

# MODIFICATION OF LEAF-WAX PROFILES TOWARDS THRIPS RESISTANCE IN ONION

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# Thrips "Resistance" in 'White Persian'

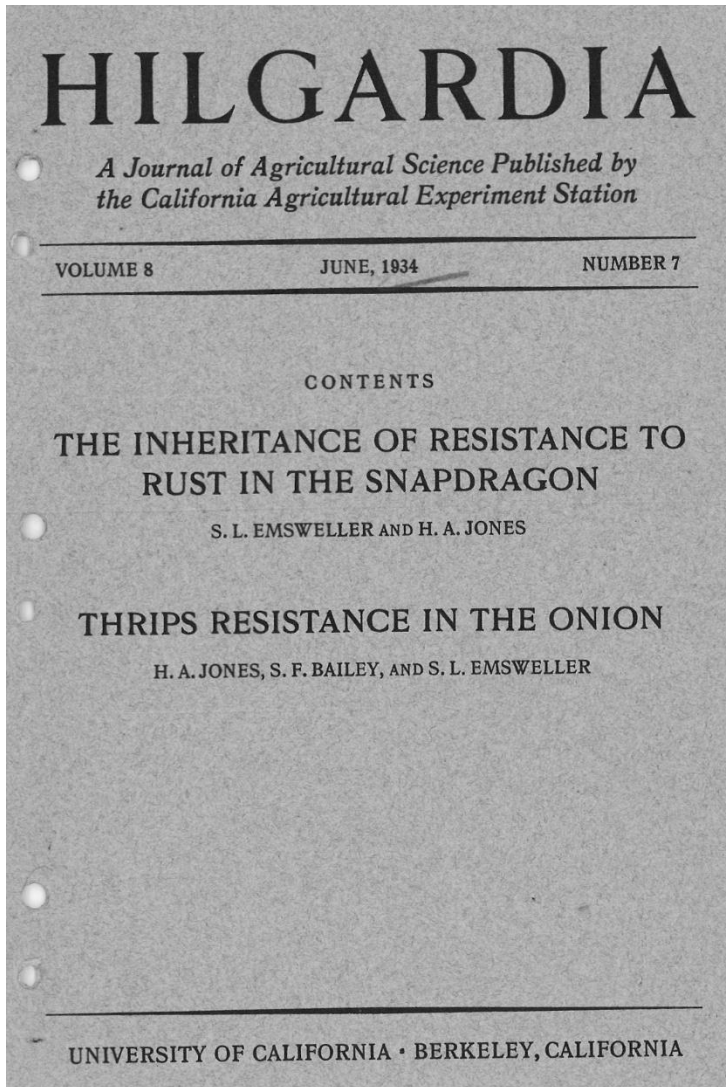
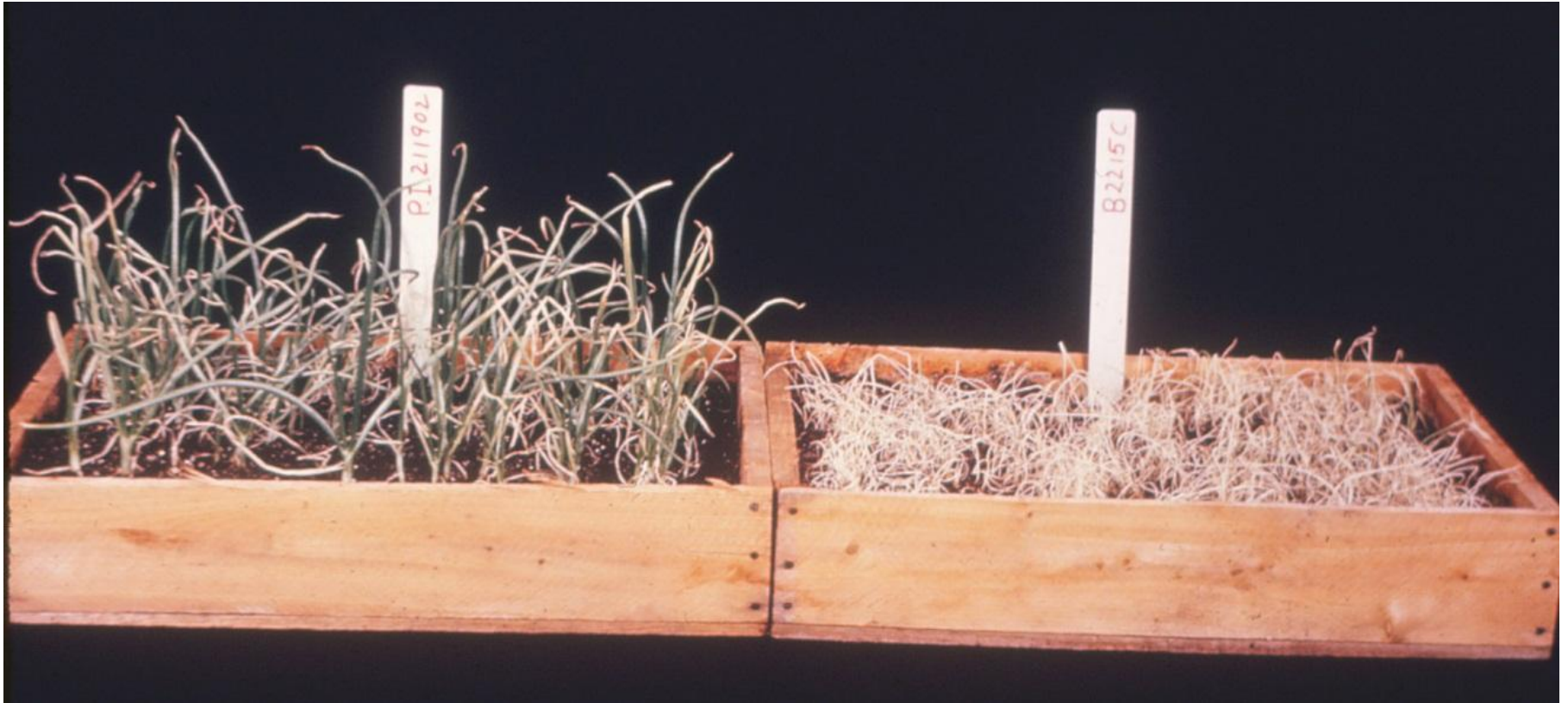


Fig. 3.—Australian Brown on the left; White Persian on the right. Note the habit of growth.

**PI 86279 from Kashan Iran**

# USDA-Beltsville 1967



PI 211902 from  
Abyaneh Iran

B2215C

# Lighter Green Foliage => Less Thrips Damage

"Glossy"

"Semi-Glossy"

"Waxy"



Greater Thrips Numbers and Damage



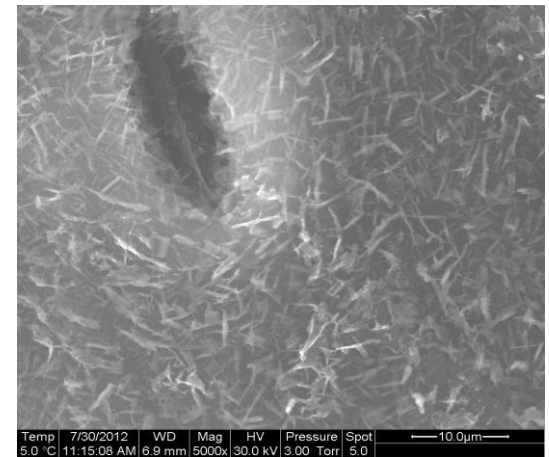
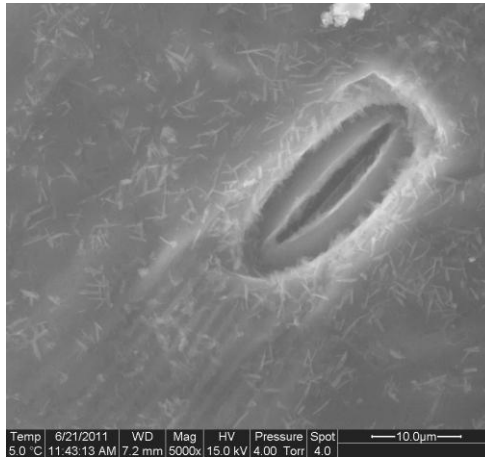
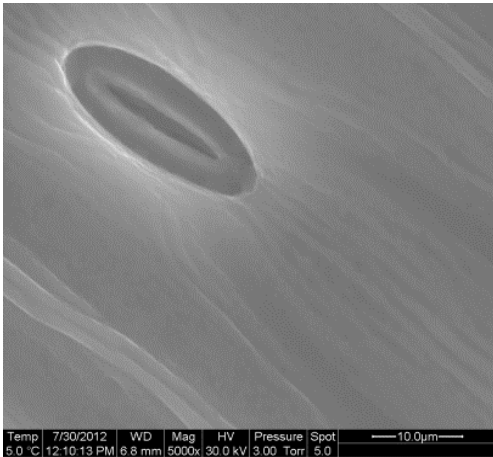
# Scanning EM of Leaf Surface



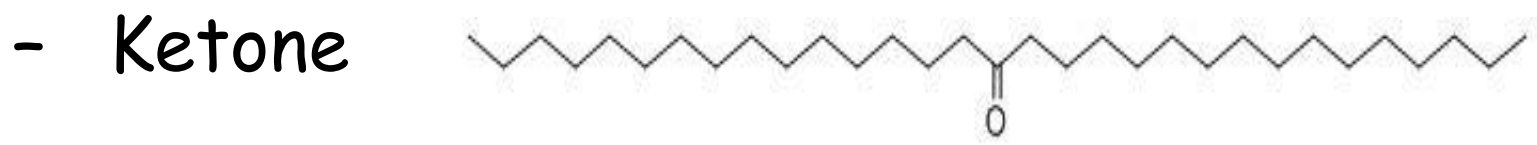
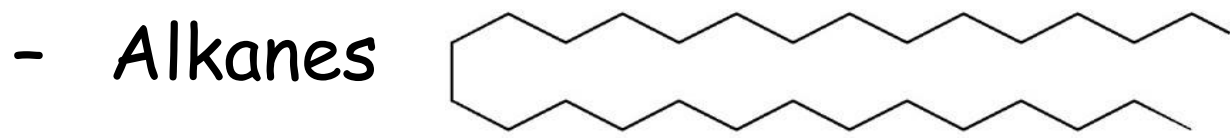
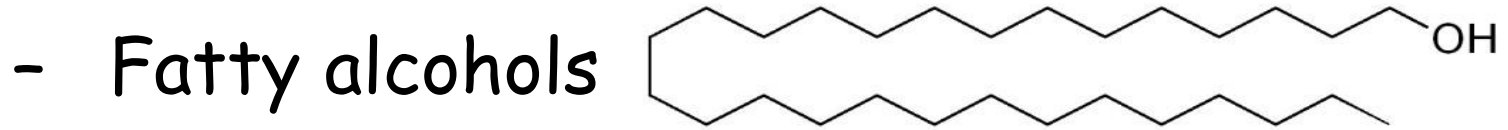
Glossy

Semi-Glossy

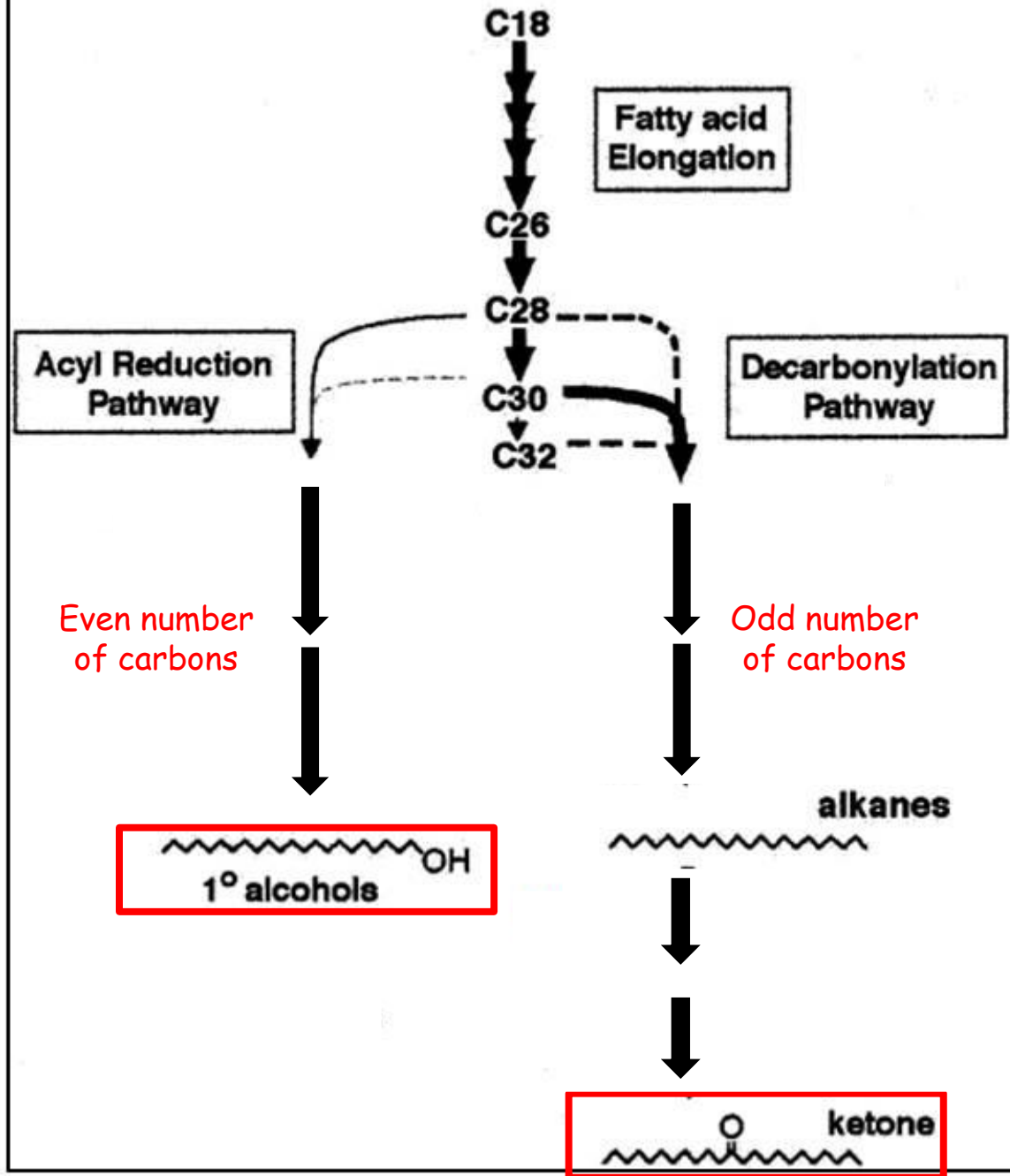
Waxy



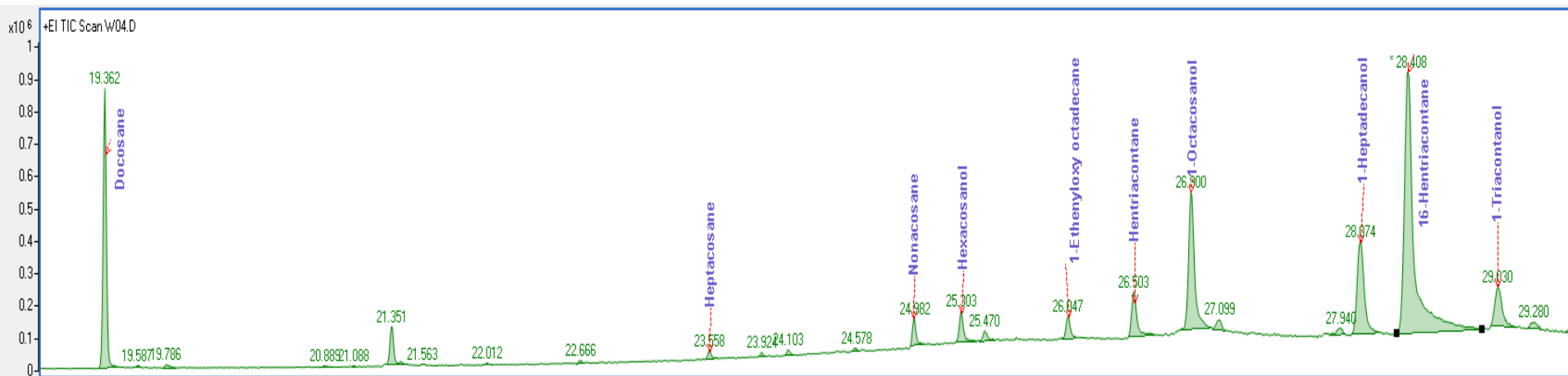
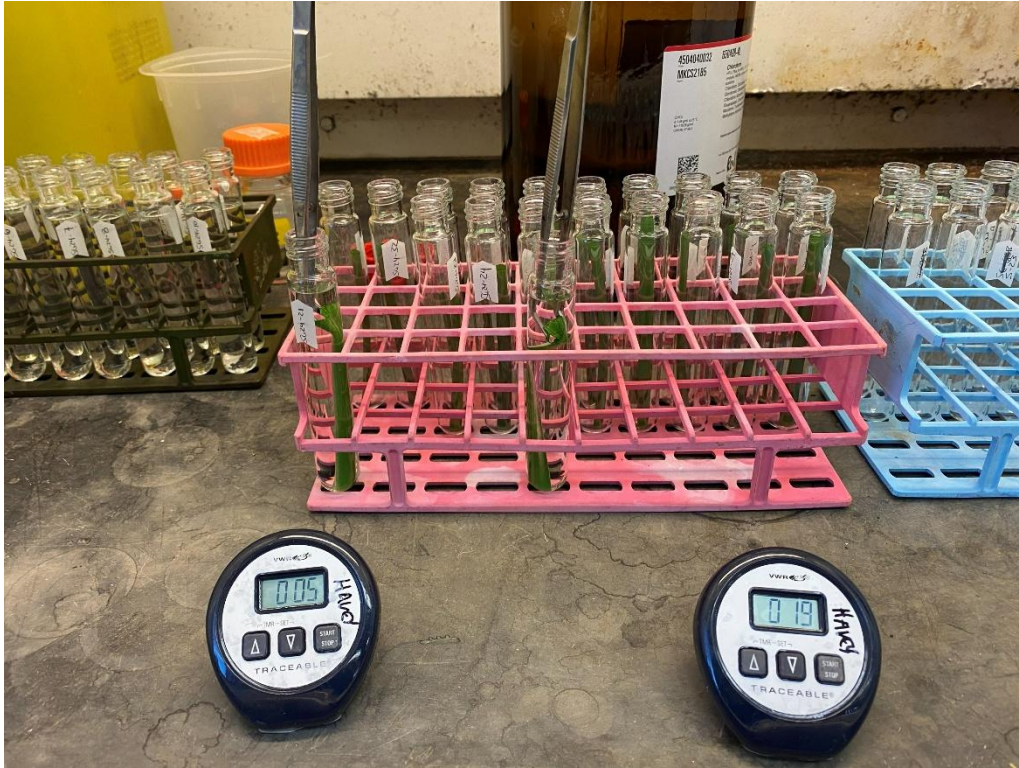
# Epicuticular Waxes in Onion



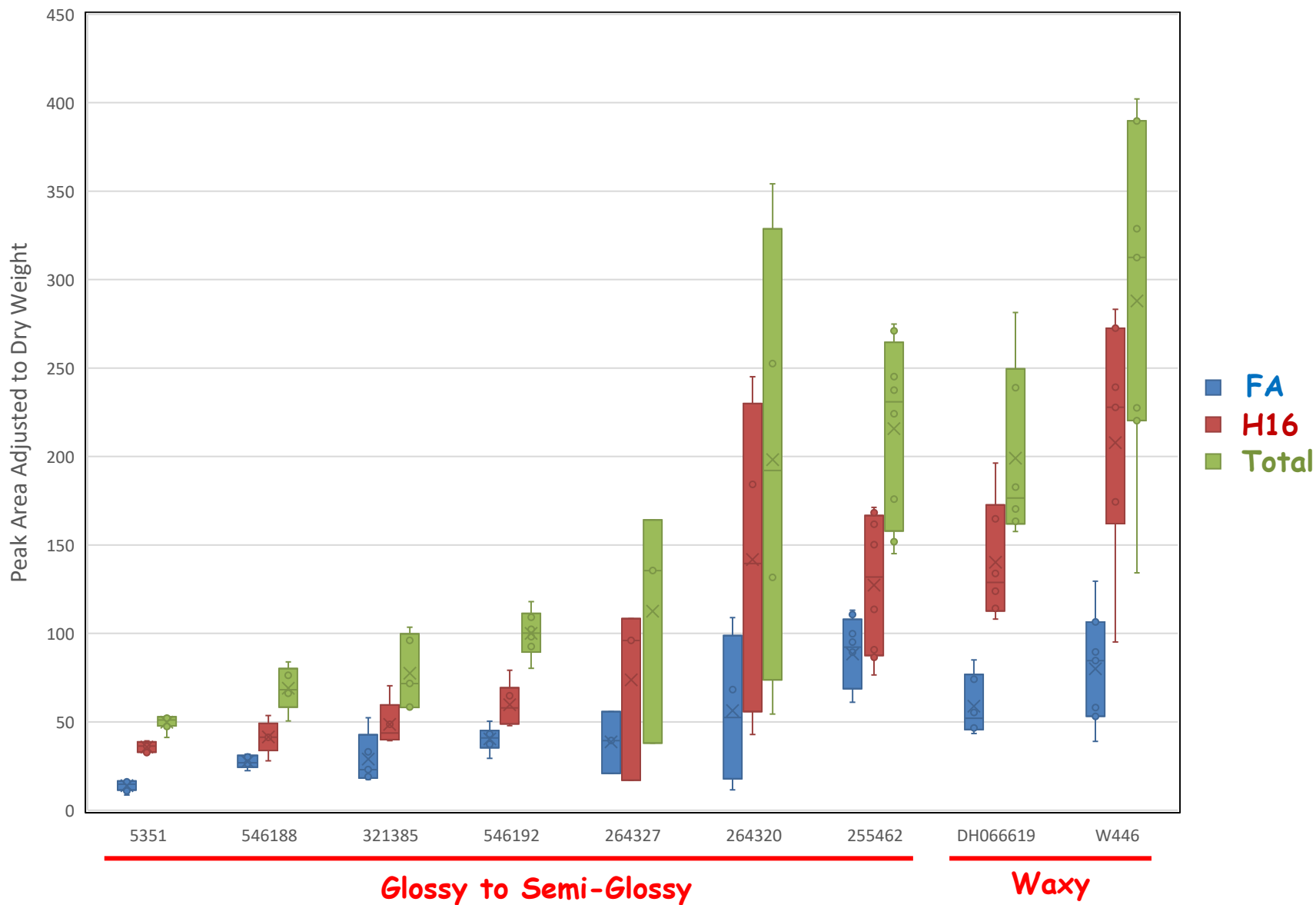
# Wax Biosynthetic Pathways in Arabidopsis



Modified from Millar et al. 1999



# Amounts of Fatty Alcohols, H16 and Total Wax



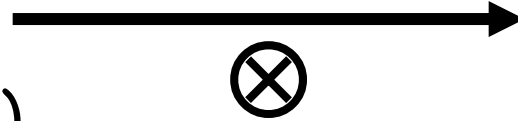
# "Low Bloom" Onion PIs



# Development of 'SG-Synthetic'

PI 255462 (Russia)  
PI 264320 (Spain)  
PI 264327 (Spain)  
PI 321385 (Romania)  
PI 546188 (YSS-Winegar)  
PI 546192 (YSS)  
B5351 (Colorado #6)

Pairwise Crosses



All F<sub>2</sub> progenies  
were semi-glossy



10 F<sub>2</sub> progenies from  
each of 8 families  
randomly intermated  
for 2 generations



'SG-Syn'

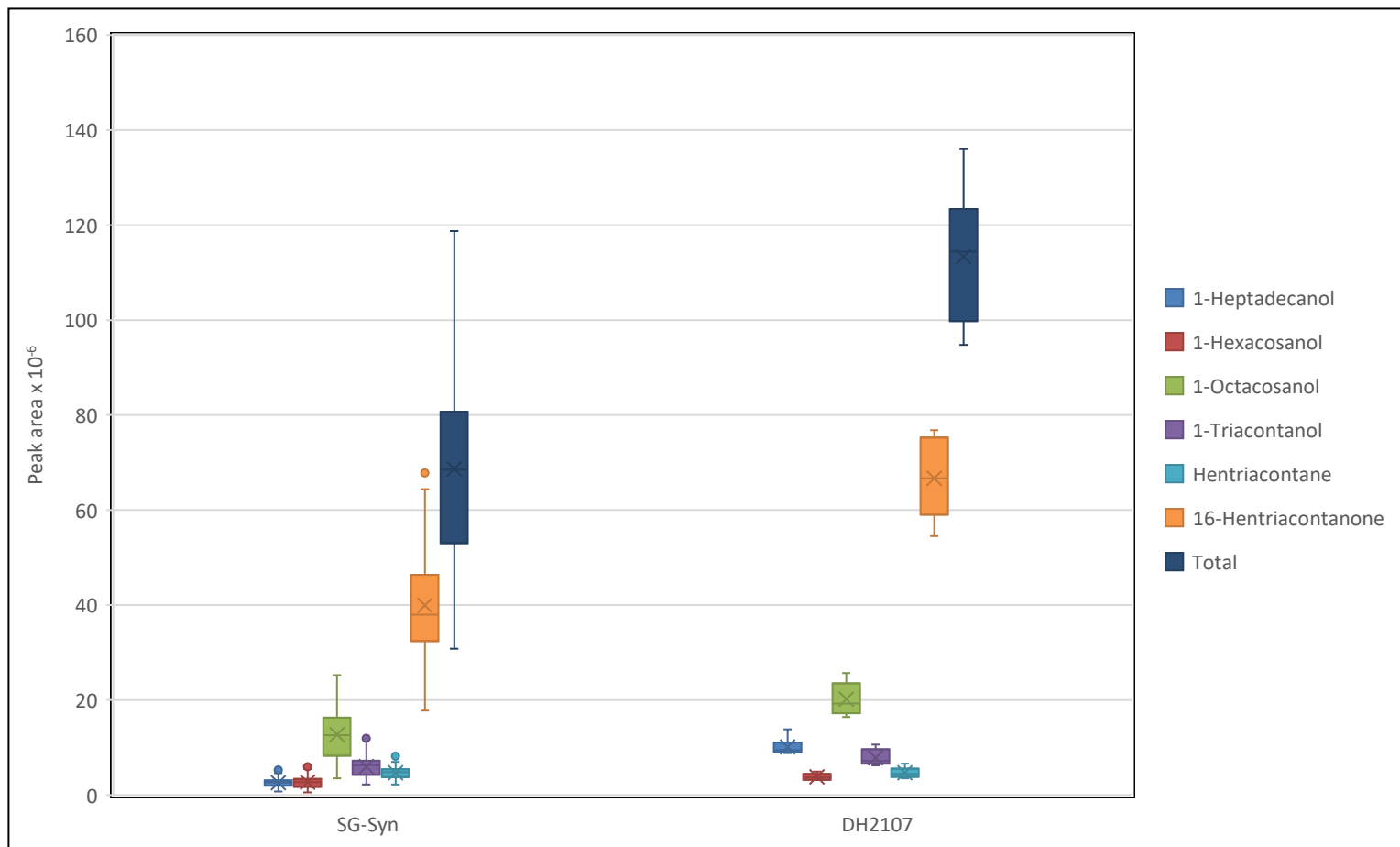
# Development of 'SG-Synthetic'



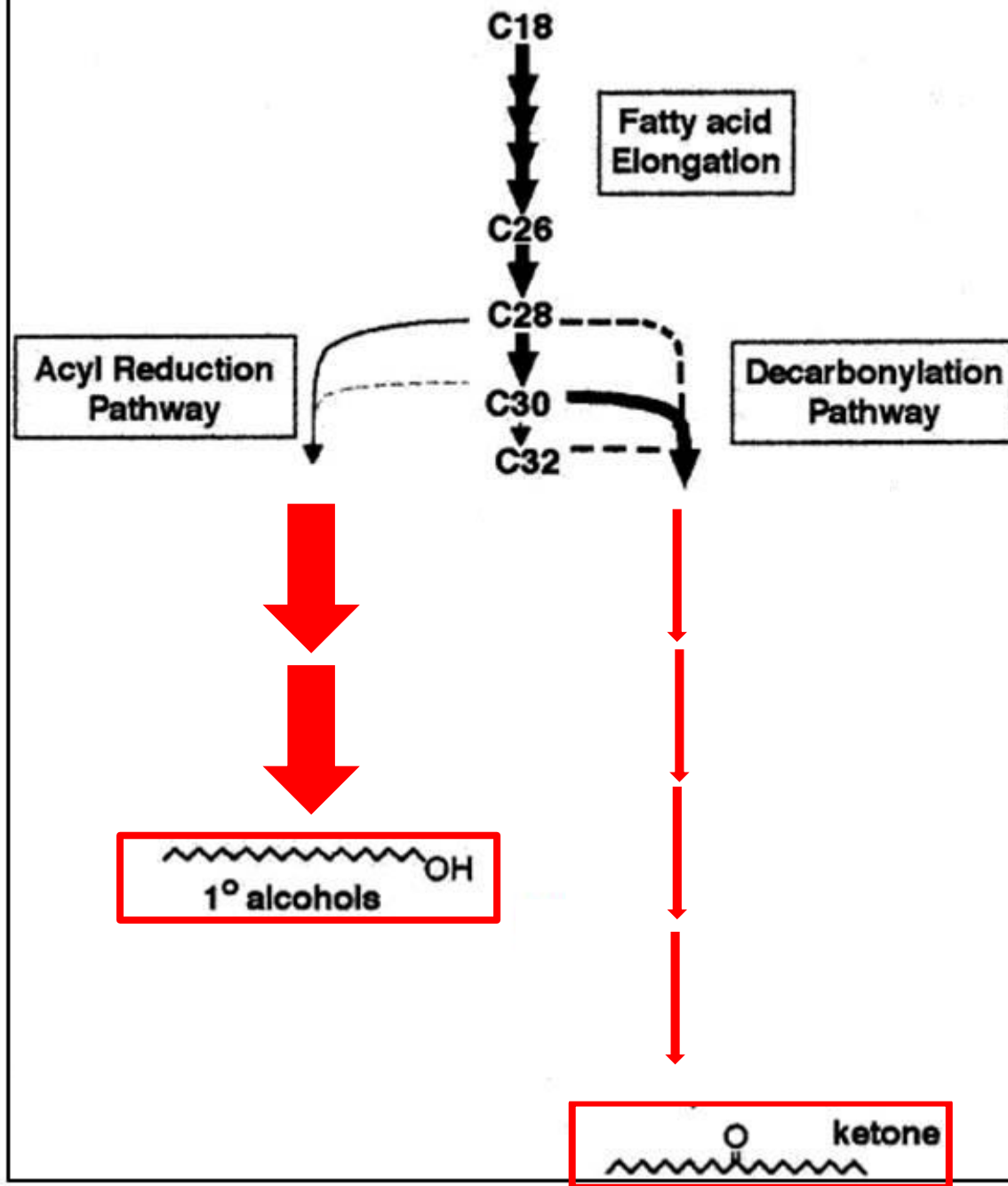
# Herbicide Damage



# Peak areas of individual waxes and total wax on the foliage semi-glossy SG-Syn and waxy doubled haploid (DH) 2107



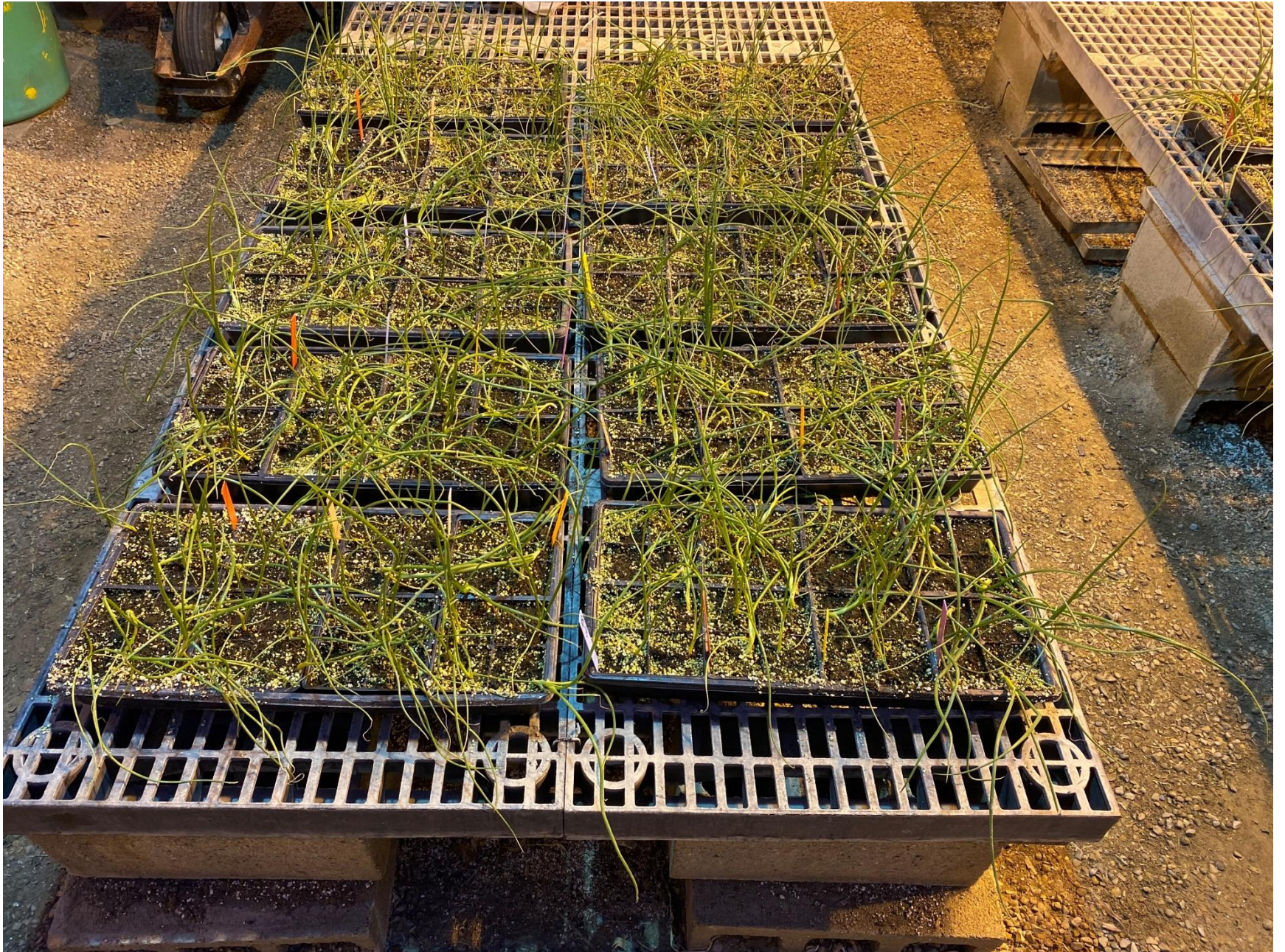
# Wax Biosynthetic Pathways in Arabidopsis



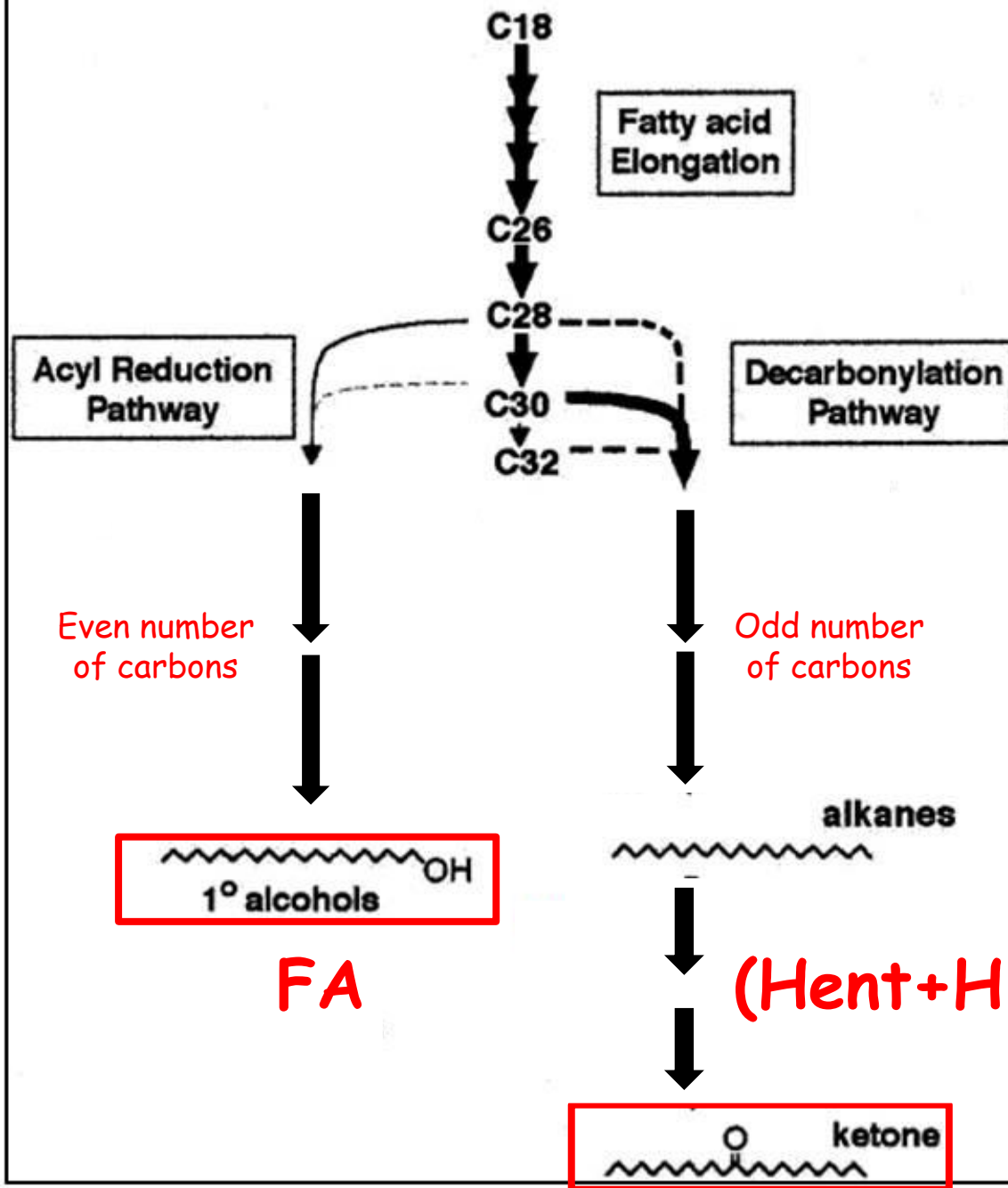
Modified from Millar et al. 1999

# Half-Sib and $S_1$ Families from SG-Syn





# Wax Biosynthetic Pathways in Arabidopsis

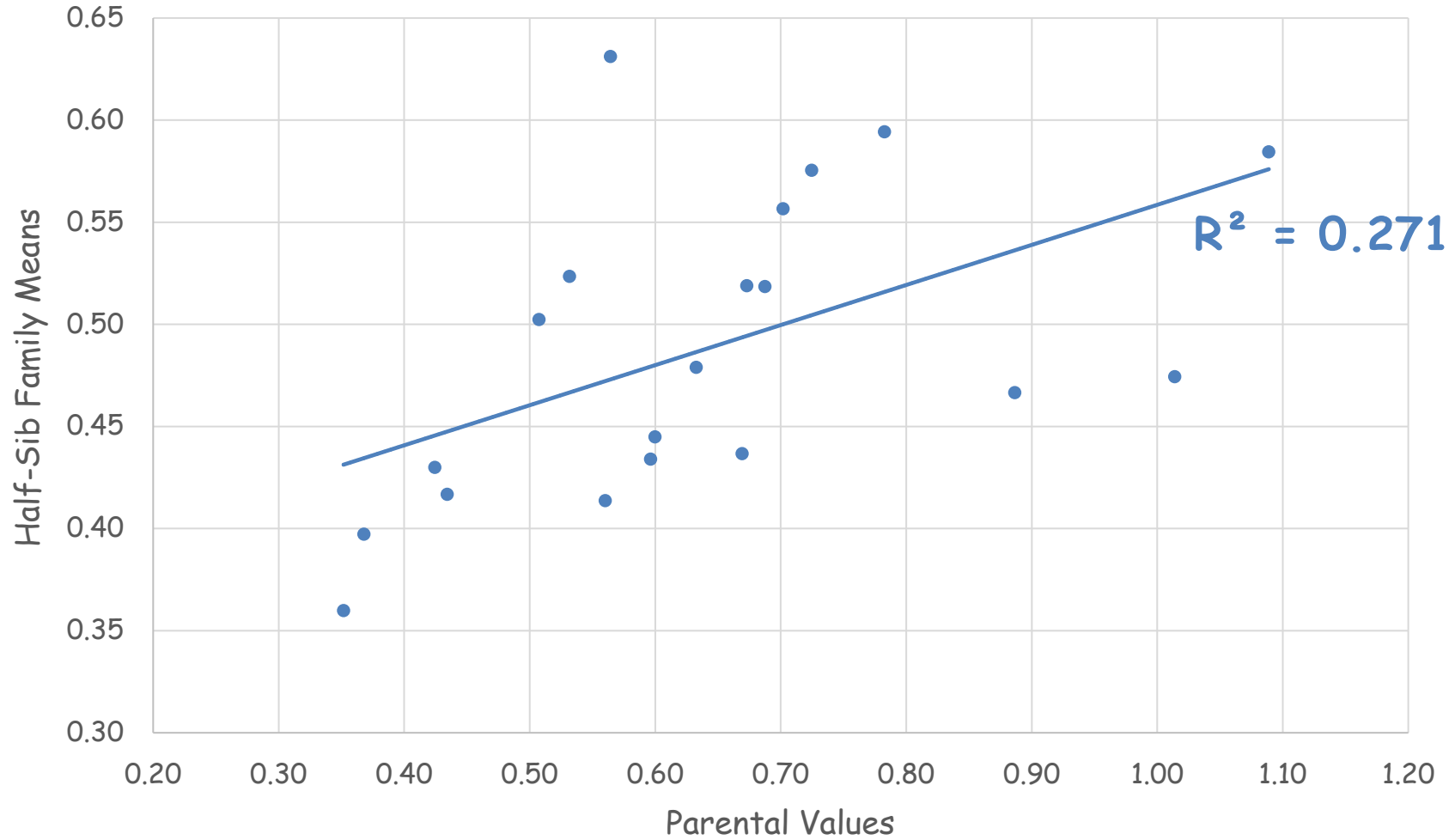


FA  
(Hent+H16)

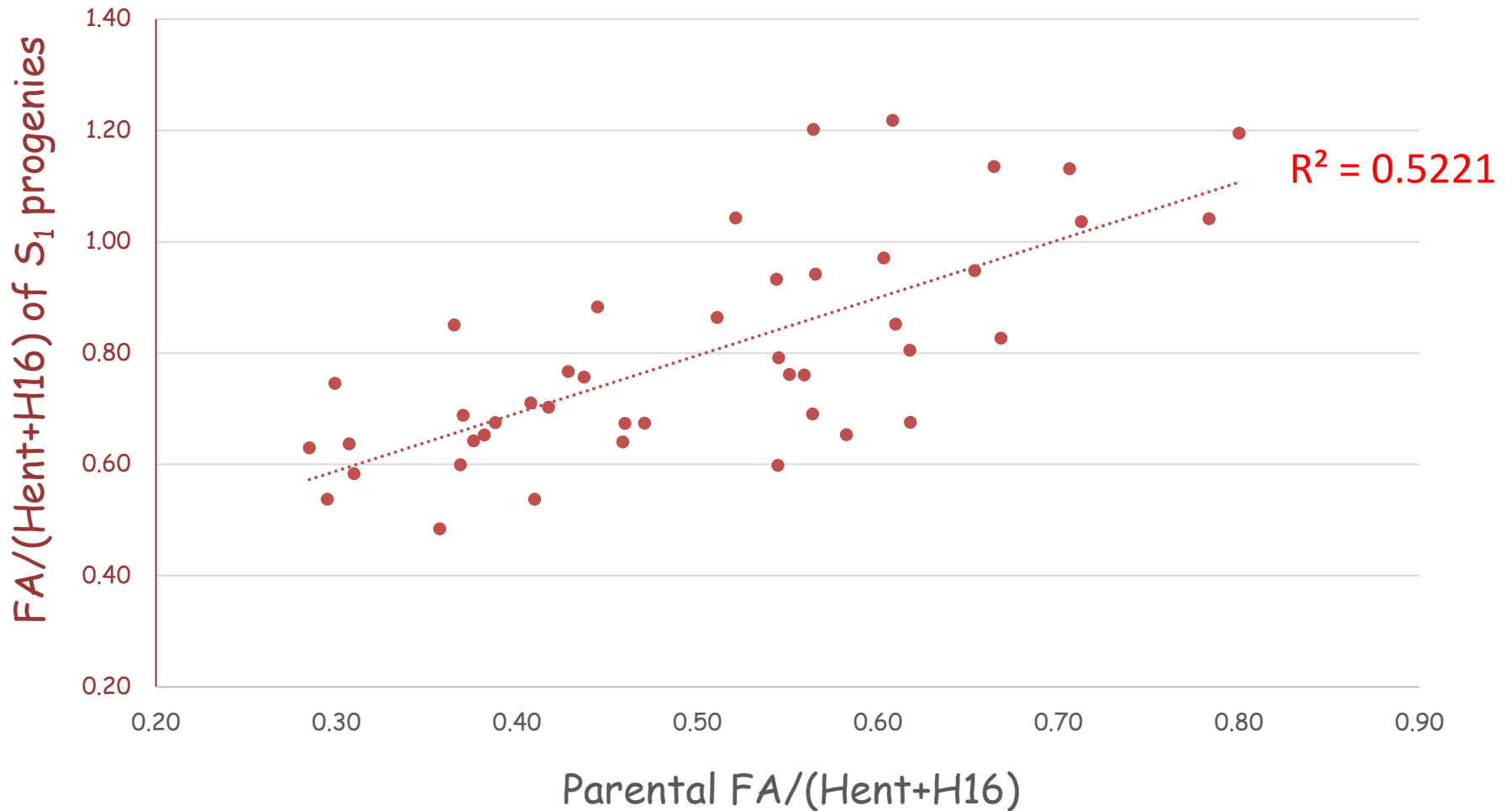
(Hent+H16)

Modified from  
Millar et al. 1999

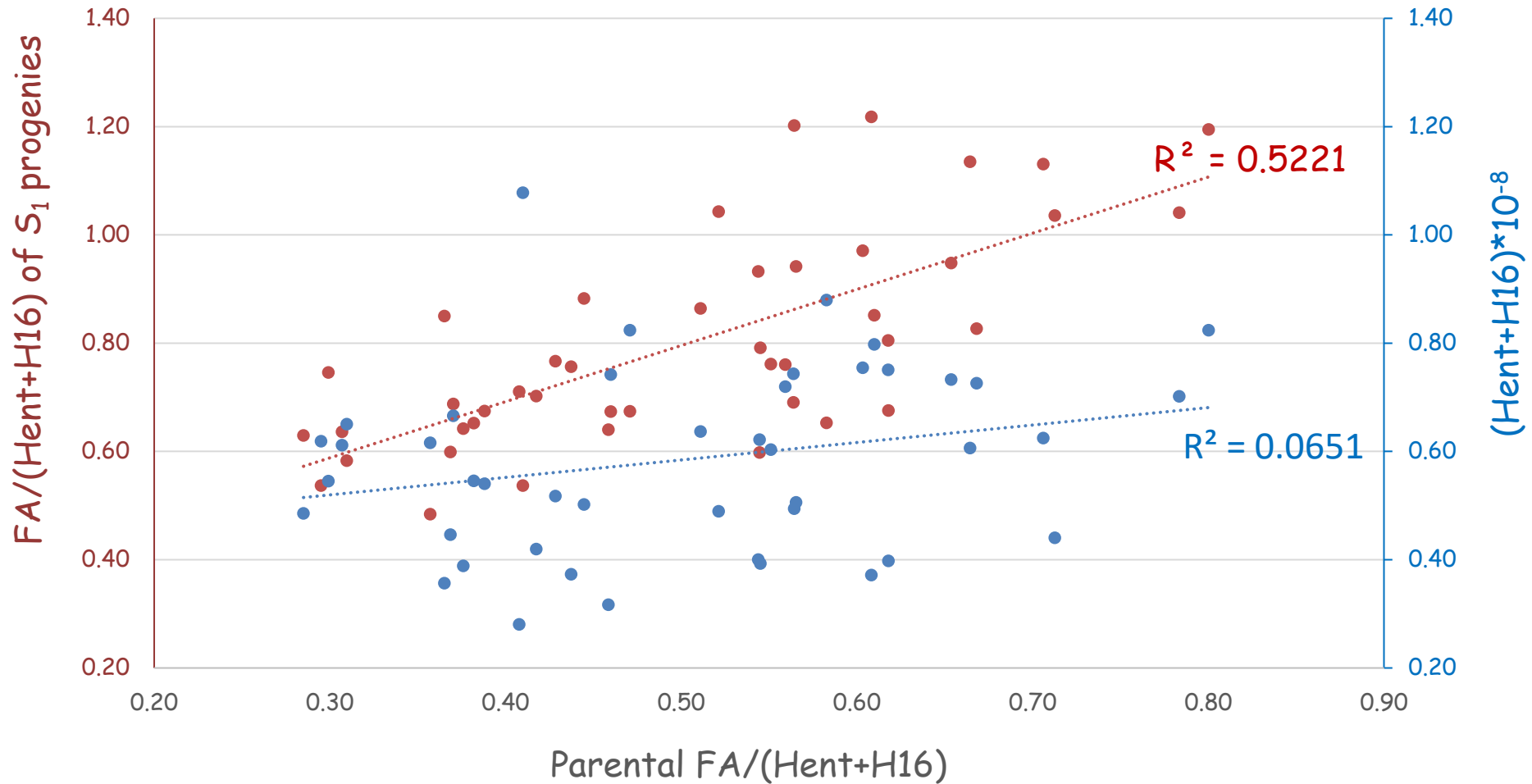
# Parent-Offspring Regression for FA/(Hent+H16)



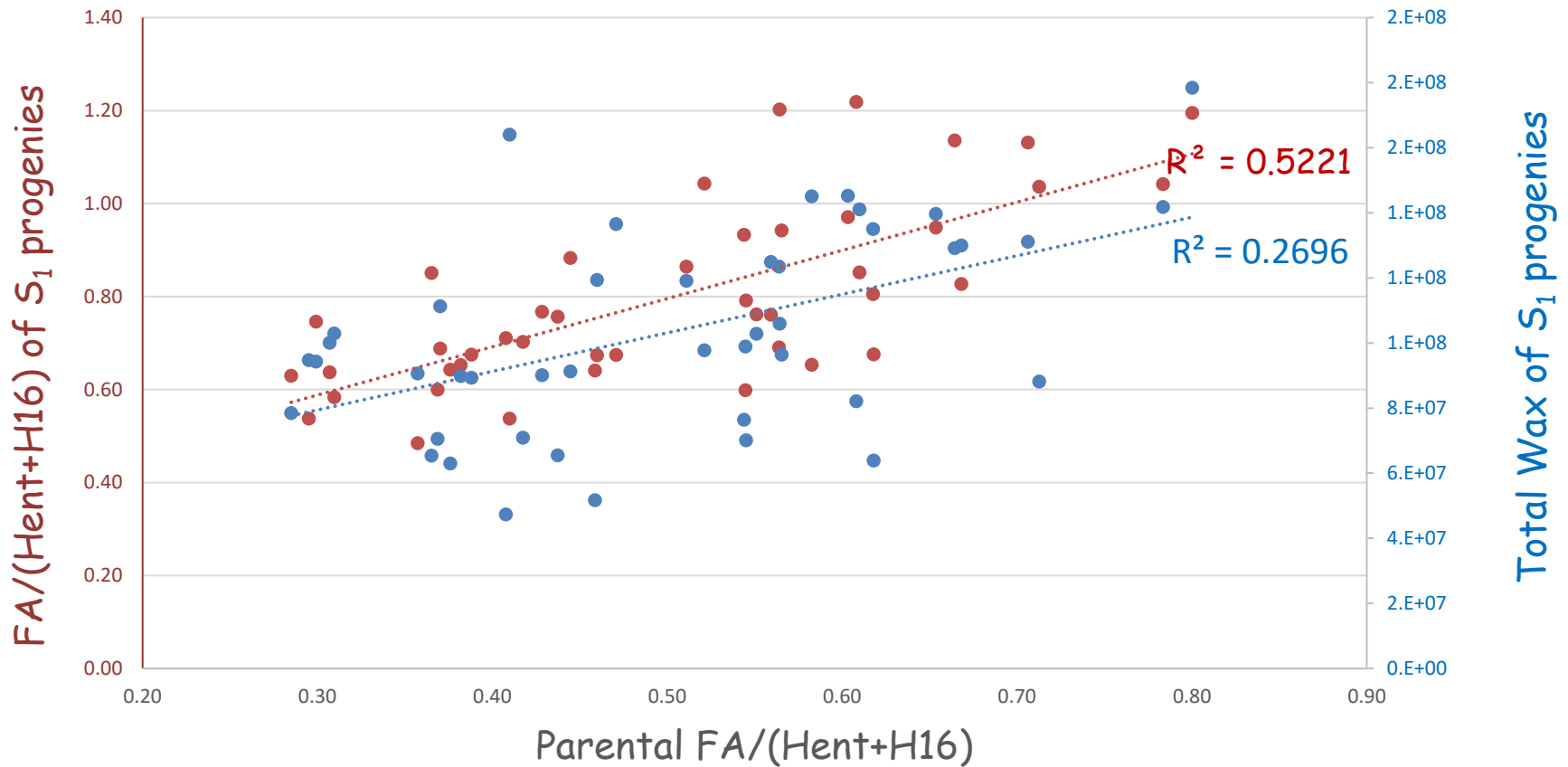
# Parent-S<sub>1</sub>-Offspring Regression for FA/(Hent+H16)



# Parent- $S_1$ -Offspring Regressions of $FA/(Hent+H16)$ and $[Hent+H16]$



# Parent- $S_1$ -Offspring Regressions of FA/(Hent+H16) and Total Wax



# Parent-Offspring Regressions for FA/(Hent+H16)

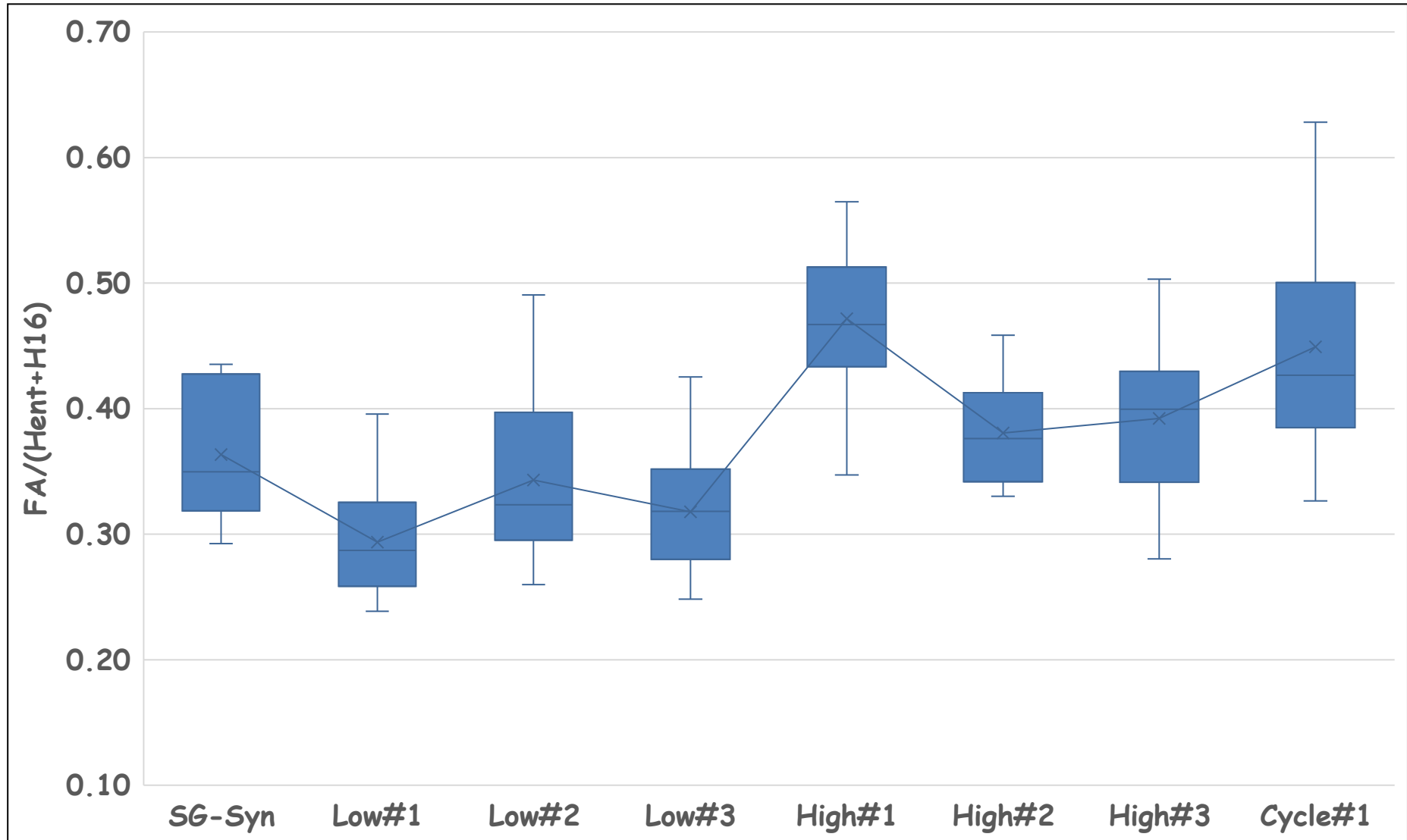
$$\frac{FA}{(Hent+H16)} \quad \frac{\uparrow}{=}$$

Total Wax      

## Response to Selection??

- Intermated HS progenies from low and high families
- Intermated  $S_1$  progenies from families with high ratios

FA/(Hent+H16) for parental SG-Syn, low and high HS selections, and highest S<sub>1</sub> families



# Mean peak areas from divergent HS selection for FA/(Hent+H16) ratio

<u>Selection</u>	<u>Mean FA/(Hent+H16)</u>
Low#1	0.34 ± 0.01 a
Low#2	0.32 ± 0.02 a
Low#3	0.38 ± 0.01 a
High#1	0.78 ± 0.02 b
High#3	0.88 ± 0.01 b
High#2	1.19 ± 0.19 c

# Special Thanks To

- USDA ARS, SCRI, and OREI
  - Funding
- Grad students
  - Steve Damon
  - Eduardo Muniaz
- Kincaid family, Palmyra WI
  - Field space
- Scott Hendricks, Seminis
  - Cages