“Aphids and Climate!”

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A New Addition to Local Aphid Fauna...

- Discovered on the Palouse in 2011
- *Metopolophium festucae cerealium* M.F.C.
- Significance?

Projects

- Greenhouse experiment @ Manis
- Field experiment @ Kambitsch
- Collecting and sorting aphids from “pan traps”
- Washing pots and pans!

The Greenhouse experiment @ Manis

- Designed to test the effect of M.F.C. coinfestation **on** R.padi growth under different conditions.

BYDV Present or BYDV Not Present
X
80% of BM in H20 or 10% or BM in H20
X
MFC Present or MFC Not Present
=
8 Different Treatment Combinations

V80M - V80 - V10M - V10
S80M - S80 - S10M - S10

Hypotheses

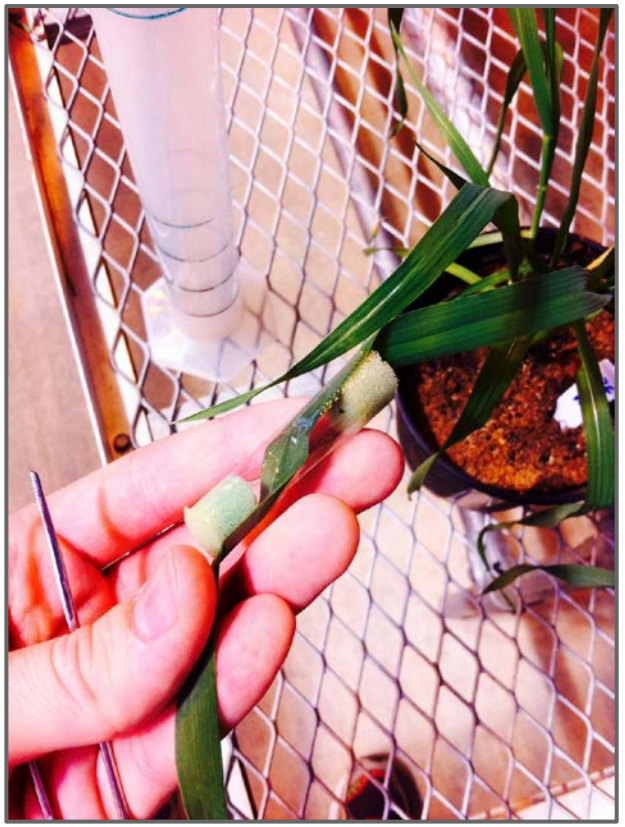
- $H1_a$: Reproductive rate (rm) of R. padi will differ on plants receiving different amounts of H_20
- $H2_a$: Reproductive rate of R. padi will differ on plants coinfested vs. not infested with M.F.C
- $H3_a$: Reproductive rate of R. padi will not on plants infected with BYDV vs not infected with BYDV
- $H4_a$: There are interactions among water stress, MFC coinfestation, and BYDV infection.

Methods

- Planted 96 pots of Wheat (*Triticum aestivum*)
- Let grow for 2 weeks
- Watered and culled

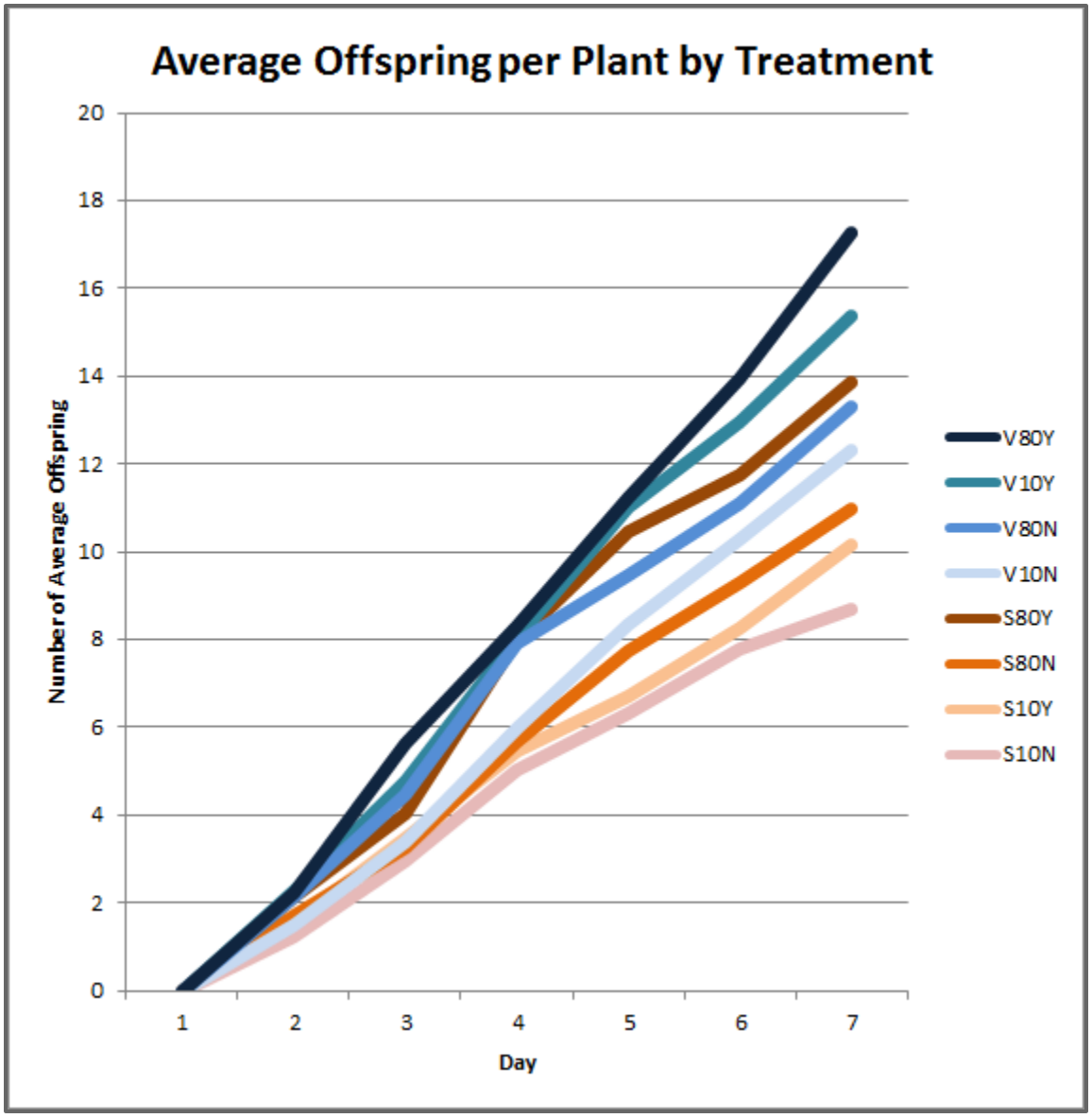
Methods cont.

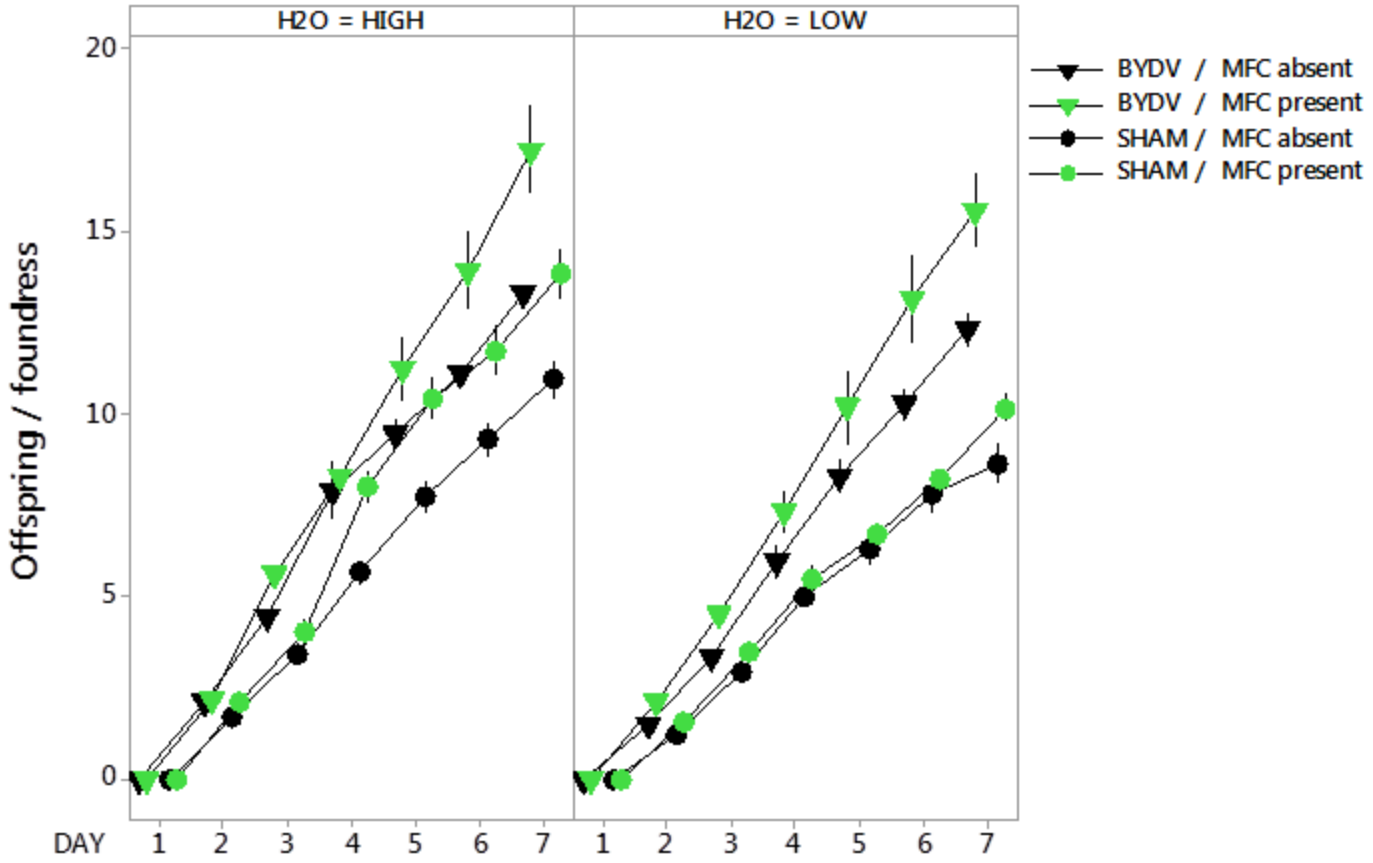
- Transferred 4 infectious R.padi to ½ of plants
- Left on for 72 hours
- Removed afterwards
- Started H_20 regime

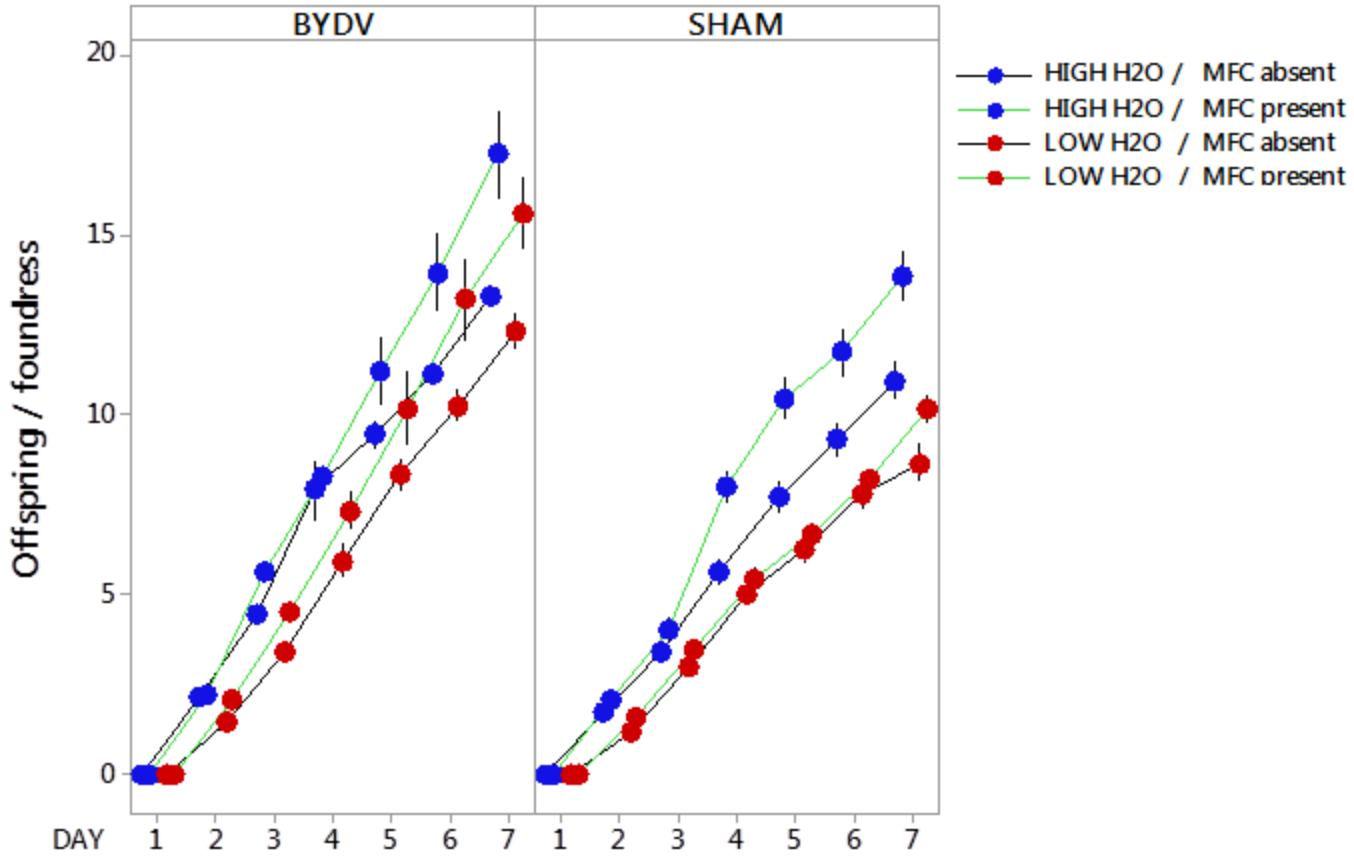


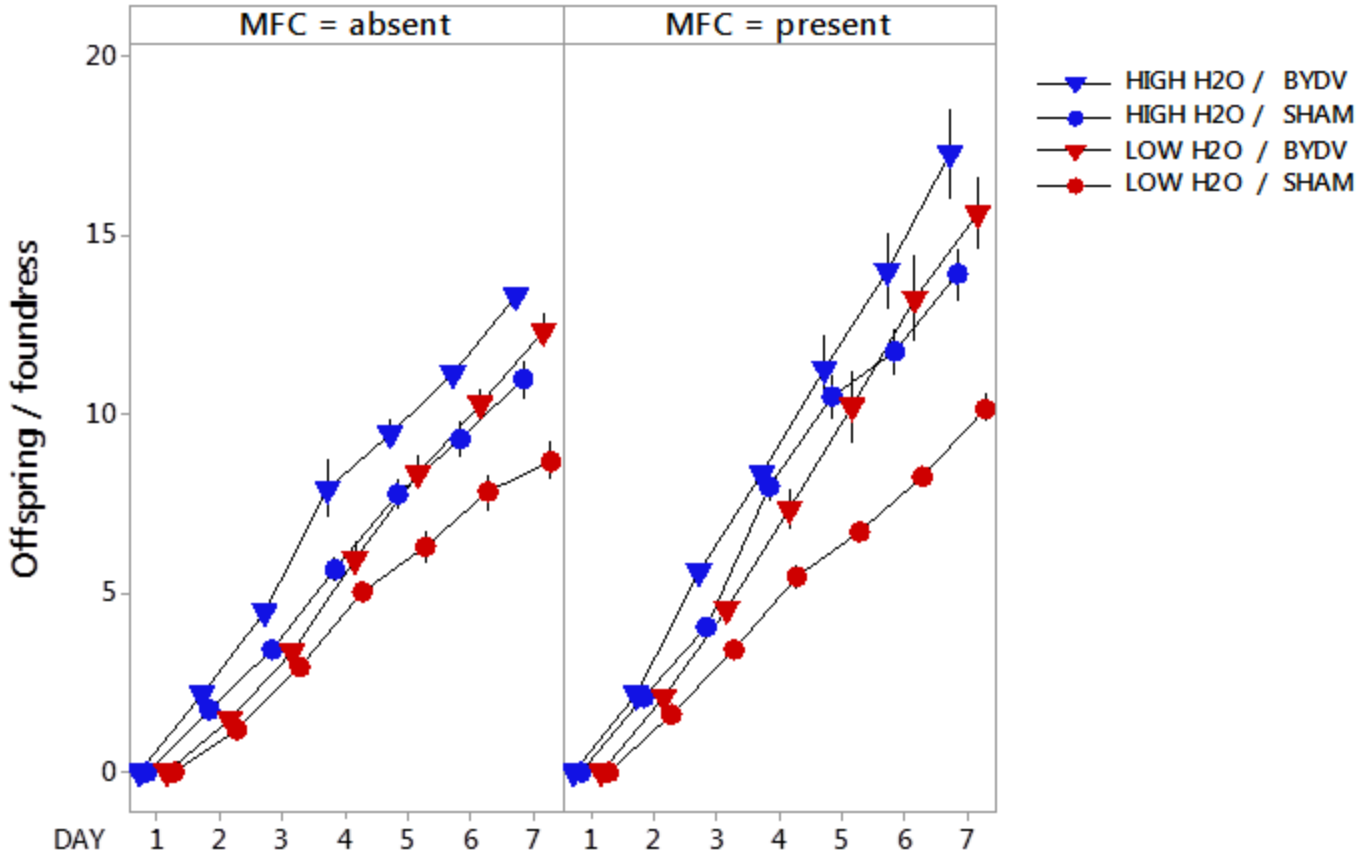
Methods cont.

- After one more week
- 4 R.padi adults or 2 R.padi and 2 MFC
- Let them produce nymphs
- Reduce to nymphs


Average Offspring per Plant by Treatment
Number of Average Offspring
20
18
16
14
12
10
8
6
4
2
0
1
2
3
4
5
6
7
Day
V80Y
V10Y
V80N
V10N
S80Y
S80N
S10Y
S10N


H2O = HIGH
H2O = LOW
Offspring / foundress
DAY
0
5
10
15
20
1
2
3
4
5
6
7
BYDV / MFC absent
BYDV / MFC present
SHAM / MFC absent
SHAM / MFC present


BYDV
SHAM
Offspring / foundress
DAY
0
5
10
15
20
1
2
3
4
5
6
7
HIGH H2O / MFC absent
HIGH H2O / MFC present
LOW H2O / MFC absent
LOW H2O / MFC present


MFC = absent
MFC = present
Offspring / foundress
20
15
10
5
0
DAY
1
2
3
4
5
6
7
HIGH H2O / BYDV
HIGH H2O / SHAM
LOW H2O / BYDV
LOW H2O / SHAM

Analysis of Variance for
Daily Cumulative Reproduction

Source	DF	Adj SS	Adj MS	F-Value	P-Value	
DAY	5	7984.6	1596.91	7.01	0.002	x
H2O(DAY)	6	328.1	54.68	7.93	0.067	x
VIR(DAY)	6	679.7	113.28	14.00	0.017	x
MFC(DAY)	6	427.4	71.23	21.42	0.126	x
H2O*VIR(DAY)	6	49.2	8.20	1.73	0.261	
H2O*MFC(DAY)	6	20.6	3.44	0.72	0.648	
VIR*MFC(DAY)	6	27.8	4.64	0.98	0.511	
H2O*VIR*MFC(DAY)	6	28.5	4.75	1.63	0.136	
Error	517	1503.6	2.91			
Total	564	11021.2				

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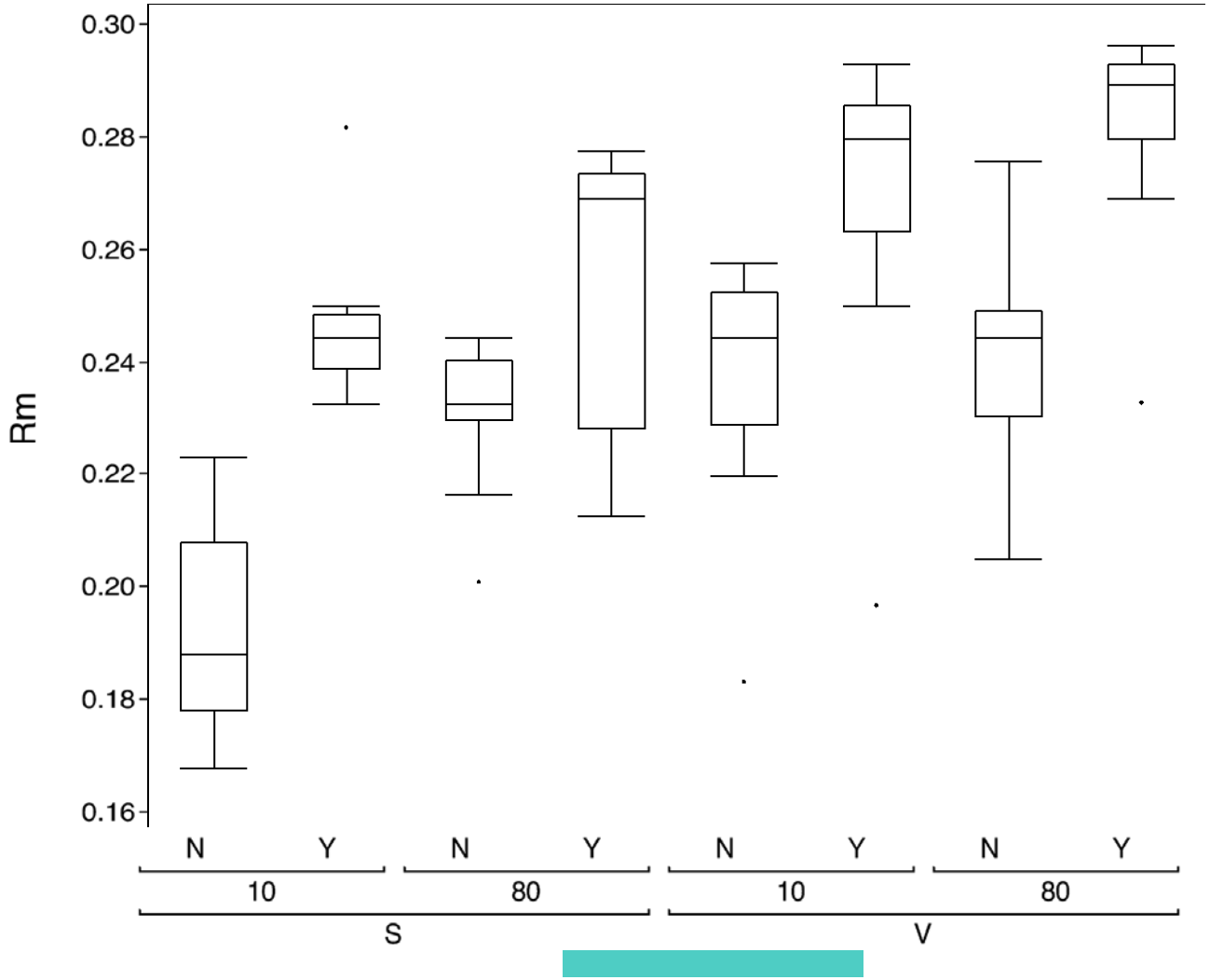
Finding the Intrinsic Growth Rate

$$R_m = [0.74 (\log_e M_d)] / d$$

Intrinsic Rate of Growth for *R. padi*



ANOVA for R_m

Source	DF	Sum of Squares	Mean Square	F-Value	P-Value
Model	7	0.05701407	0.008145	23.0197	<.0001*
Error	88	0.03113629	0.000354		
C. Total	95	0.08815036			

Source	DF	Sum of Squares	F-Value	P-Value
Virus	1	0.01698801	48.0129	<.0001*
Water	1	0.00529219	14.9572	0.0002*
MFC	1	0.03073602	86.8687	<.0001*
Virus*Water	1	0.00127223	3.5957	0.0612
Virus*MFC	1	0.00000275	0.0078	0.9300
Water*MFC	1	0.00066352	1.8753	

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Hypotheses Revisited

- $H1_0$: Reproductive rate (rm) of R. padi will not differ on plants receiving different amounts of H20
- $H2_0$: Reproductive rate of R. padi will not differ on plants coinfested vs. not infested with M.F.C
- $H3_0$: Reproductive rate of R. padi will not differ on plants infective BYDV vs not infected with BYDV
- $H4_0$: There are no interactions among water stress, MFC coinfestation, and BYDV infection.

Discussion

- The effects are consistent
- Results supported hypothesis

Conclusion & Thanks Yous

- Very valuable experience
- Really wish my experiment wouldn’t have tanked
- Thank you!

Thanks!

Any questions?