

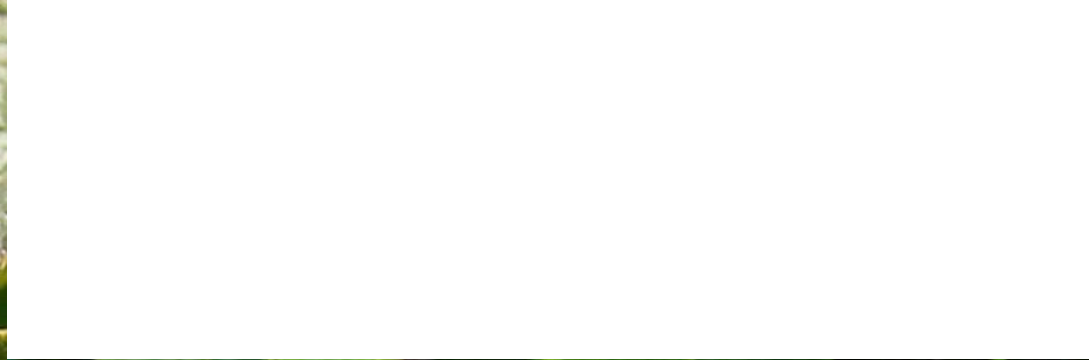
# Insect Pests in Upper Midwest Hazelnut Plantings: A First Look

Ariadna Chediack

Bayfield County - UW Extension  
ariadna.chediack@wisc.edu







## **During 2017 and 2018 Field Seasons – Primarily in Bayfield County**

- 46 species collected, 20 species identified
- 36 Genera
- 36 Families
- 11 Orders:      \* 3 Orders of Arachnida  
                         \* 8 Orders of Insecta



*Parthenolecanium* sp, Lecanium scales. Spooner.

Lecanium scales, field ants and big bud mite bud. Bayfield.



Male and female.  
Hayward.

*Polidrosus formosus*, green immigrant leaf weevil. Bayfield.



*Melanoplus bivittatus*, two-striped grasshopper. NGLVC.

*Anthereaea polyphemus*, silk moth. Spooner and Bayfield.







*Poanias excaecata*, (most likely), blind sphinx moth caterpillar. Bayfield.



*Lithacodes fasciola*, yellow shouldered slug moth. Spooner.



*Acleris* sp, leaf roller. Bayfield.



*Halysidota tessellaris*,  
banded tussock moth.  
Bayfield





*Hyalophora cecropia*, giant silk moth or cecropia moth.  
Spooner.





*Popilia japonica*,  
Japanese beetle.  
Stoughton.



*Potinus* sp, firefly. Stoughton.



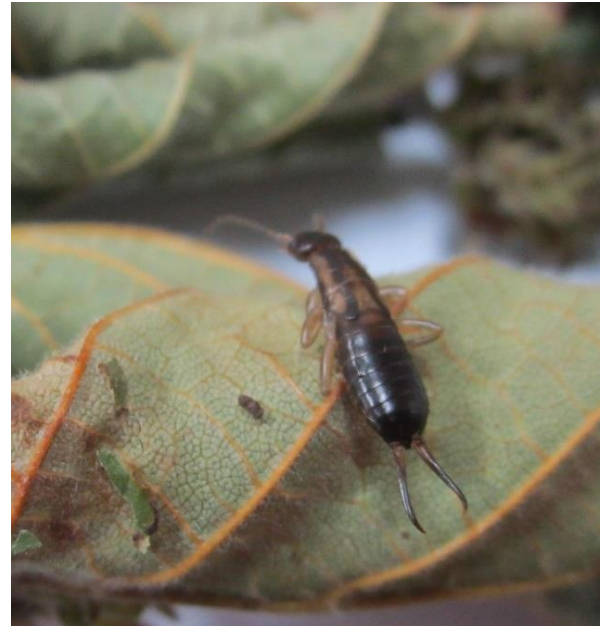
Reduviidae, assassin bug eggs. Bayfield.



*Euchistus servus euchistoides*, stink bug.  
Bayfield.



Fly, spider nest. NGLVC.



*Forficula auricularia*,  
European earwig.  
Bayfield.





*Phidippus* sp, bold jumper spider. Spooner.



*Argiope trifasciata*, banded argiope. Spooner.



*Argiope* sp, garden spider. Stoughton.



*Araneus trifolium*,  
shamrock orb weaver.  
Spooner.



Shamrock orb weaver  
hunting a grasshopper,  
and another spider spp.  
NGLVC.



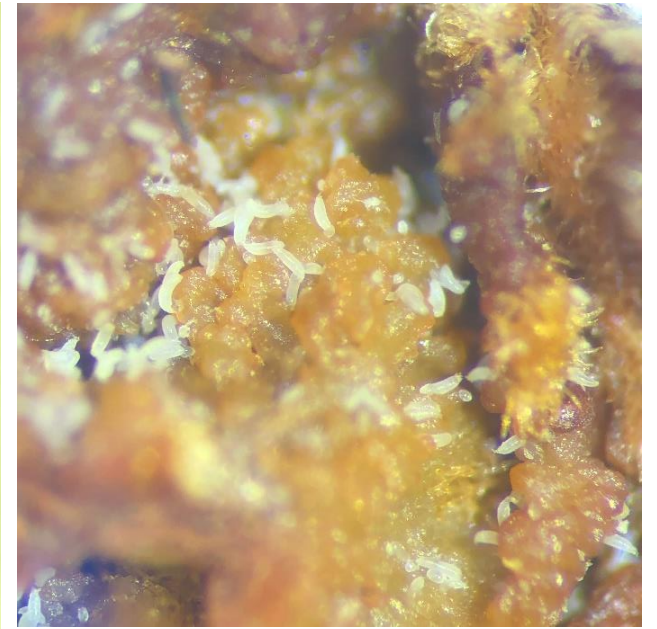
Photo by P.J. Liesch

*Leptothrips* sp, black hunter (tube tailed thrip). Predator. Bayfield.

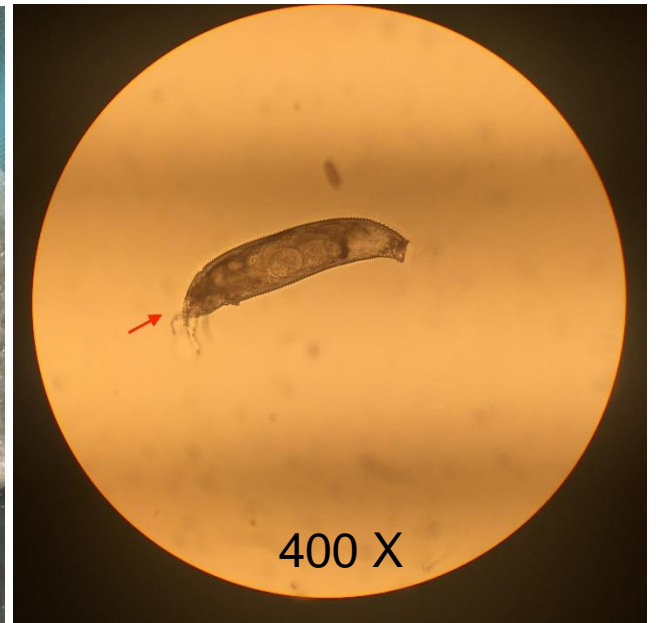
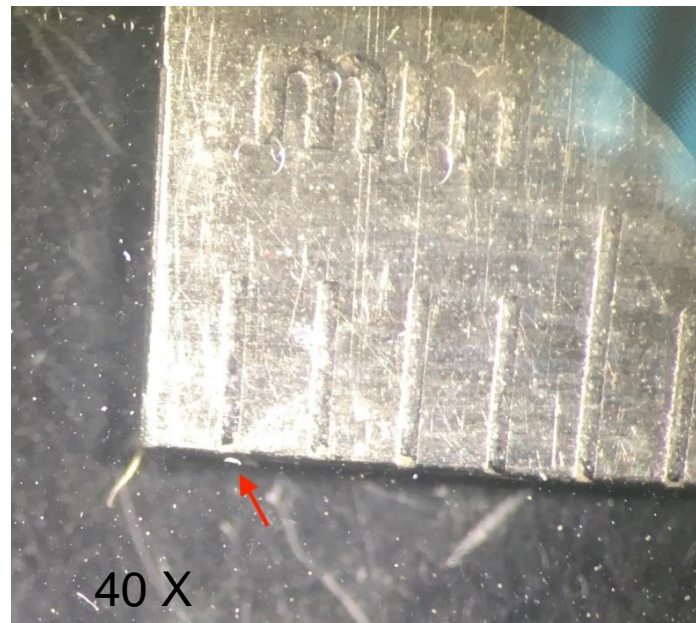
**BBM**  
**Big Bud Mite**



*Phytoptus (Phytocoptella)*  
*avellanae*, Big Bud Mite.



Photos by P.J. Liesch





BBM (small) and Phytoseiidae = predator mite (large).

● *Phytocoptella (Phytoptus) avellanae*

● *Cecidophyopsis vermiformis* have not found in our plantings yet.

# BBM Ratings (% of damaged buds)

0 = 0 %

1 = 1 – 25 %

2 = 26 – 50 %

3 = 51 – 75 %

4 = 76 – 100 %

1

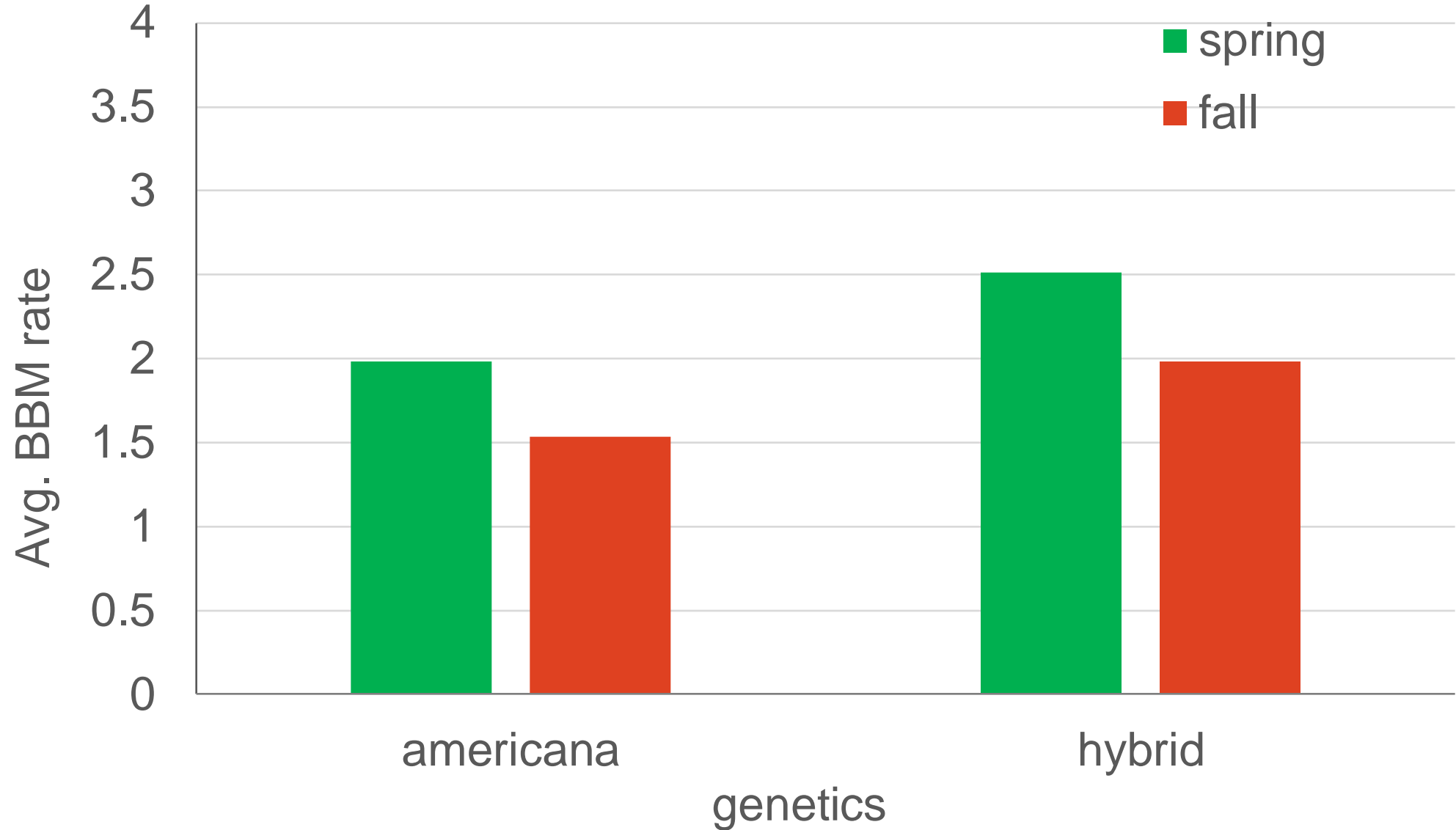




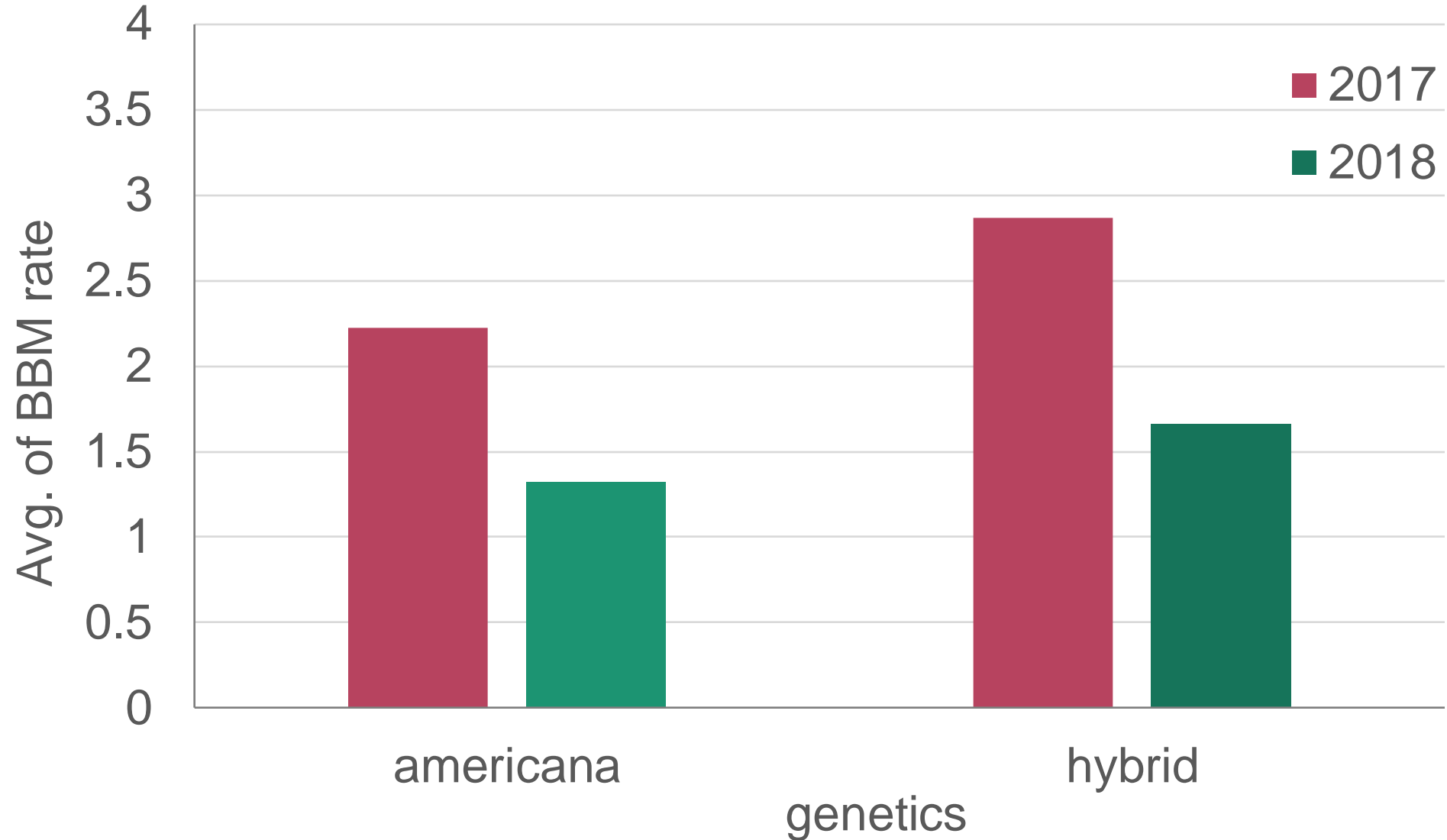
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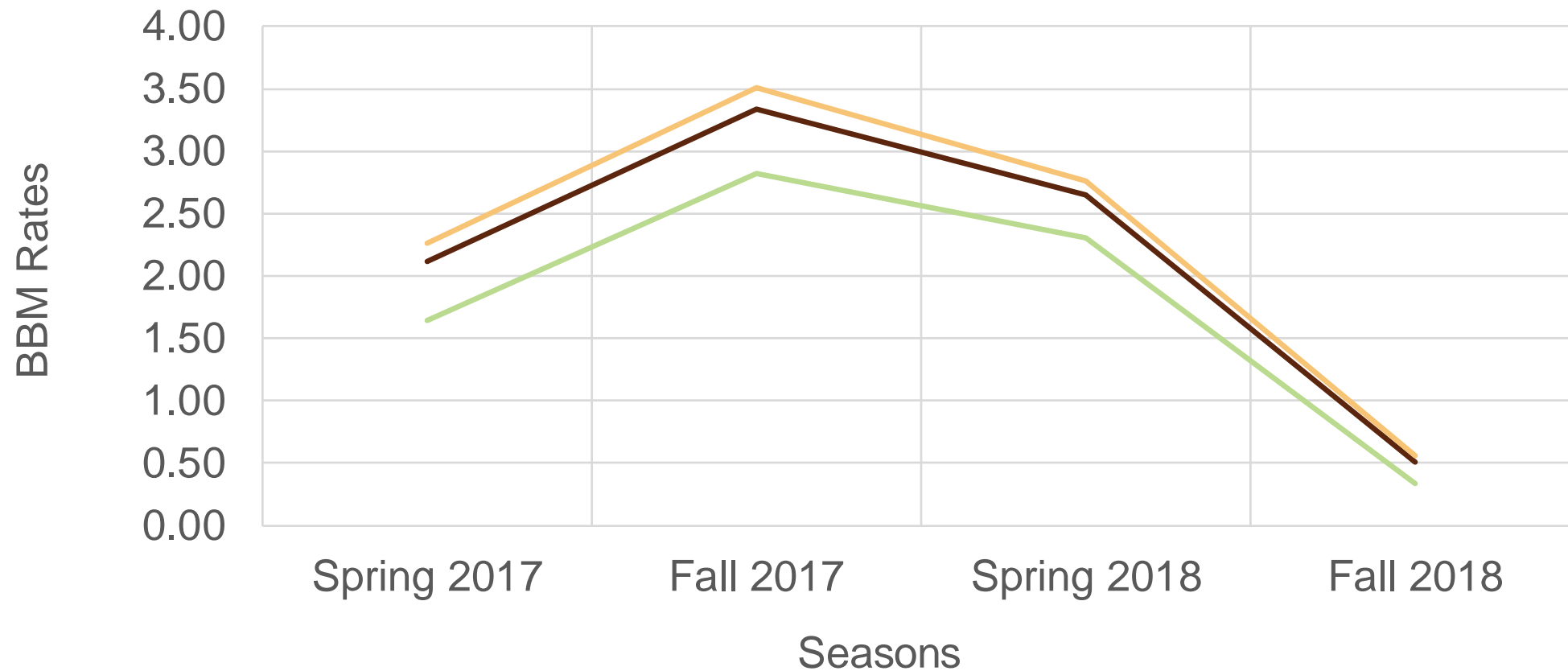
# Average Big Bud Mite Rating for *Corylus americana* Vs Hybrid Genotypes for Spring and Fall (2017-2018)



# Average of Big Bud Mite Rating for *Corylus americana* Vs Hybrid Genotypes for 2 Years



# Average BBM Rating By Season for C. americana and Hybrids

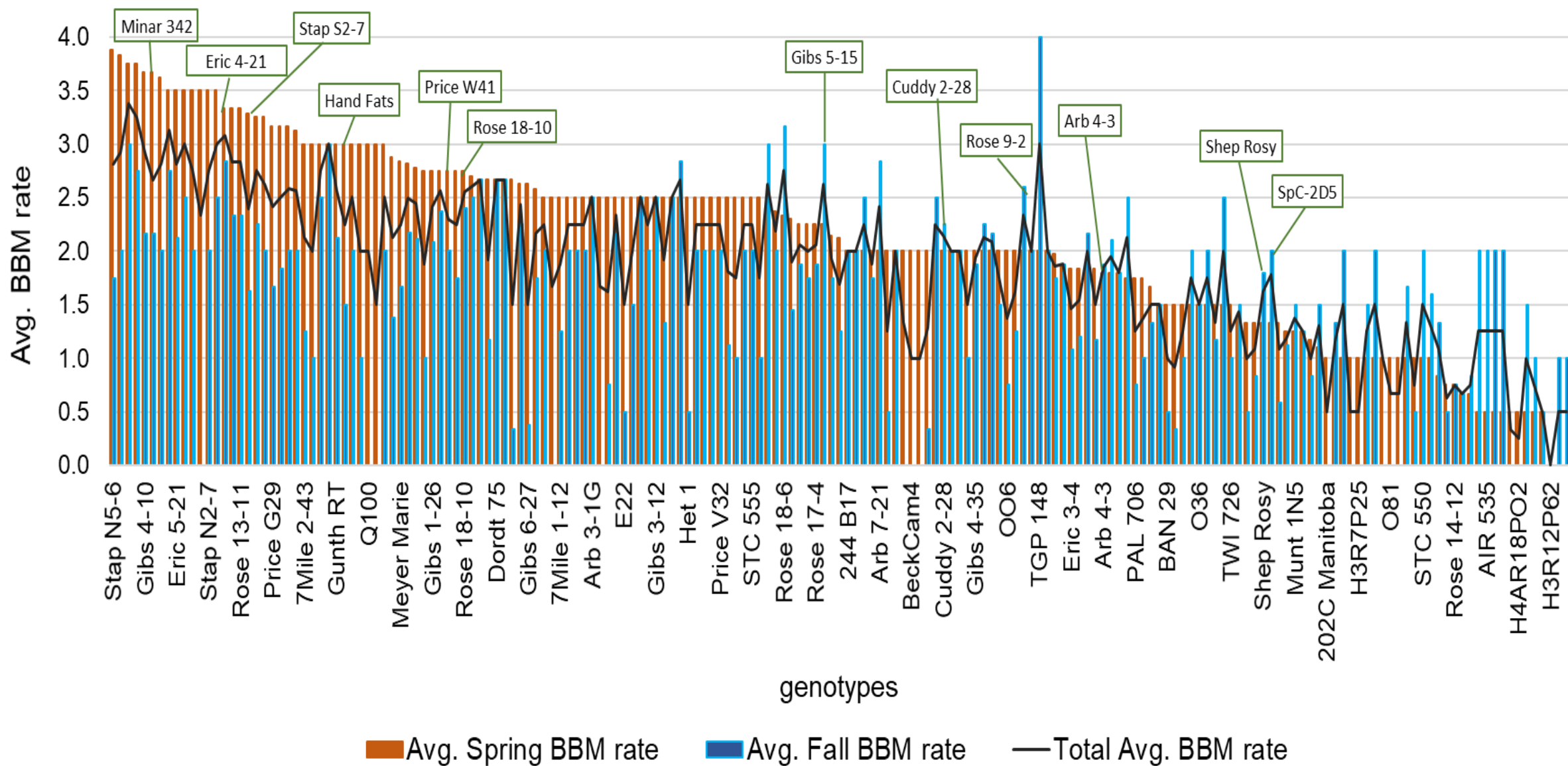


— Avg. BBM

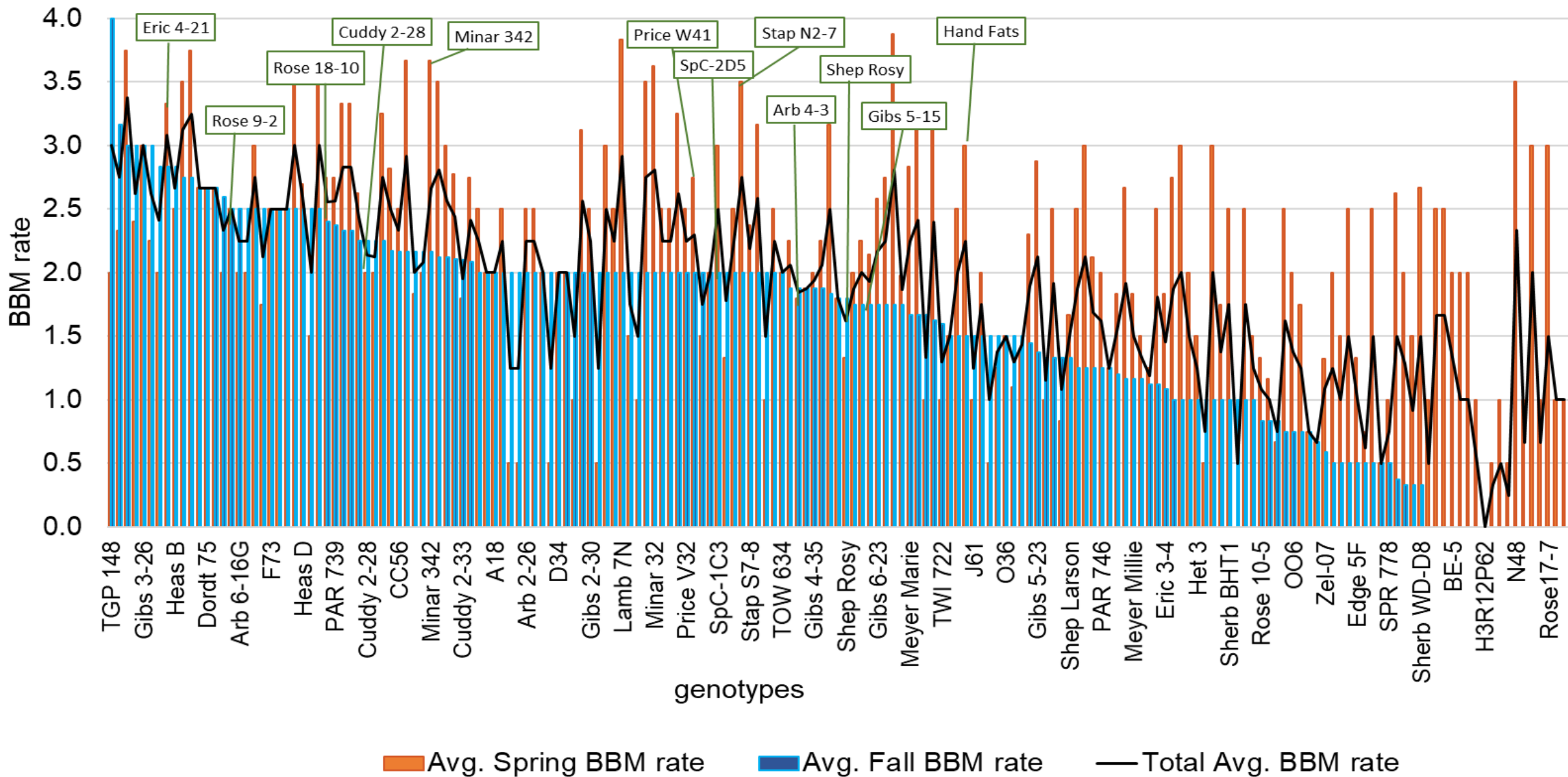
— Avg. C. americana BBM

— Avg. Hybrids BBM

# Individual Genotype BBM Ratings Averaged Across 2017 and 2018 at Bayfield (highest to lowest average spring rating)



# Individual Genotype BBM Ratings Averaged Across 2017 and 2018 at Bayfield (highest to lowest average fall rating)



# BBM Conclusions

# BBM Conclusions

- Spring shows higher BBM rates.
- 2017 was a BAD year for BBM, in particular Fall 2017.
- Hybrids show higher BBM rates than pure *C. americana*.
- Top 12 genotypes fell towards the higher BBM rates distribution, above 35%, for both Spring and Fall.



**WEEVIL(S)?**



*Curculio obtusus*,  
hazelnut weevil.  
Eastern US,  
Southeastern Canada..



Copyright © 1996 Lucinda Treadwell,  
<http://www.insectsexplained.com/thesis.htm>

*Curculio occidentis*,  
hazelnut weevil.

West coast, Arizona, New Mexico.

Similar to *C. obtusus*



Hazelnut grub found in a nut from Spooner. Identified as a species in the Curculionidae (weevil) family.

## Adult weevils found

*Strophosoma melanogrammum*, nut leaf weevil.



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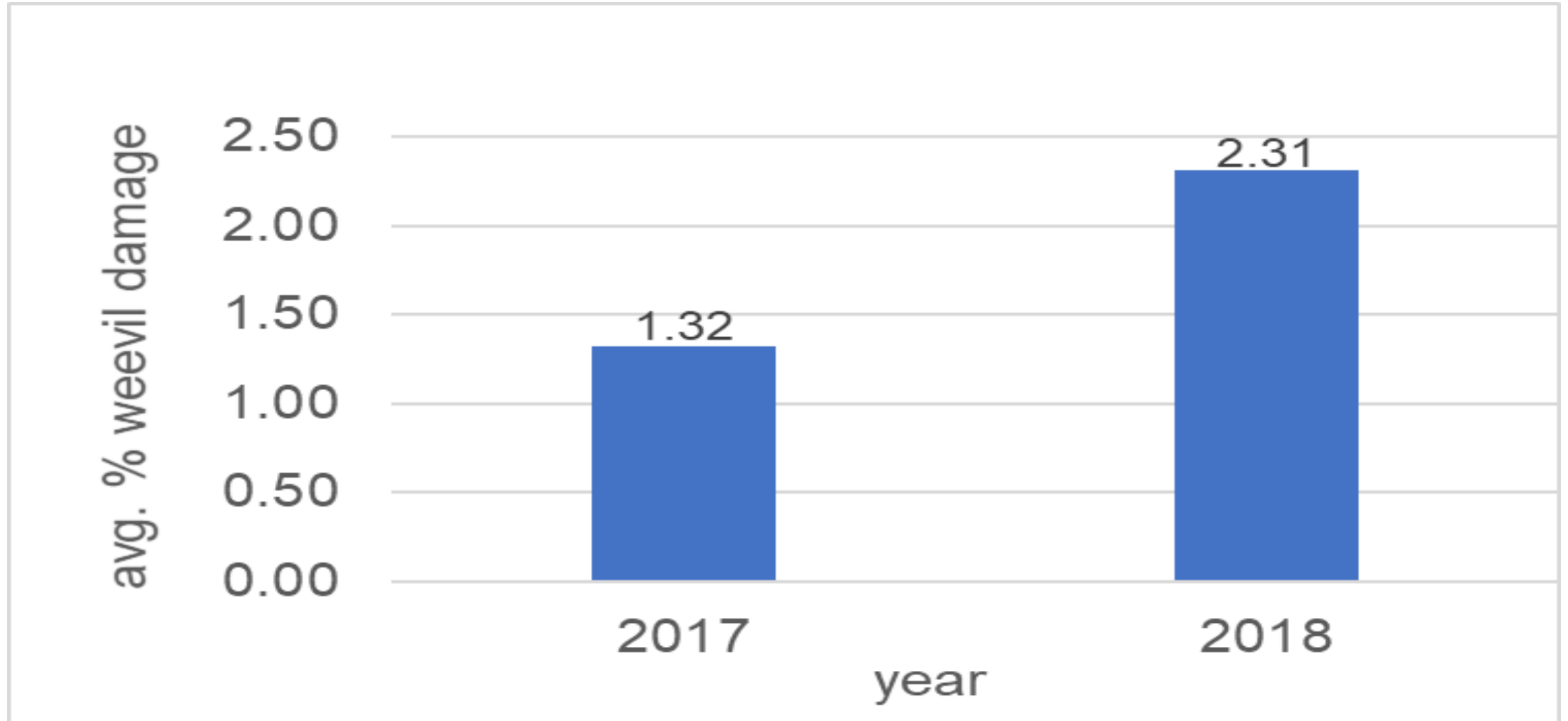
*Otiorynchus ovatus*, strawberry root weevil.



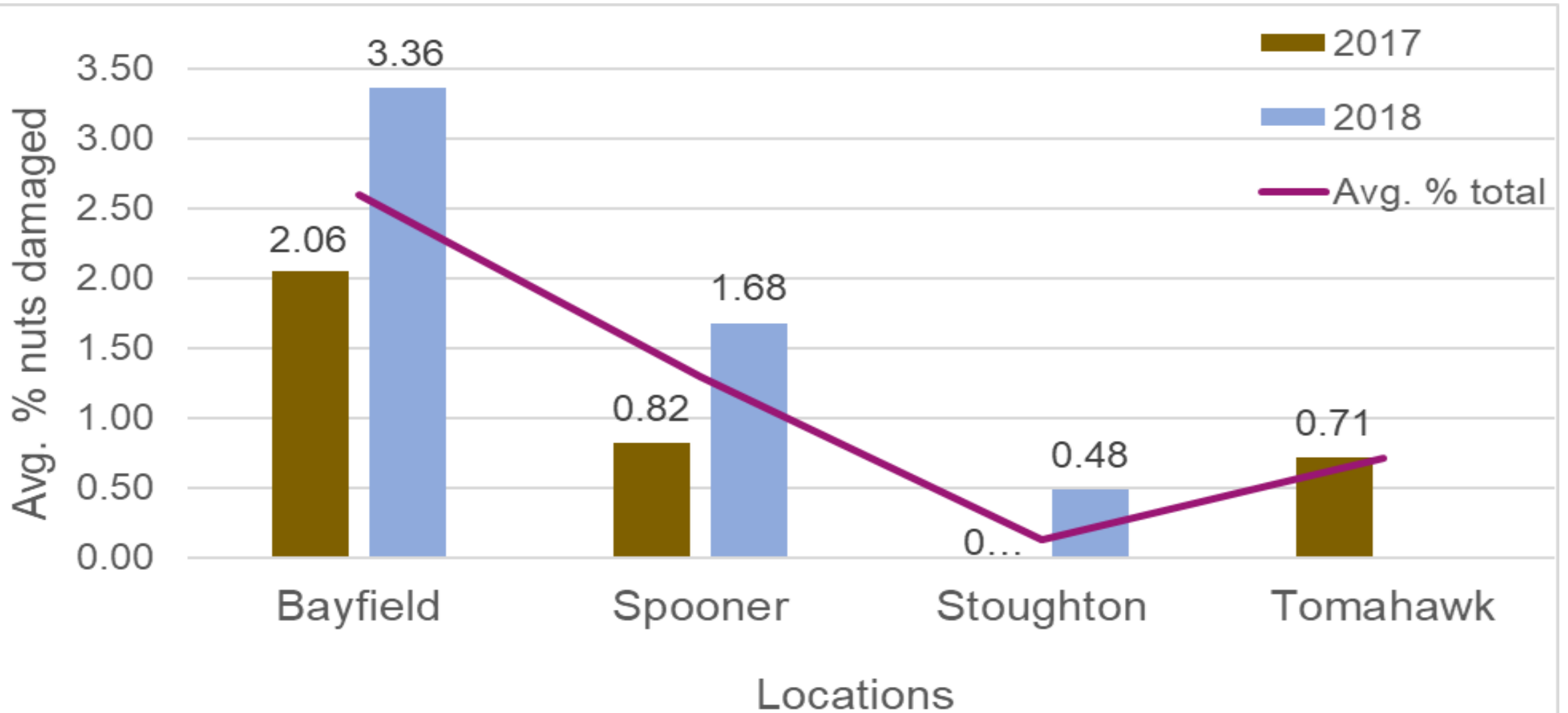
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*Polydrosus formosus*, green immigrant leaf weevil.

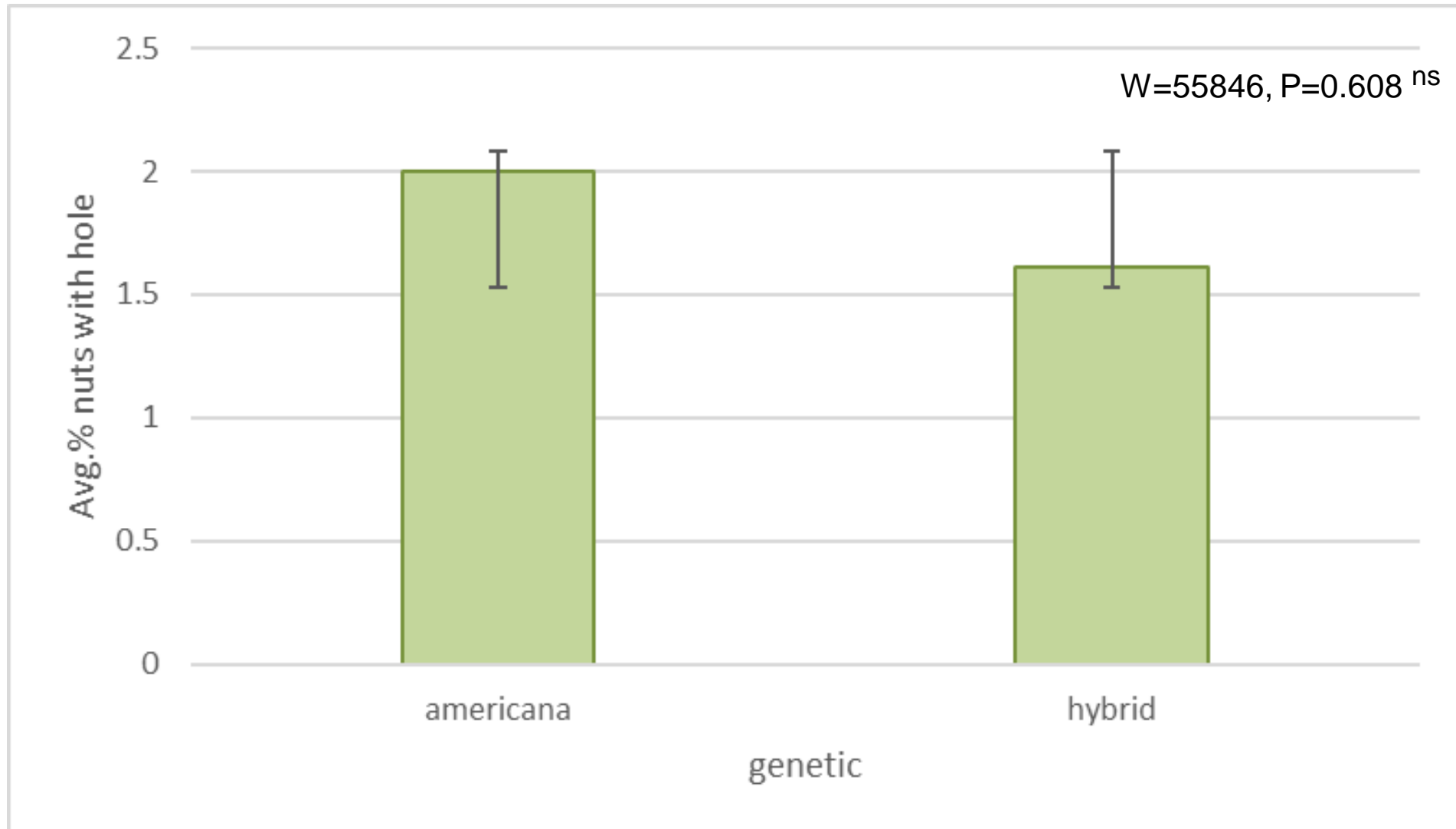
# % of Nuts with Weevil Hole Averaged Across Sampling Location



# % of Nuts With Weevil Hole By Location and Year

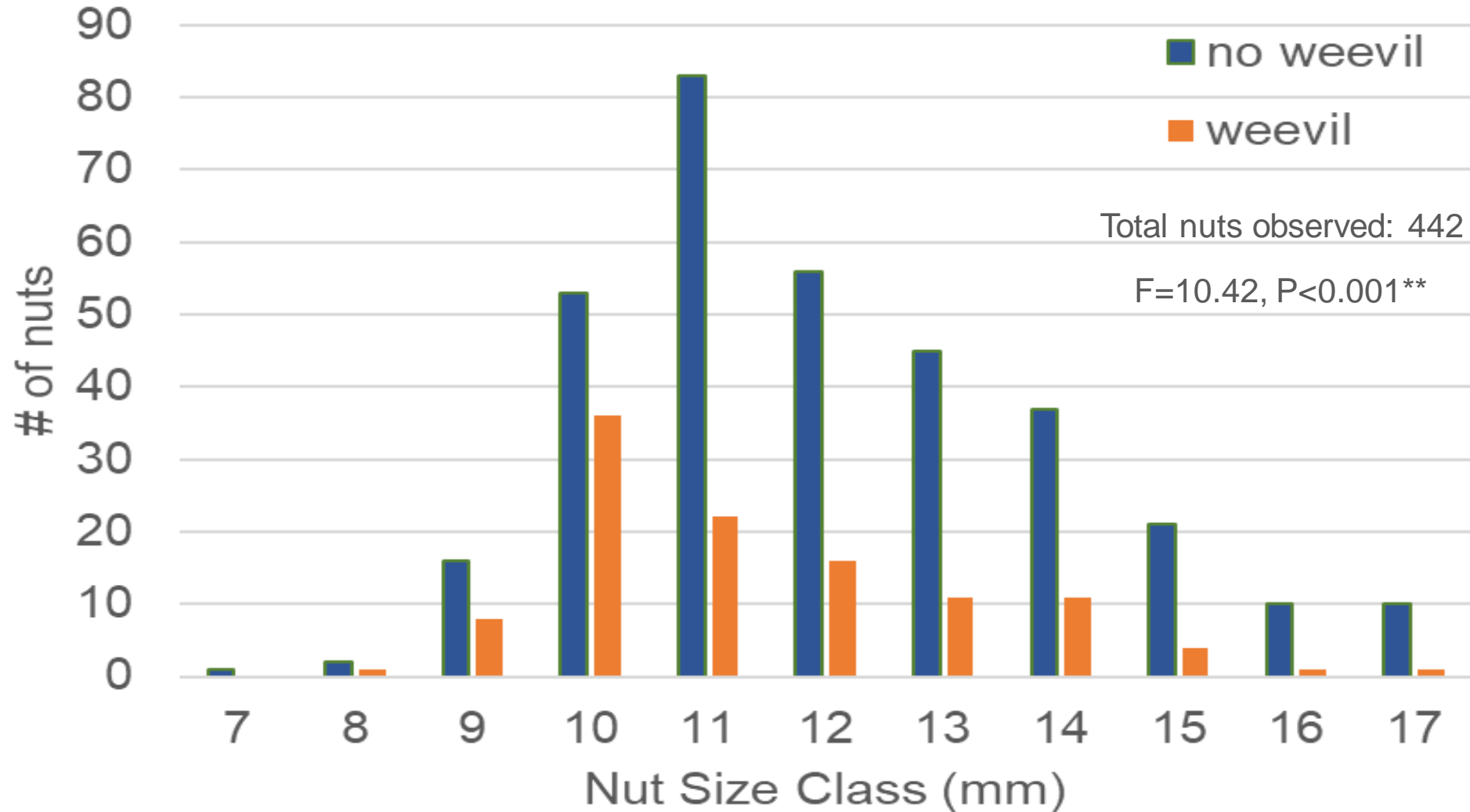


# % Weevil Damage of Hybrid and C. americana Hazelnuts





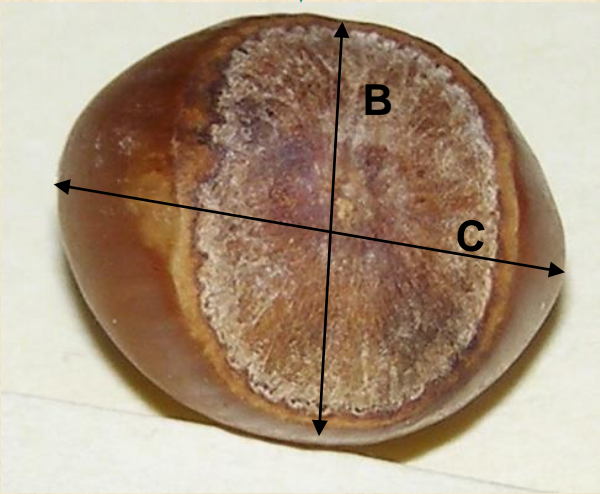
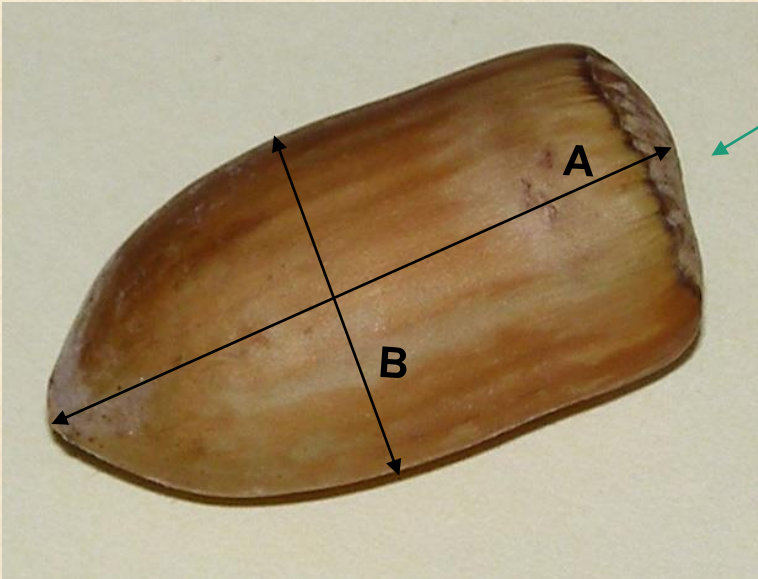
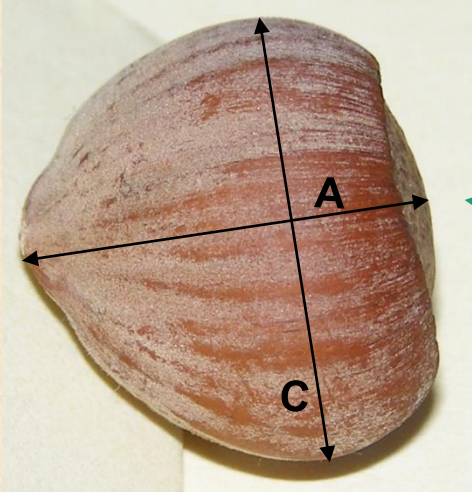
Number of Nuts with weevil damage in each Size Class  
(most of the weevil damaged observed was in small nuts)



# Shell measurements

A = hilum to micropyle  
B and C = perpendicular to A  
B = narrowest  
C = widest

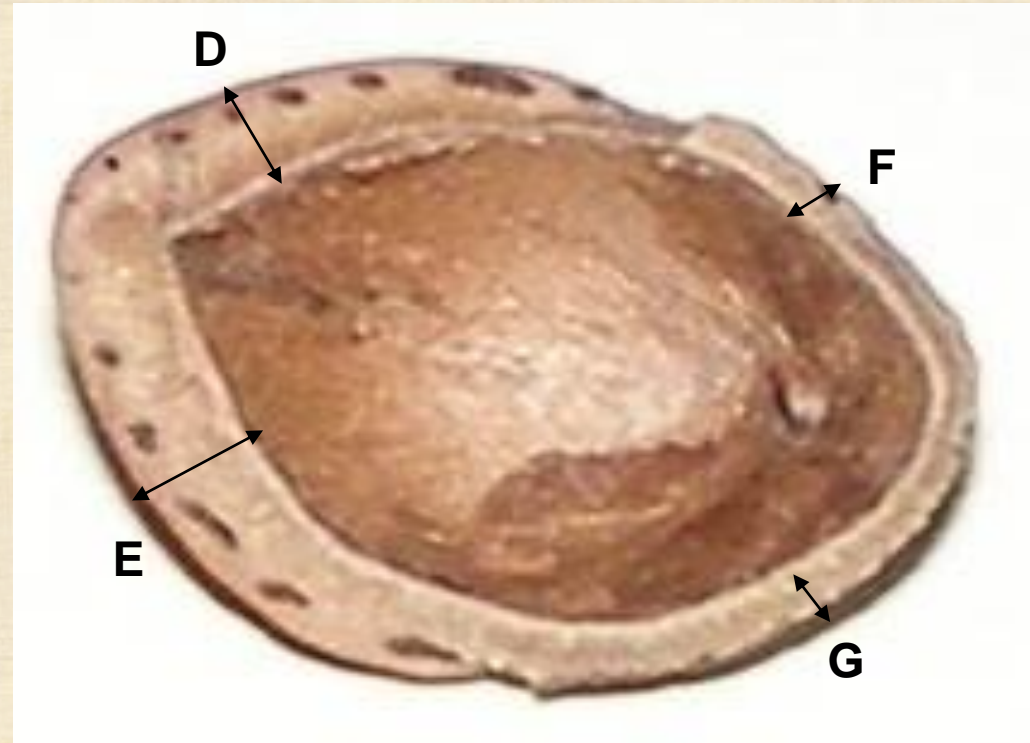
Micropyle region



hilum

D and E = thicker thickness  
F and G = thinner thickness

Micropyle region

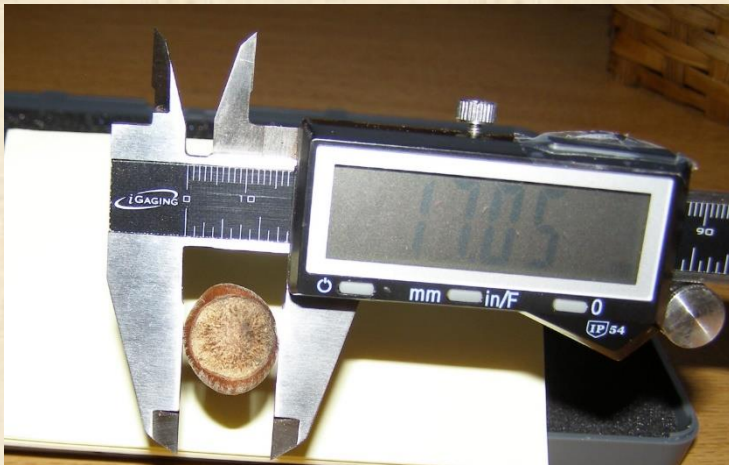


hilum end

B



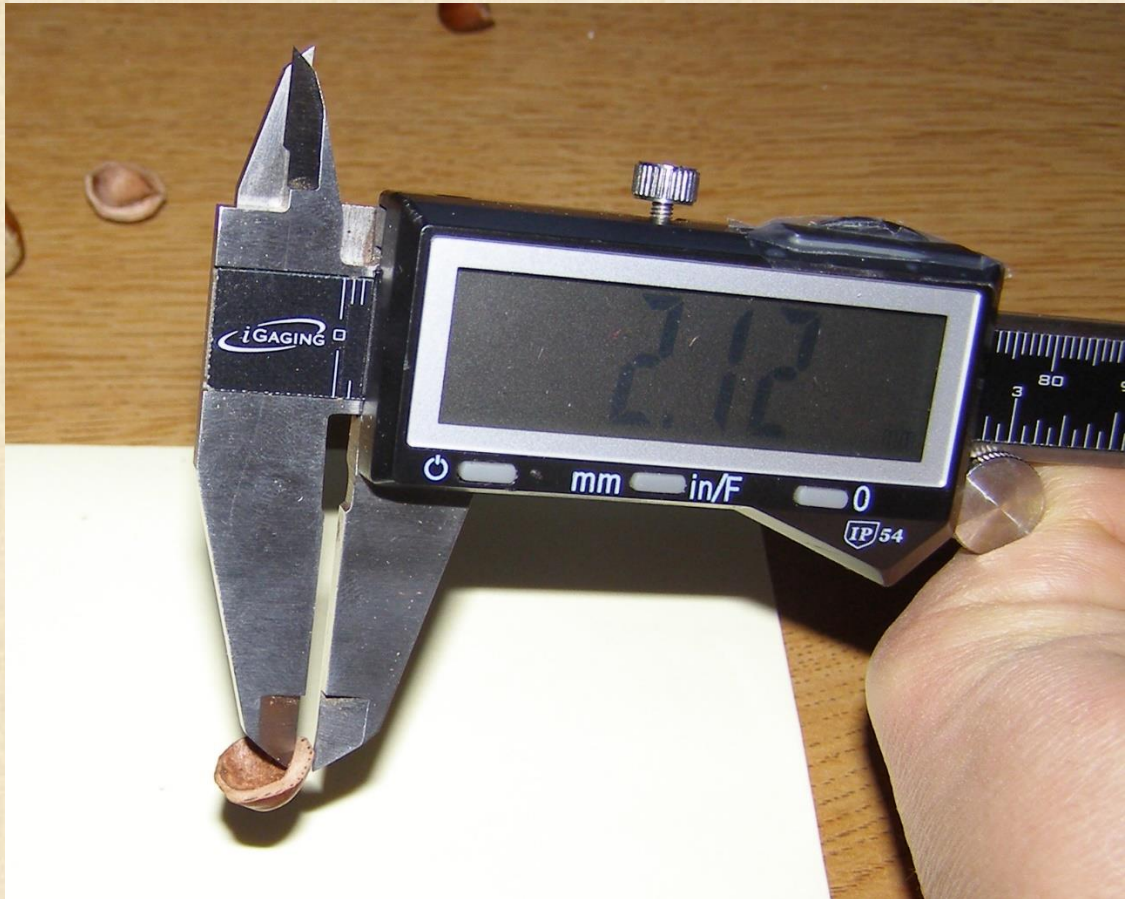
C



A= hilum to micropyle



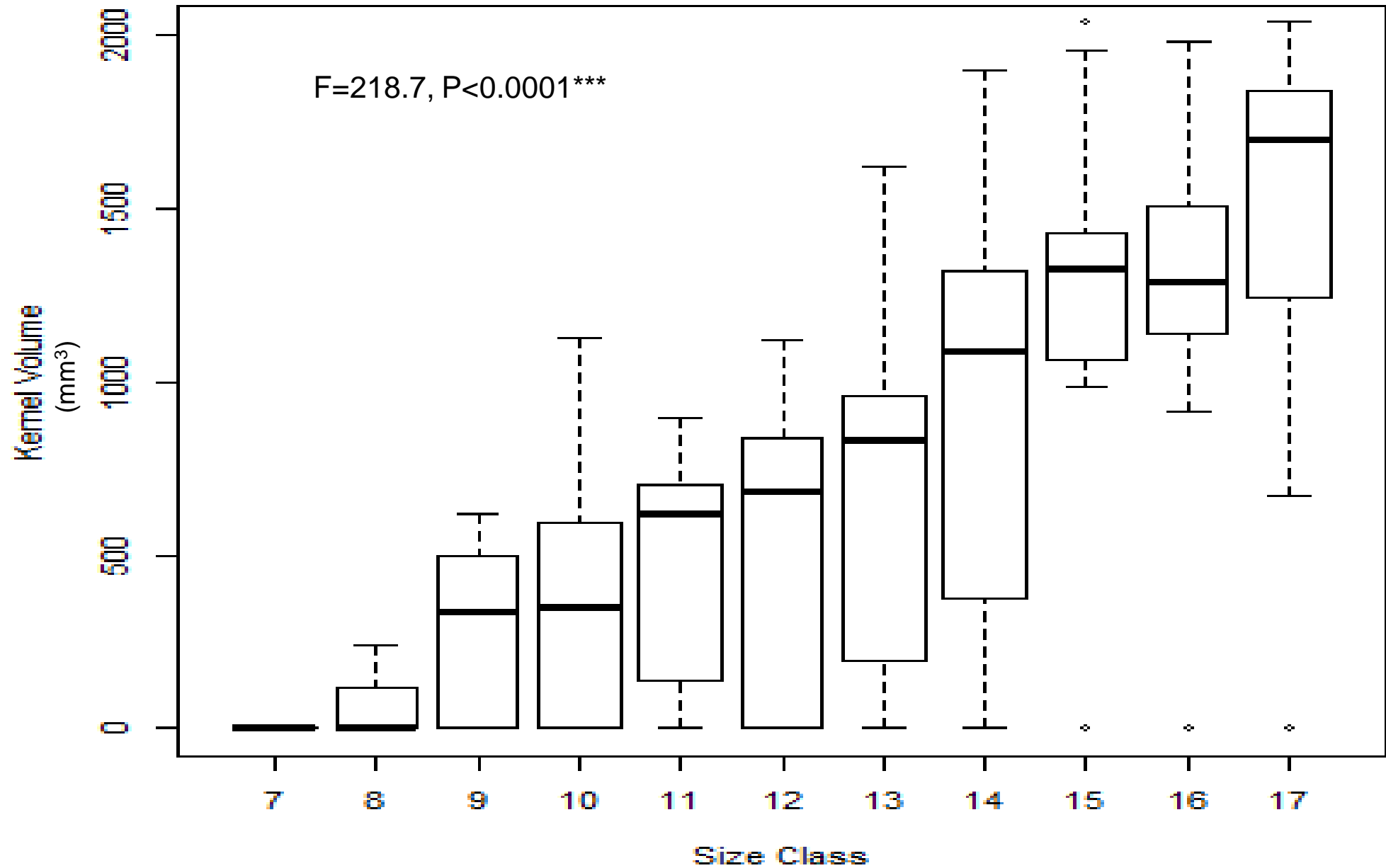
D and E



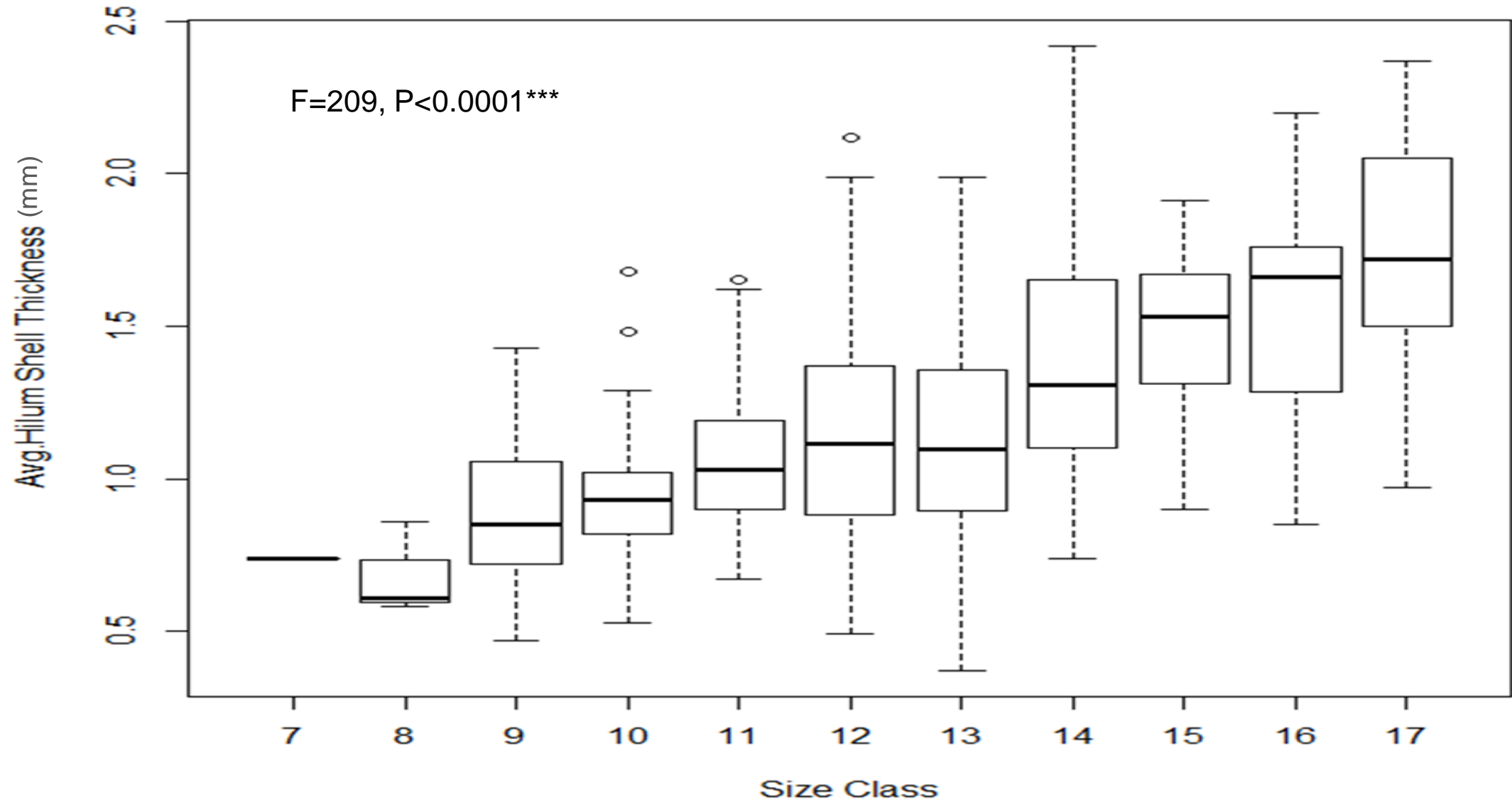
F and G



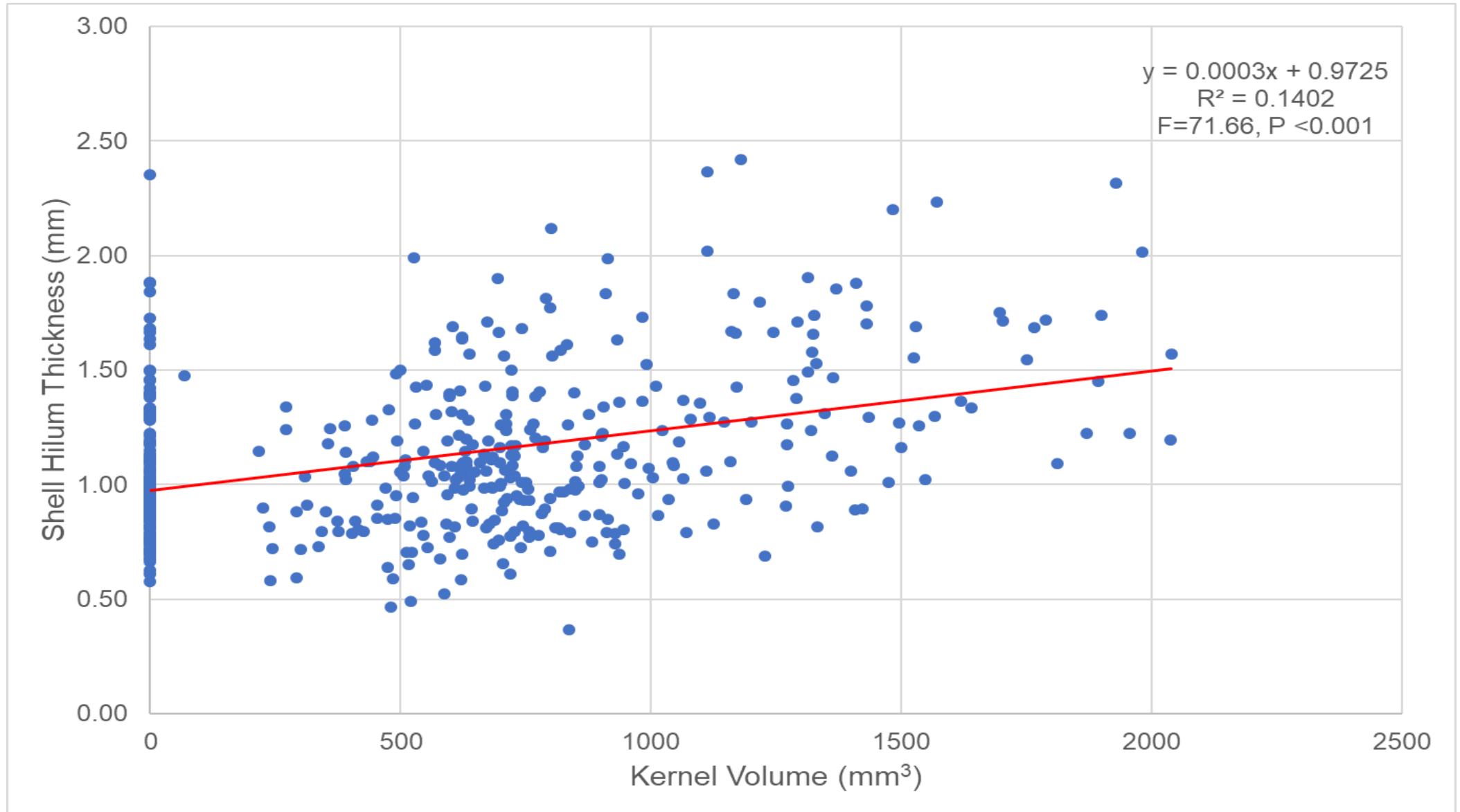
# The Larger the In-shell Nut, the Larger the Kernel Volume



# The Larger the In-Shell Nut, the Thicker the Shell

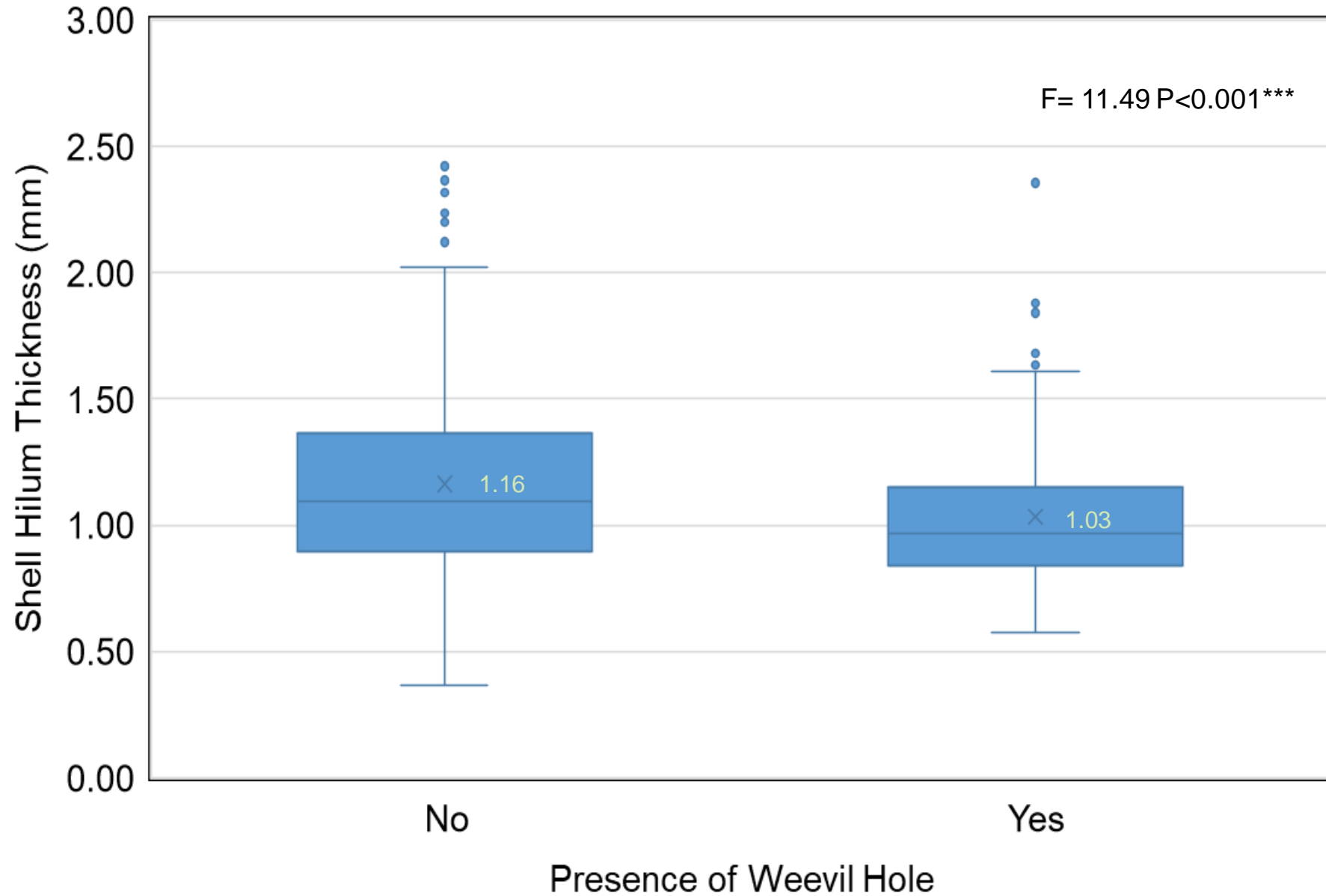


# Positive Correlation Between the Shell Hilum Thickness and the Kernel Volume





# Shell Hilum Thickness by Weevil Hole Presence



## Slight Correlation Between Shell Thickness and Weevil Damage (thinner the shell, the more likely to observe weevil exit holes)

Genotypes	No Weevil Hole	Yes Weevil Hole
Rose 17-4	1.79	1.74
AIR-535	1.58	1.34
Price G29	1.57	1.54
MCF-632	1.34	1.40
Stap S7-8	1.29	1.33
MAR-688	1.21	1.04
AFI-543	1.20	0.95
Rose 17-7	1.18	0.94
STC-555	1.17	1.01
A92	1.14	0.96
BE5	1.05	0.99
HAU-511	1.02	0.97
244 B17	0.98	0.87
Hand Fats	0.93	0.84
NAM-557	0.92	0.87
B45	0.92	0.93
O36	0.85	0.99
BAN-25	0.79	0.84
N48	0.70	0.72

# Weevil Conclusions

# Weevil Conclusions

- Overall, weevil damage was less than 3.5%.
- Percentage of weevil damage increased in 2018 in all sites (unknown for Tomahawk because it was not harvested).
- It seems that Americana genotypes are more affected than hybrids, but that difference is not statistically significant.
- Hazelnuts in the size classes 10, 11 and 12 (mm) showed more weevil predation.

# Weevil Conclusions

- In general, when there is more kernel filling the shell, the shell at the hilum side is thicker.
- On average, hazelnuts that were not affected by weevils had thicker shell than those predated by weevils.
- Do weevils prefer thinner-shelled varieties or does weevil infestation result in thinner shells?

# Weevil Conclusions

- There are significant differences of the shell hilum thickness between nuts with and without a weevil hole.
- There was no differences of shell hilum thickness in nuts with or without a weevil hole within genotype.
- Not enough data to conclude on
  - which genotypes are more affected or WHY.
  - what causes the difference in the shell thickness.

# Questions for the future

- BBM: Response of the different genotypes to increasing BBM rates.
- What impact does BBM damage have on yield in shrub hazelnuts.
- What is affecting BBM population levels in Upper Midwest hazelnuts.

# Questions for the future

- What species is our weevil.
- When do weevils lay the eggs?
- Who or what controls them: earwigs, spiders, daddy longlegs, birds?





Thanks to.....

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Questions?  
Comments!