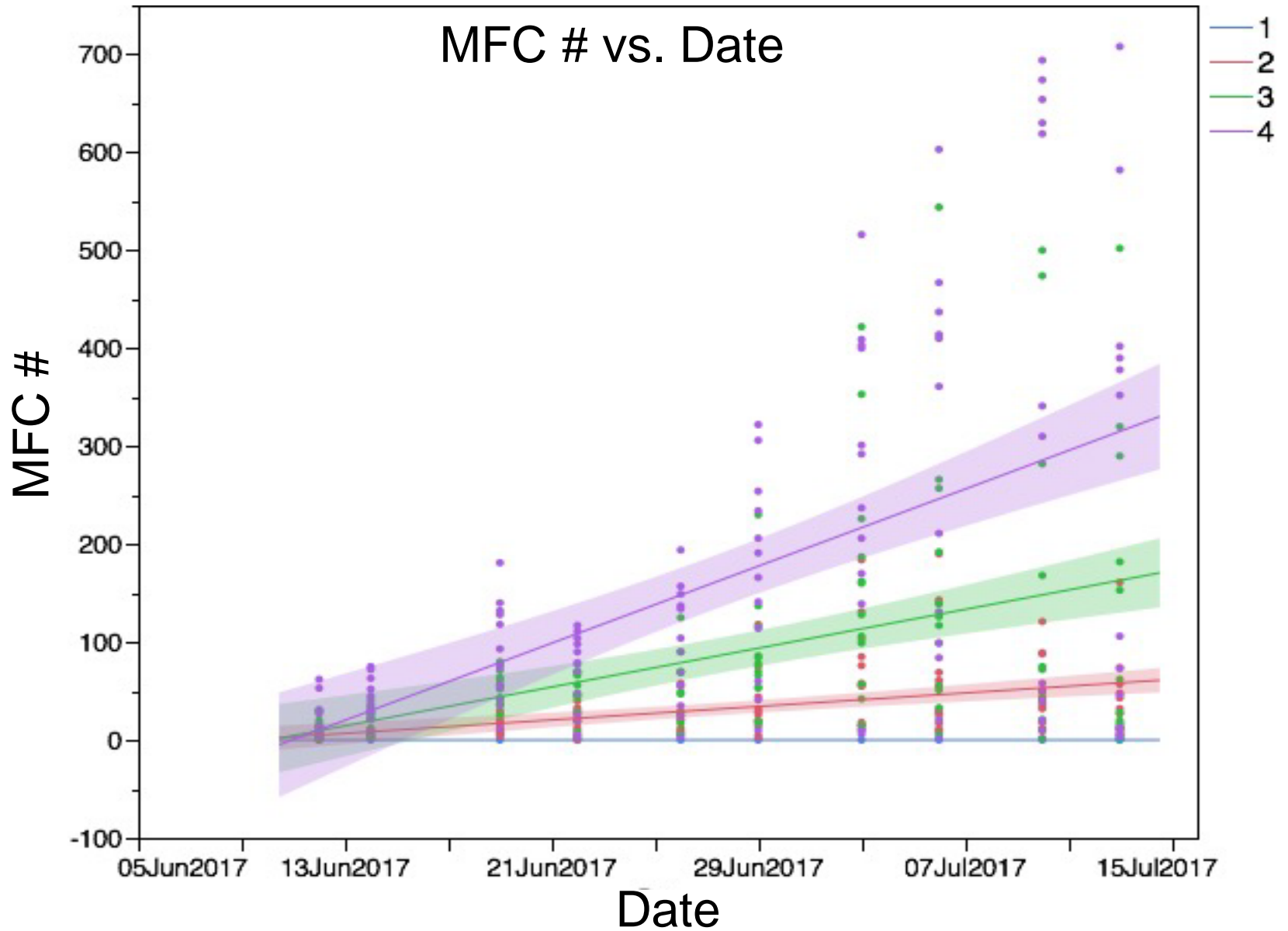
Installation



Infestation



Results



Research Question 1

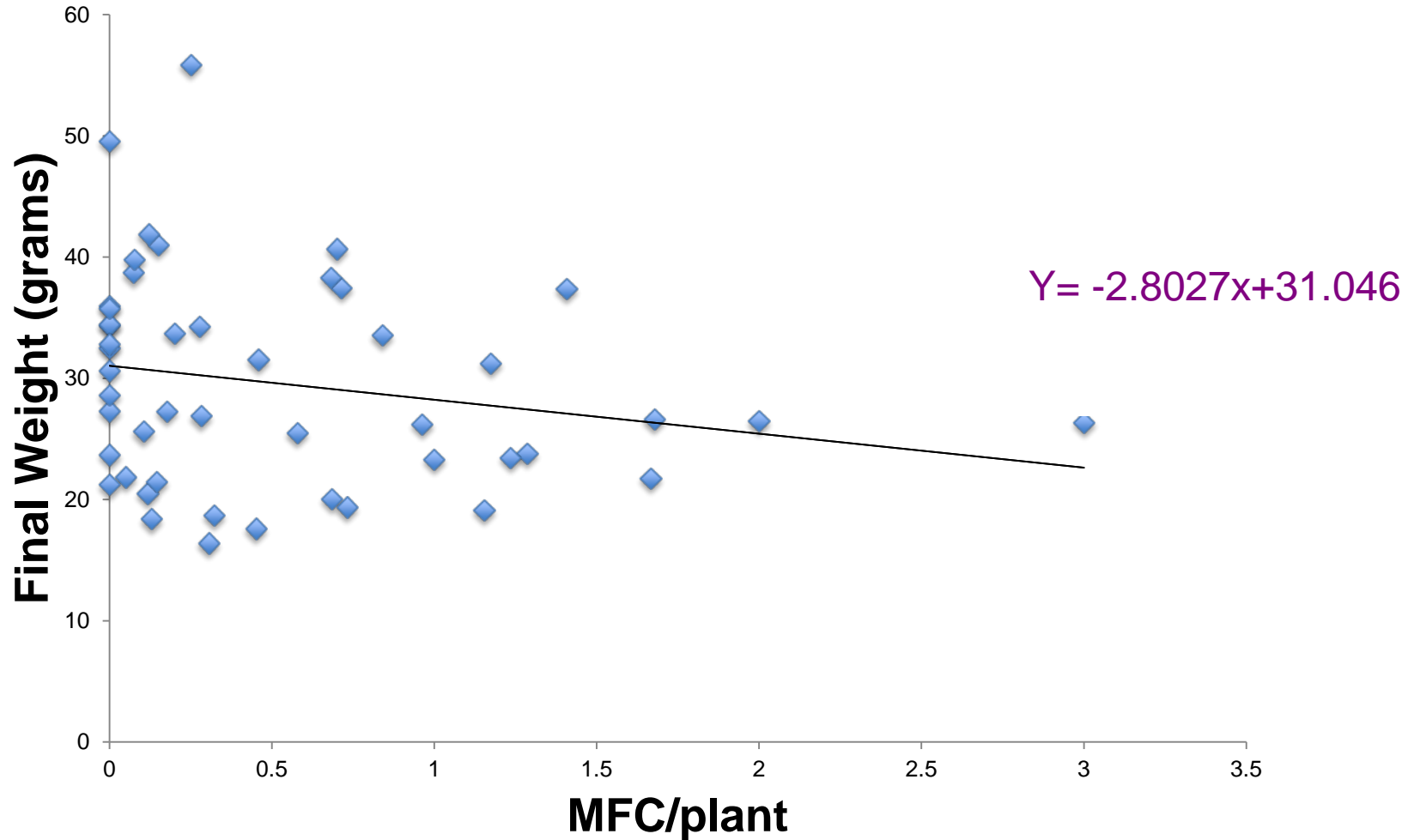
1. What is the relationship between MFC population density and crop yield of spring wheat?

Methods

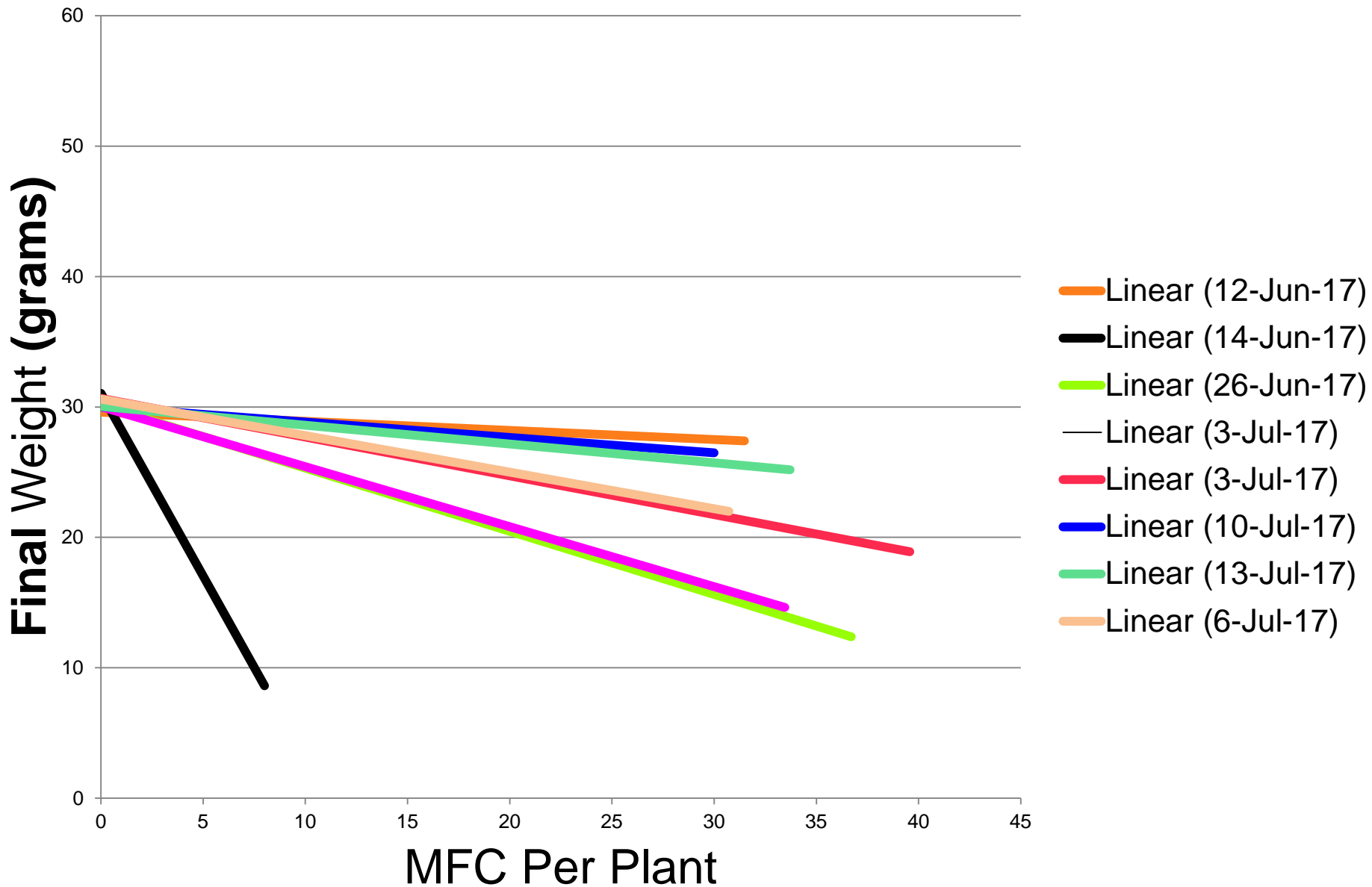
- From Six Randomly Selected Plants Dried in Oven:
 - Collected Biomass

Regressions

Final Weight vs. MFC/Plant [14 June 2017]

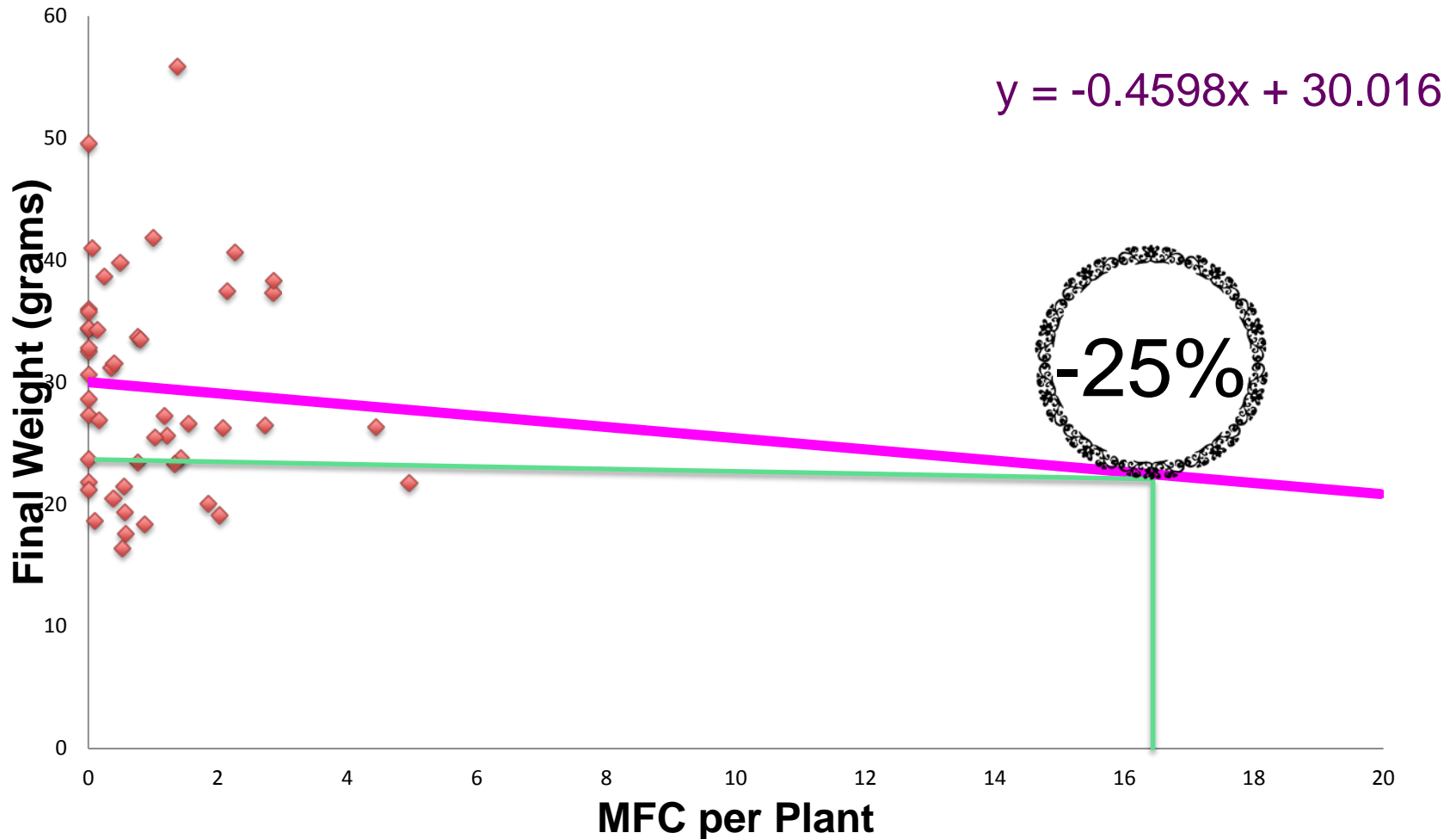


Biomass vs. MFC/Plant



Regressions Projections

Final Weight vs. MFC/Plant [29 June 2017]



Summary

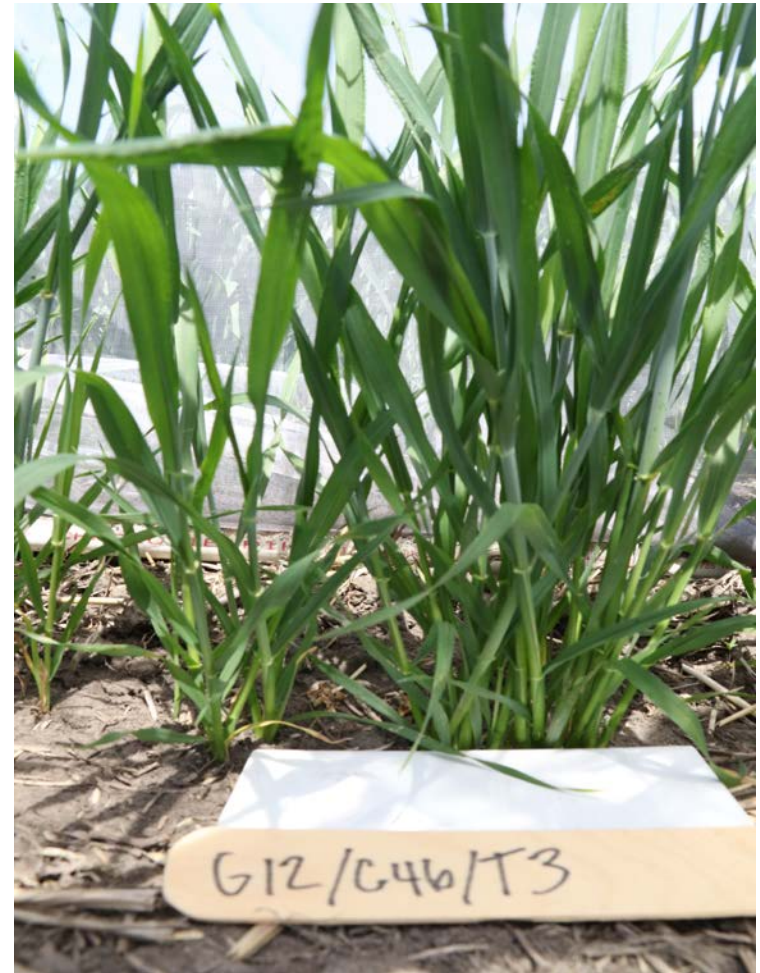
- Final Weight Decrease with MFC Present
- 16 Aphids per Plant can cause 25% Loss to Final Weight

Research Question 2

2. Can plant “staining” be used as an accurate indicator of aphid population?

Methods

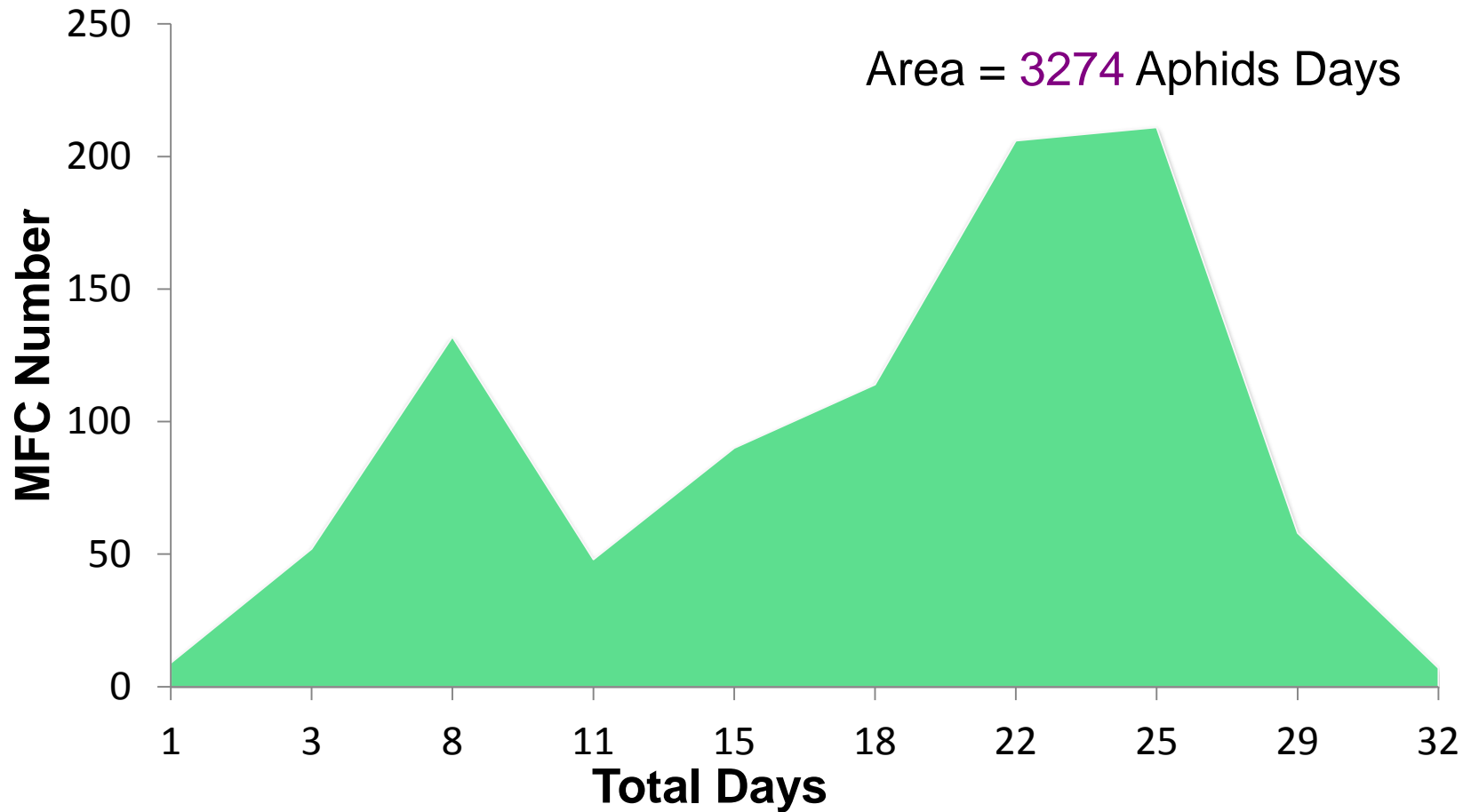
- Took Photos of Every Cage
- Found RGB (Red, Green, & Blue)
- Found Mean of RGB for each Cage



Aphid Days

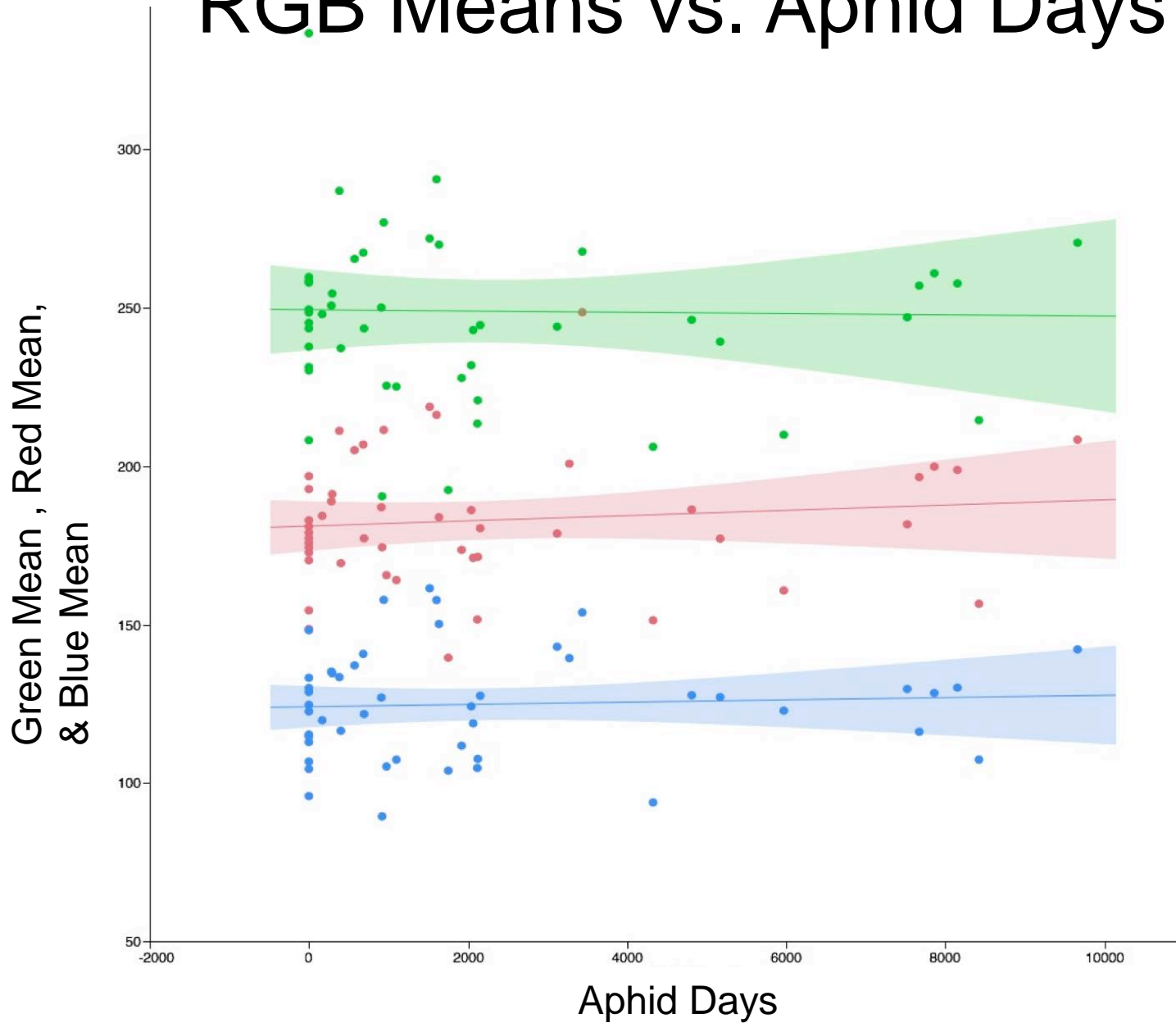
MFC Number vs. Days

Cage 45



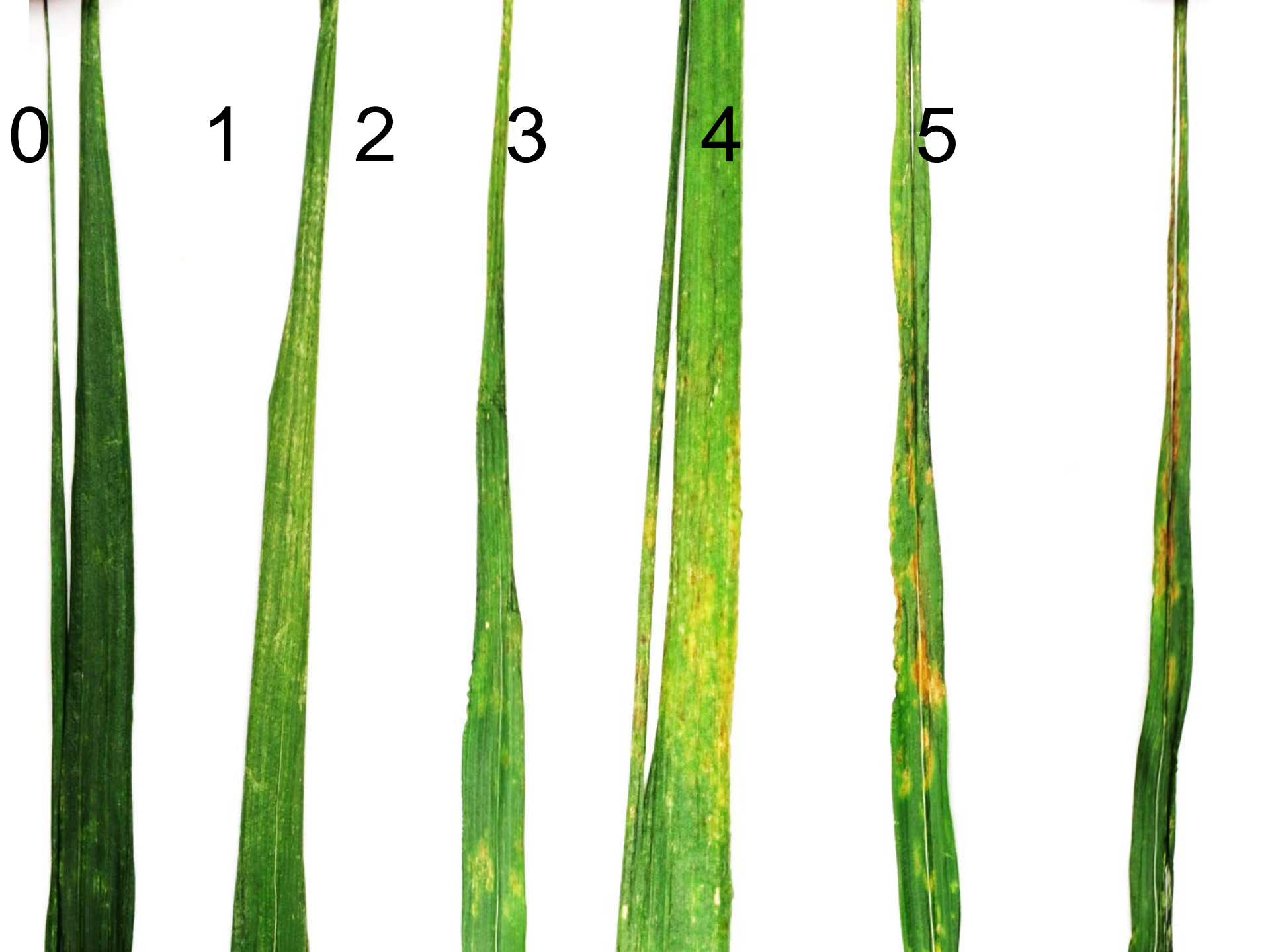
Aphid Days = Area Under the Curve

RGB Means vs. Aphid Days

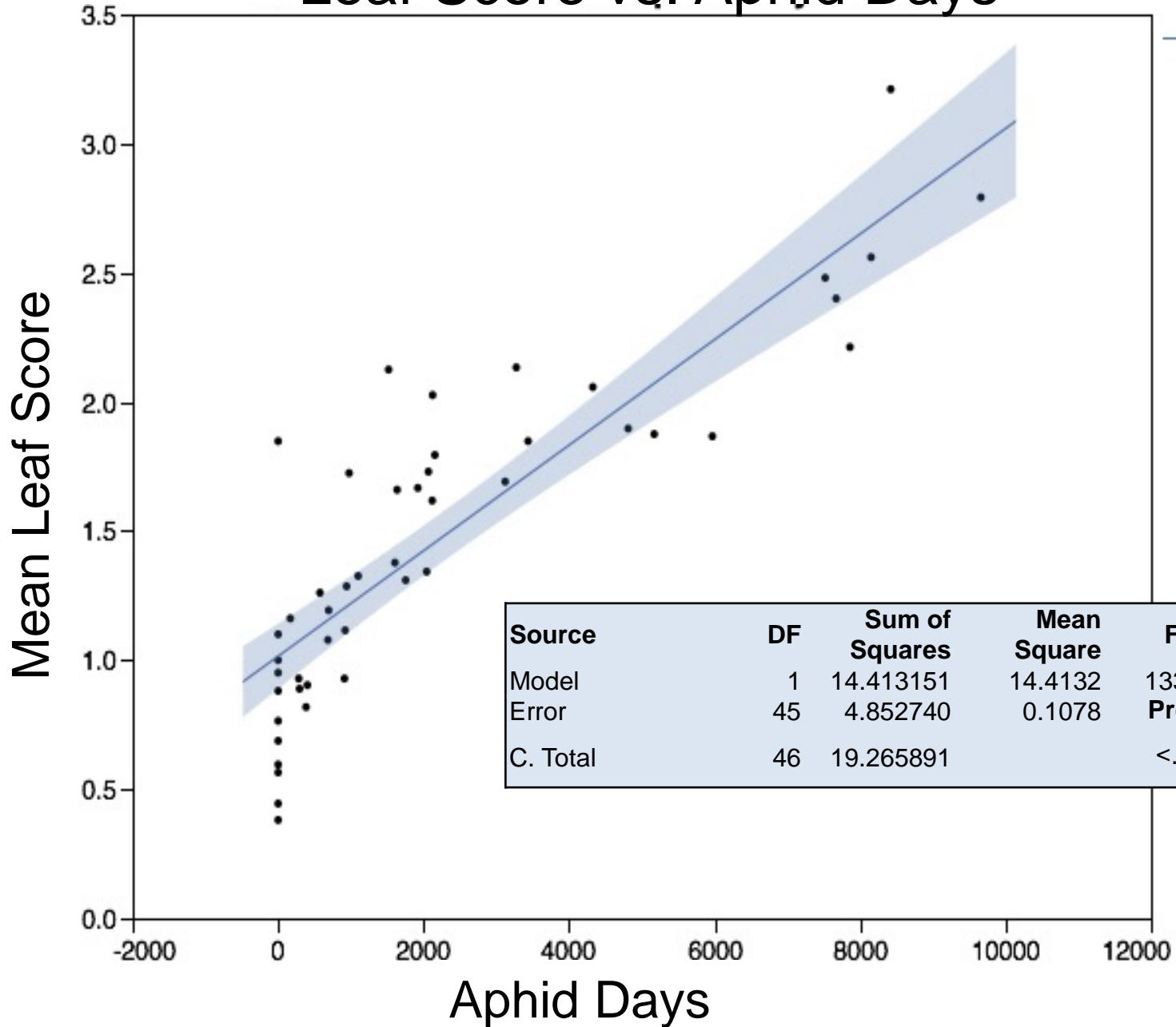


Methods 2

- From Six Randomly Selected Plants:
 - Collected Leaves
 - Scored Leaves



Leaf Score vs. Aphid Days



Summary

- Leaf Score can be used as an Aphid Population Indicator

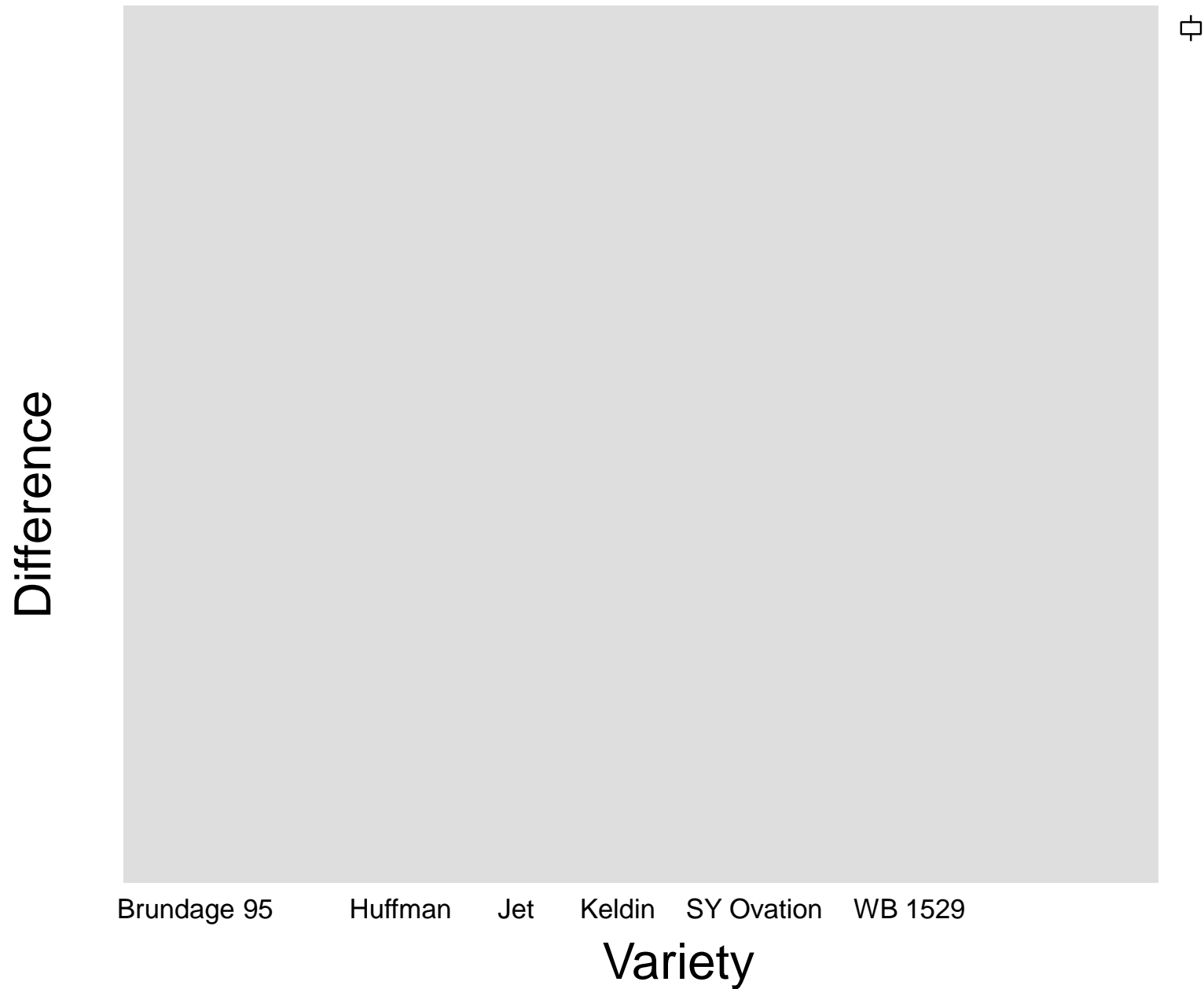
Research Question 3

3. Are different varieties of wheat more tolerant to MFC feeding?

Methods

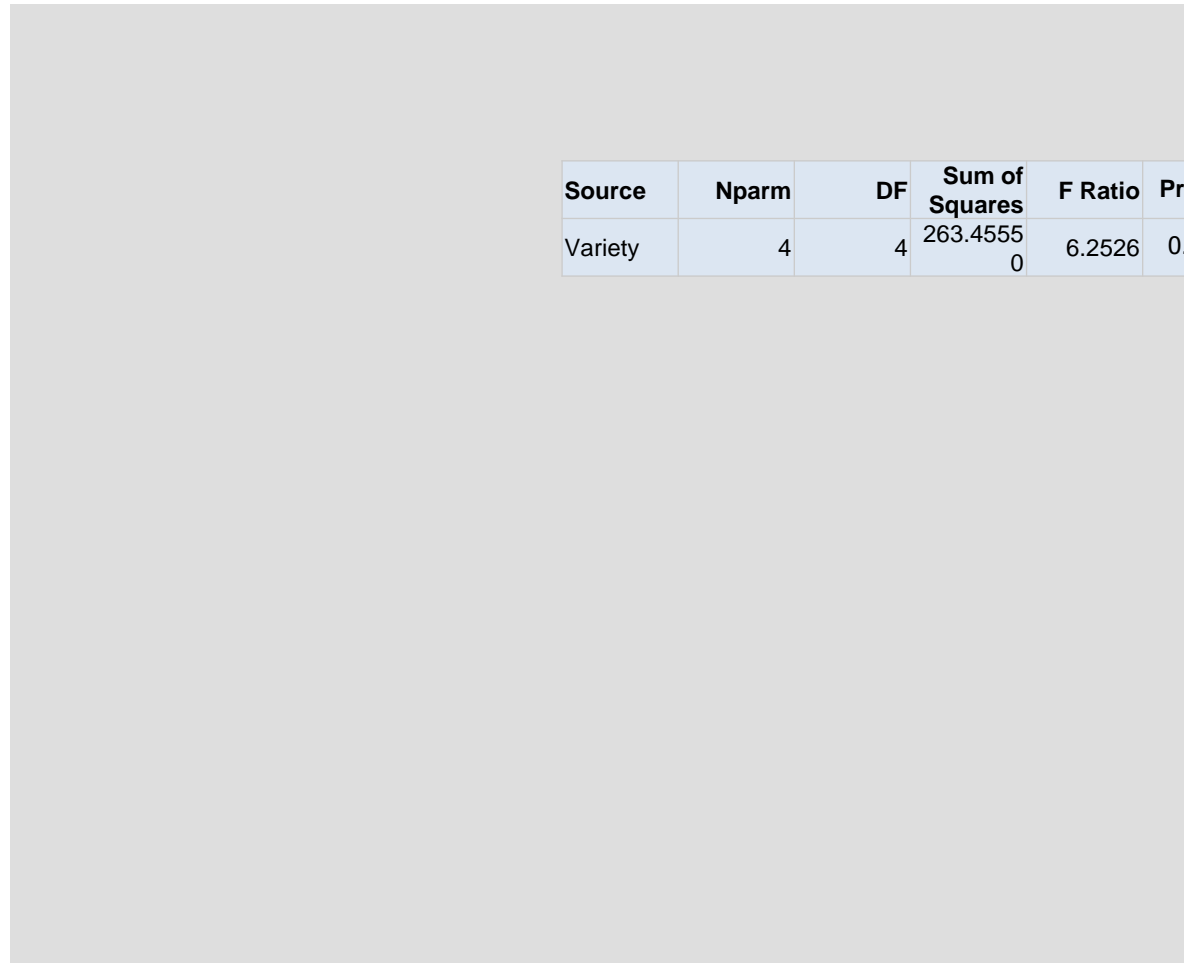
- 24 Replications of each Variety
- Place 1 Nymph on Leaf
- Allow to Feed for 8-11 Days
- SPAD Meter to take the Chlorophyll Mean for Each Plant

Winter Wheat Trial



Spring Wheat Trial

Difference



Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F	
Variety	4	4	263.45550	6.2526	0.0001*	

Glee

Iron

Melba

Seahawk

Tekoa

Variety

Summary

- Some Spring Wheat Variety are more Susceptible to MFC Feeding

Summary

- Final Weight Decrease with MFC Present
- 16 Aphids per Plant can cause 25% Damage to Final Weight
- Leaf Score can be used as an Aphid Population Indicator
- Some Spring Wheat Variety are more Susceptible to MFC Feeding

Extension: Pest Alert



Metopolophium festucae cerealiu

Photo by Taylor Murphy 2017



Sipha maydis

Photo by Melissa Franklin, 2015

Extension: Pest Alert



Pest Watch: Brown Marmorated Stink Bug

WASHINGTON STATE UNIVERSITY EXTENSION FACT SHEET • FS079E



Figure 2. BMSB 3rd instar nymph. (P. Shearer, OSU)

in a freezer until you can take it to your local WSU Extension office or local Master Gardener clinic (<http://ext.wsu.edu/locations>). Your observations will be recorded and help minimize the distribution of BMSBs statewide.

Further Reading

Bernon, G., K.M. Bernhard, A.L. Nielsen, J.F. Stimmel, E.R. Hoebeke, and M.E. Carter. 2007. Host Range of the Exotic Brown Marmorated Stink Bug, *Halyomorpha halys* (Hemiptera: Pentatomidae): Implications for Future Distribution. In *Proceedings, 17th U.S. Department of Agriculture Interagency Research Forum on Gypsy Moth and Other Invasive Species, 200*, edited by K.W. Gottschalk, 26. Gen. Tech. Rep. NRS-P-10. Newtown Square, PA: U.S. Department of Agriculture. <http://www.treesearch.fs.fed.us/pubs/12454>.

Department of Horticulture. Brown Marmorated Stink Bug in Oregon. Oregon State University, <http://horticulture.oregonstate.edu/group/brown-marmorated-stink-bug-oregon>.

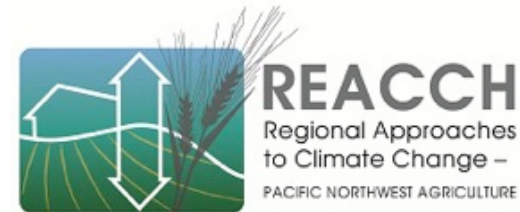
Hoebeke, E.R. and M.E. Carter. 2003. *Halyomorpha halys* (Stål) (Heteroptera: Pentatomidae): A Polyphagous Plant Pest from Asia Newly Detected in North America. In *Proceedings of the Entomological Society of Washington* 105(1): 225-237. <http://www.biodiversitylibrary.org/pdf2/002249500054811.pdf>.

New Jersey Agricultural Experiment Station. How to Control the Brown Marmorated Stink Bug. Rutgers Cooperative Extension, <http://njaes.rutgers.edu/stinkbug/control.asp>.

Acknowledgements



Questions?



**University
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