Research on *Dectes texanus* in Kansas: An Update

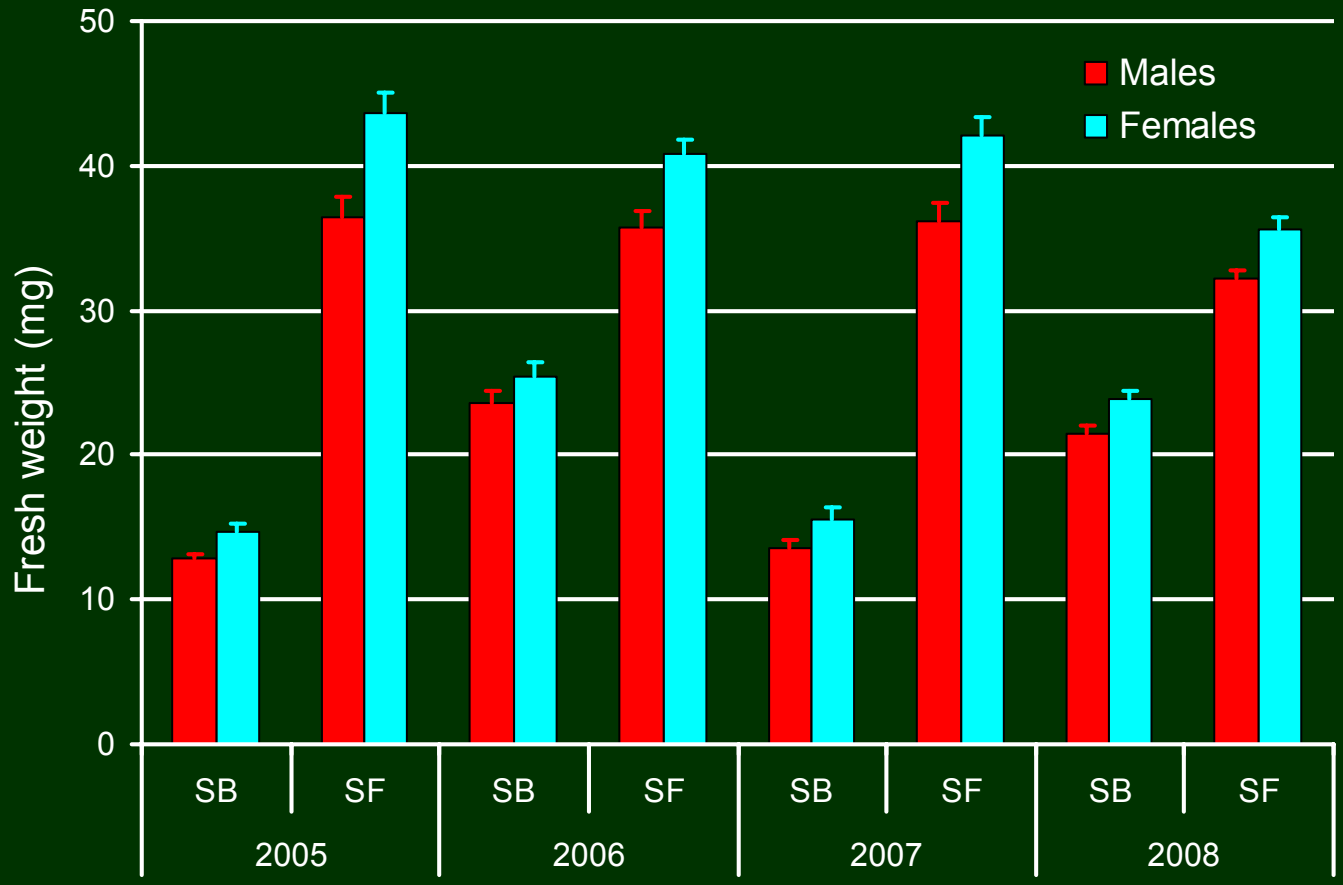
J.P. Michaud
Department of Entomology
Kansas State University

Biology of *Dectes texanus*

- one generation per year, but emergence protracted and adults long-lived
- pest populations are associated with soybean and sunflower cultivation
- cultivated sunflower is THE preferred host (best food for larvae AND adults)
- stalk boring does not impact yield, but end-of-season girdling induces lodging

Thus, our research has focused on factors affecting the onset of larval girdling behavior within stalks

Mean (+ SEM) fresh weight of emergent *D. texanus* adults in four cohorts obtained from each of two host plants (SB = soybean, SF = sunflower)

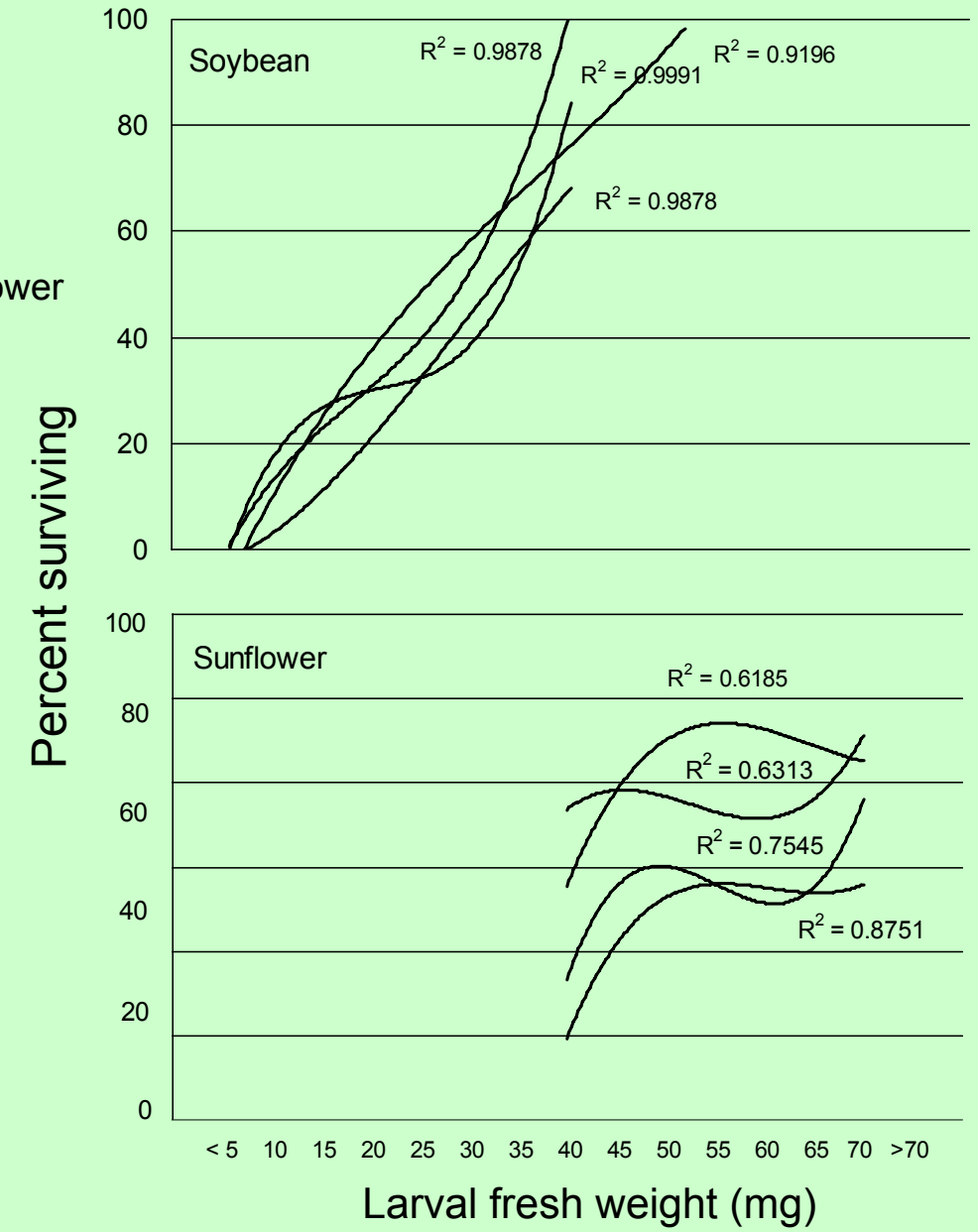


Survival as a function of larval fresh weight

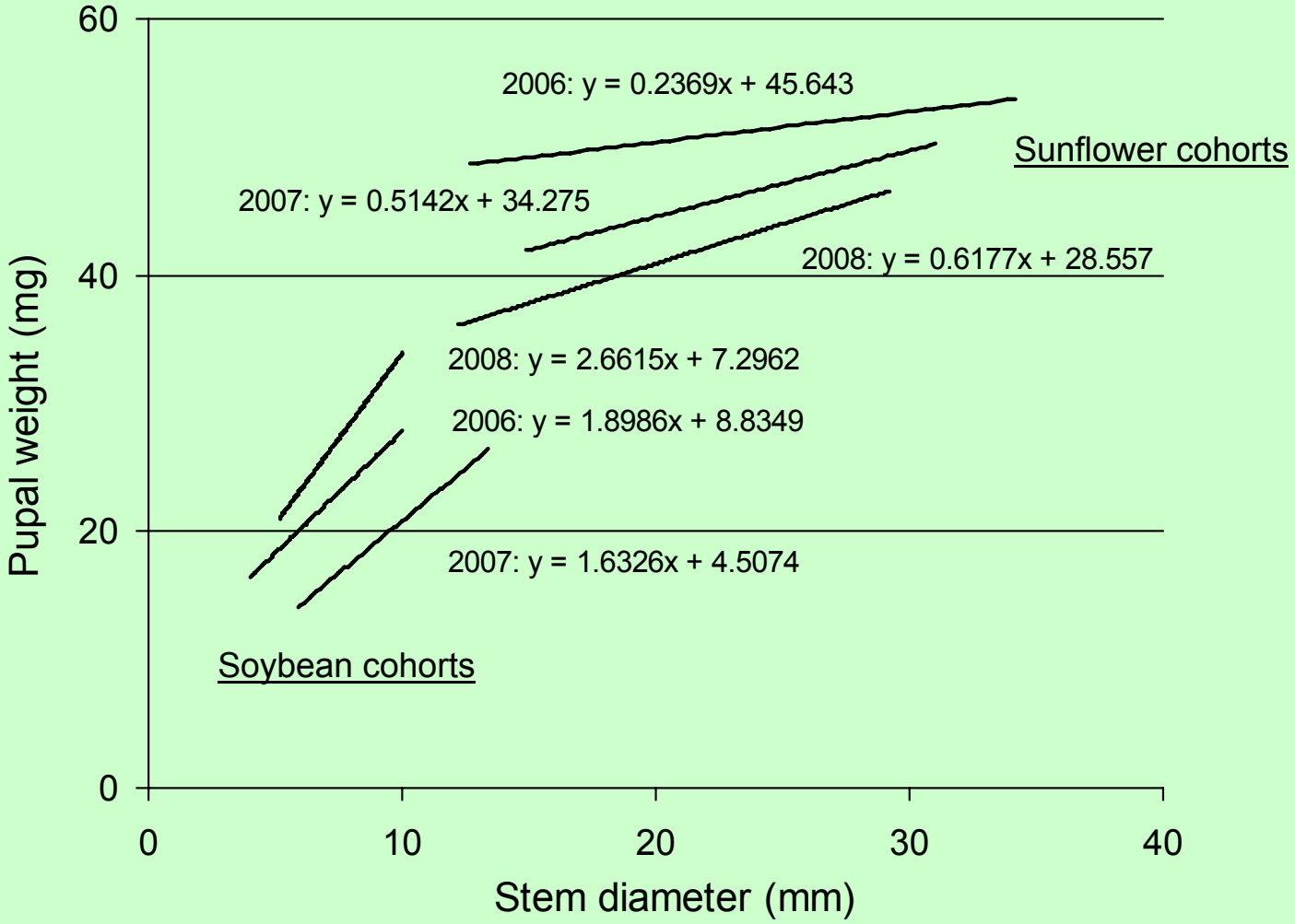
- Survival increases more rapidly with body size in soybean than in sunflower

- Cubic regressions gave the best fit to the data overall

<u>Conclusion:</u> body size is more limiting to larval survival in soybean than in sunflower



Relationship between pupal weight and stem diameter

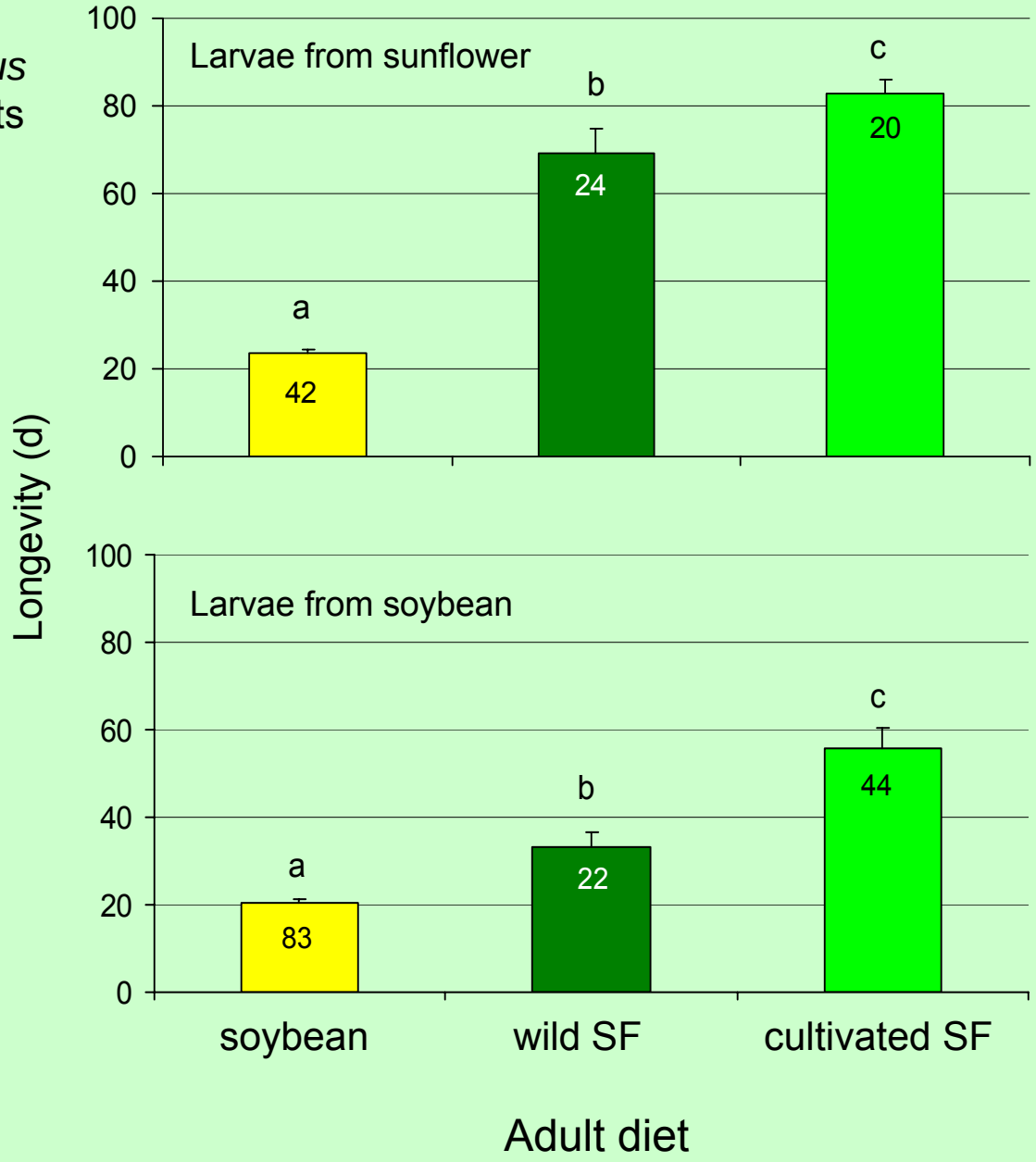


Conclusion: body size is more limited by plant size in soybean than in sunflower

Longevity (in lab) of *D. texanus* adults fed on one of three diets in 2005

Larval host interacted with adult diet

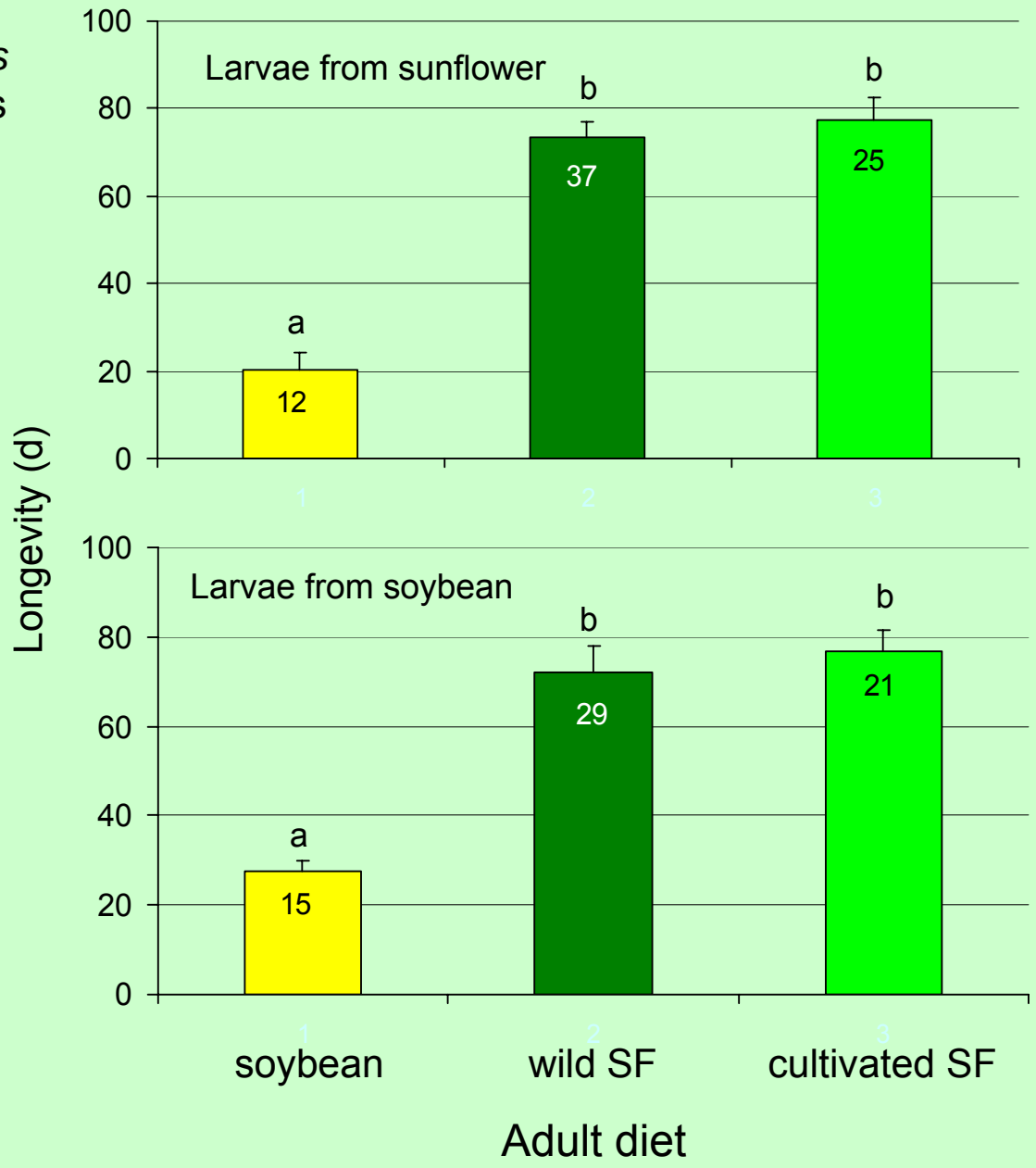
Diet quality :
SB < WSF < CSF



Longevity (in lab) of *D. texanus* adults fed on one of three diets in 2008

Larval host did not interact with adult diet

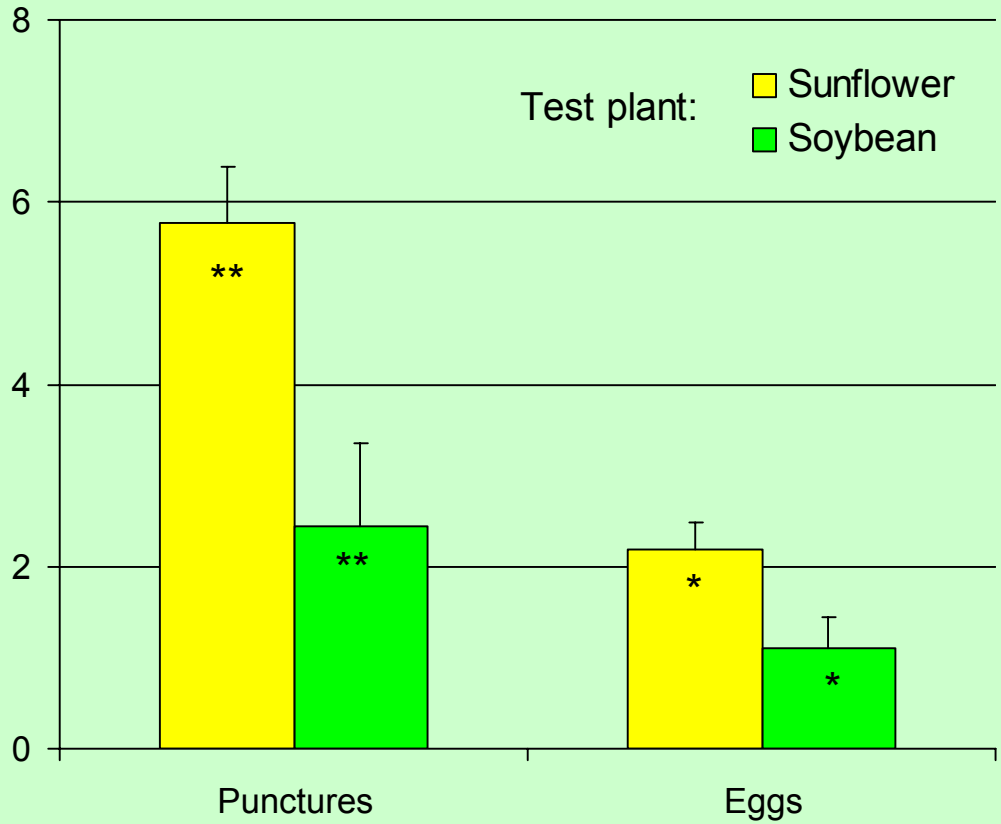
Diet quality :
SB < WSF = CSF



Mean no. ovipunctures and eggs laid by female *D. texanus* when fed an adult diet of SUNFLOWER and then caged for 48 h on either soybean or sunflower in the field

There was no effect of larval host plant -> data pooled

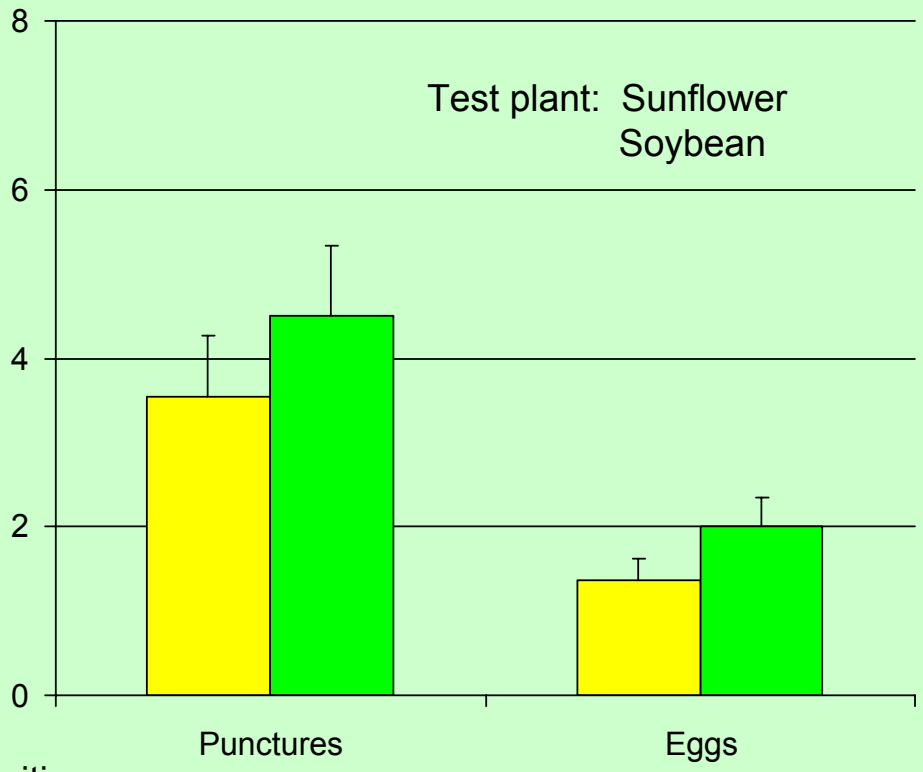
An adult diet of sunflower caused more activity on sunflower



Mean no. ovipunctures and eggs laid by female *D. texanus* when fed an adult diet of SOYBEAN and then caged for 48 h on either soybean or sunflower in the field

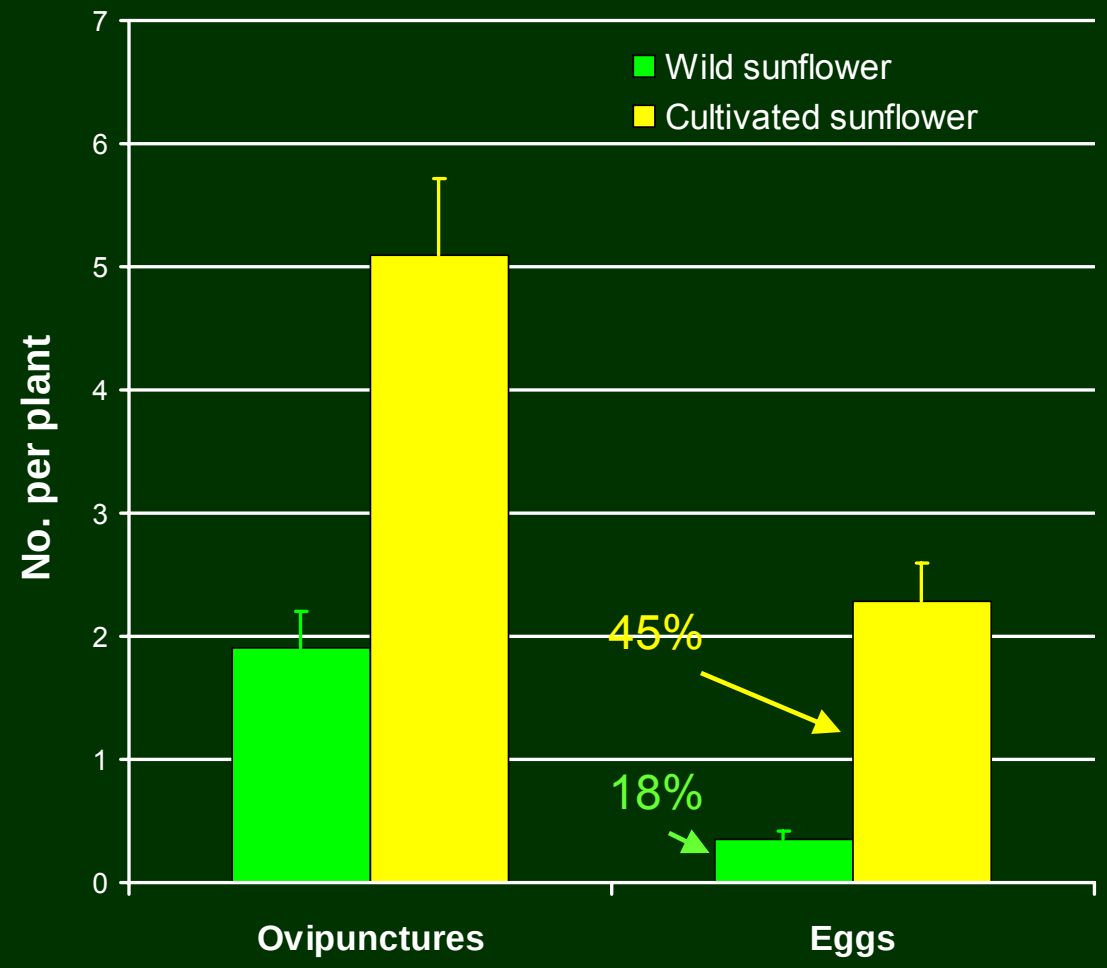
There was no effect of larval host plant -> data pooled

An adult diet of soybean resulted in similar activity on soybean and sunflower



<u>Conclusion:</u> Larval host plant does not affect plant acceptability for oviposition - adult food plant does

Activity of *D. texanus* ♀♀ caged for 48 hours on wild *H. annuus*
-> 48 h on cultivated *H. annuus*



Conclusion: Wild *H. annuus* are resistant to *D. texanus* oviposition

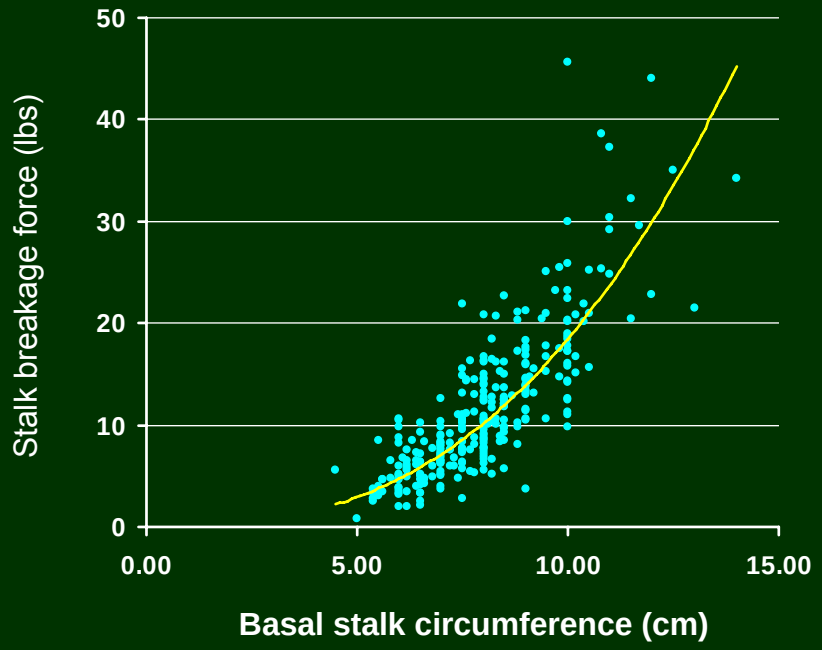
Resistance to *D. texanus* in wild *H. annuus*

	Wild	**Cultivated**	
Force required to puncture petiole with pointed probe (kg)	1.3 ± 0.05	0.8 ± 0.05	(60% more)
Percent water content	86.5 ± 0.7	92.6 ± 0.3	(6% less)
Weight of resin exuded from severed petiole after 10 min (gm / cm petiole diameter)	4.2 ± 0.17	1.0 ± 0.07	(400% more)

Conclusion: We have inadvertently bred for susceptibility to *D. texanus* in cultivated varieties

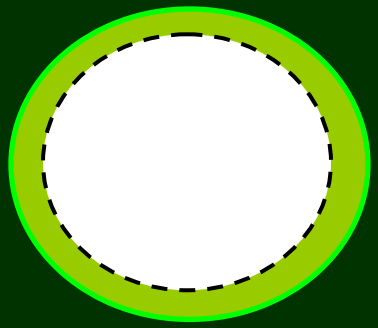
Cultural management of *D. texanus* through control of plant size

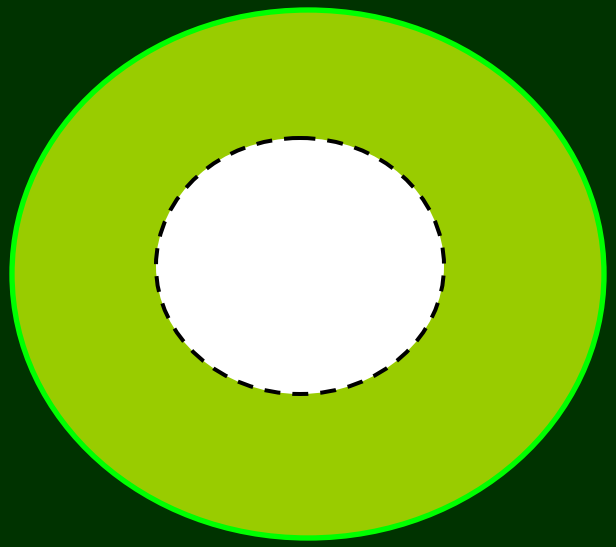
Stalk diameter affects losses to *D. texanus* in at least 3 ways…



1. **Larger stalks are stronger**
2. **Larvae limited to 1 inch diameter girdle**
3. **Larger stalks dry more slowly -> delays onset of girdling**

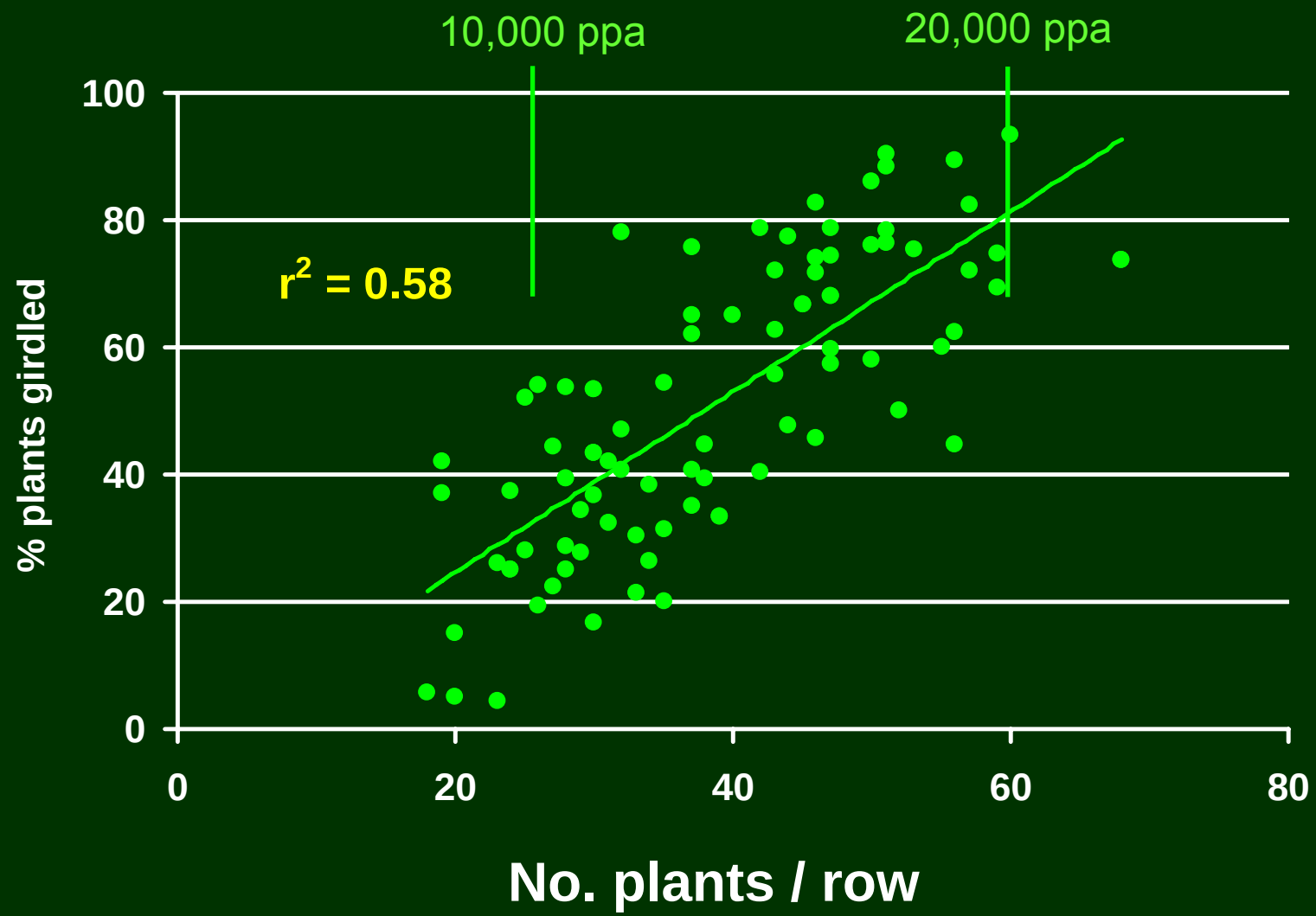
- Plant size can be manipulated by plant spacing
- Yield is relatively independent of plant population (10,000 – 20,000 ppa)
- Larger plants have larger diameter stalks

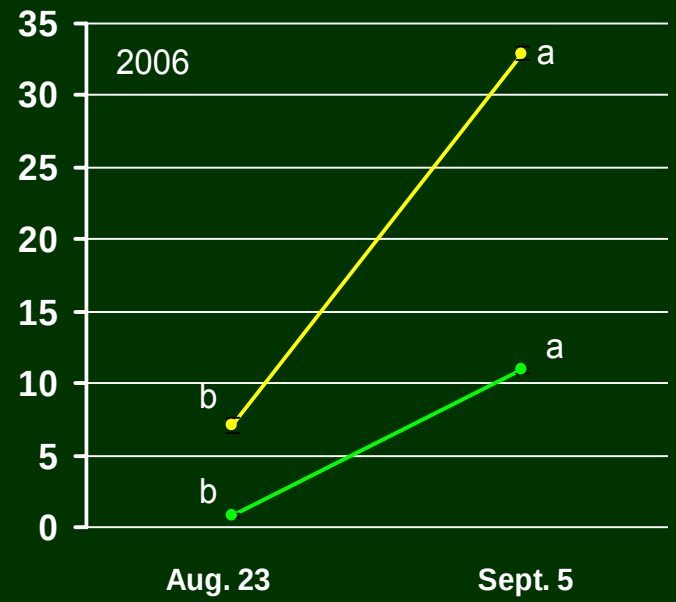




Maximum girdling radius of *Dectes* larvae is ~ 0.5 inches

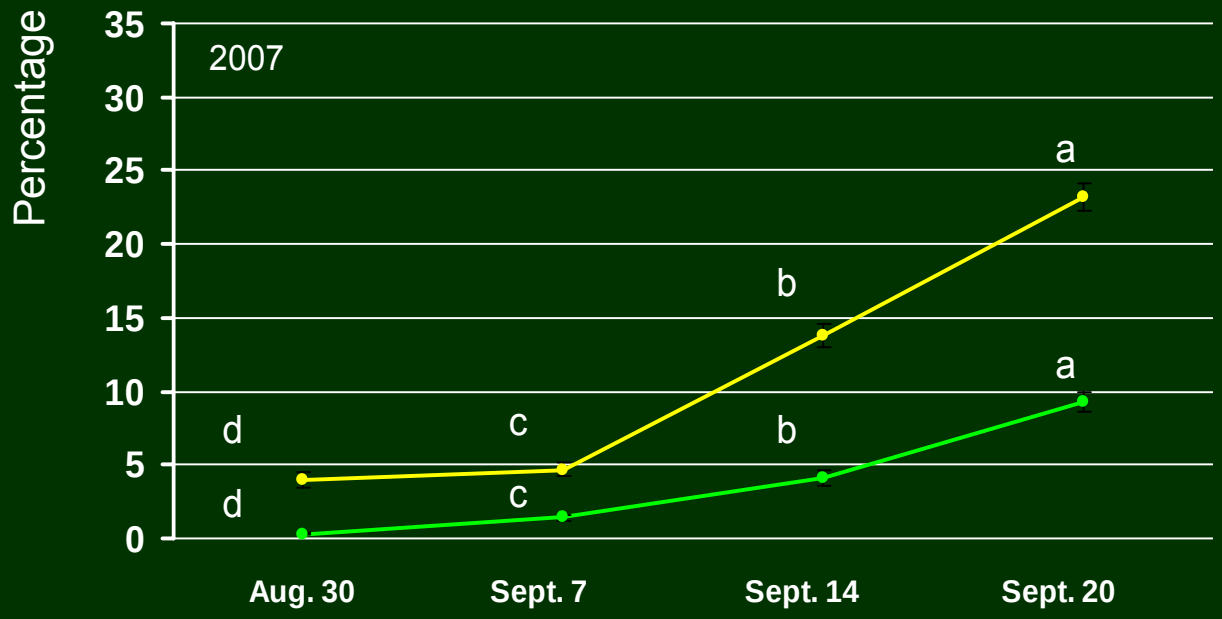
Dectes girdling as a function of no. plants / row, Sept. 5



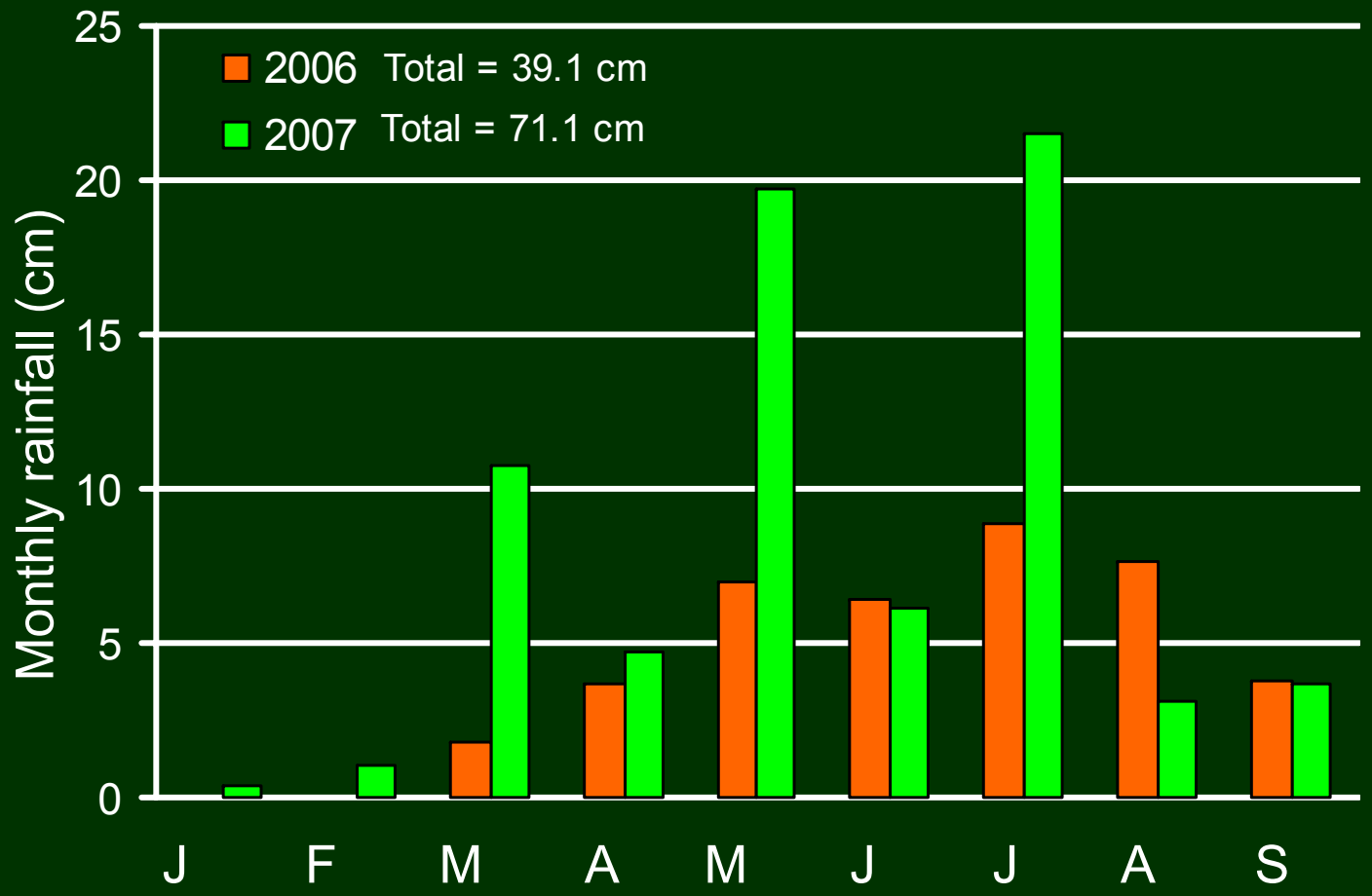


Progression of larval girdling in low density (10,000 ppa) and high density (15,000 ppa) plots in each of 2 years

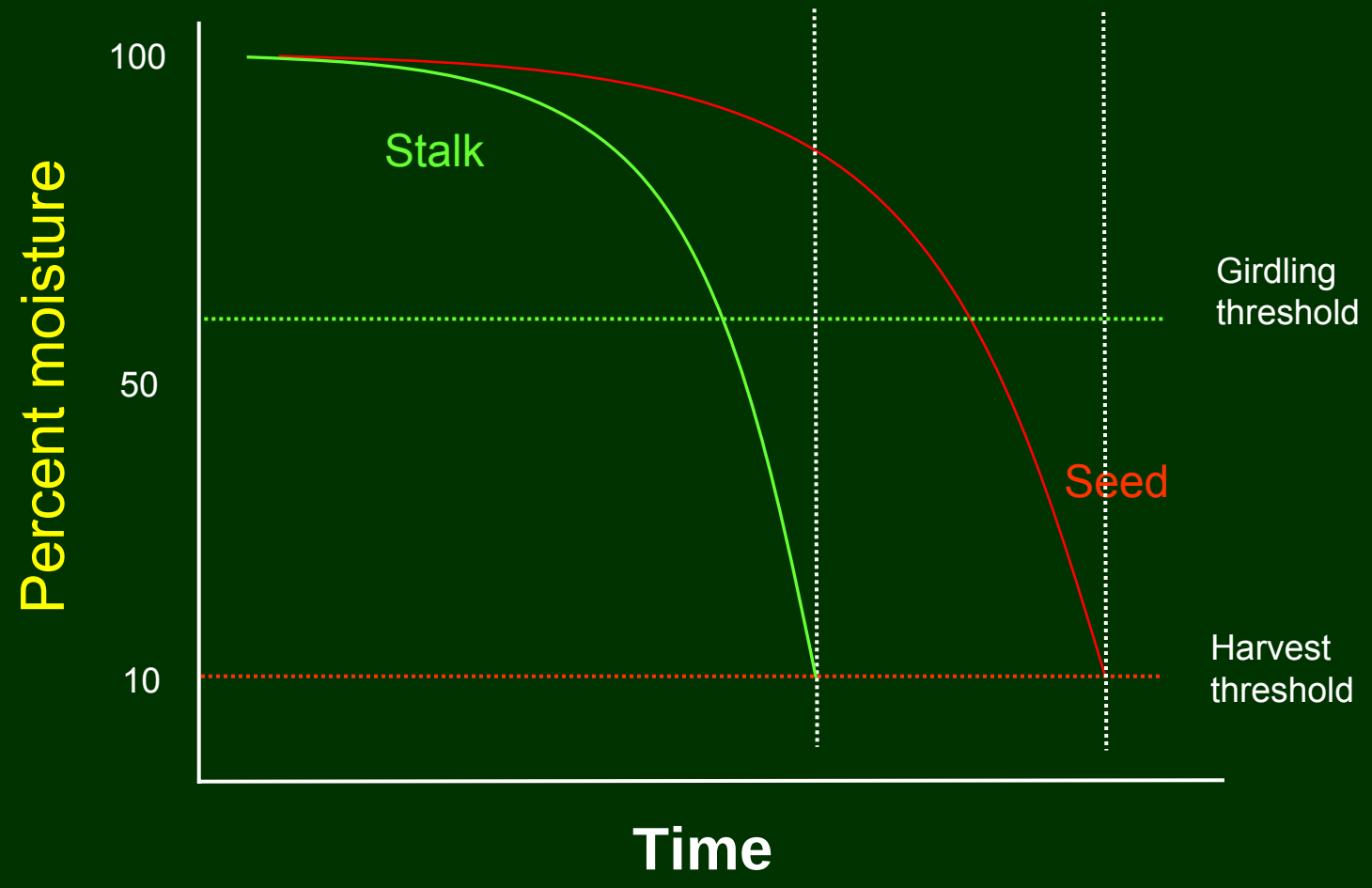
(Triumph 660CL)



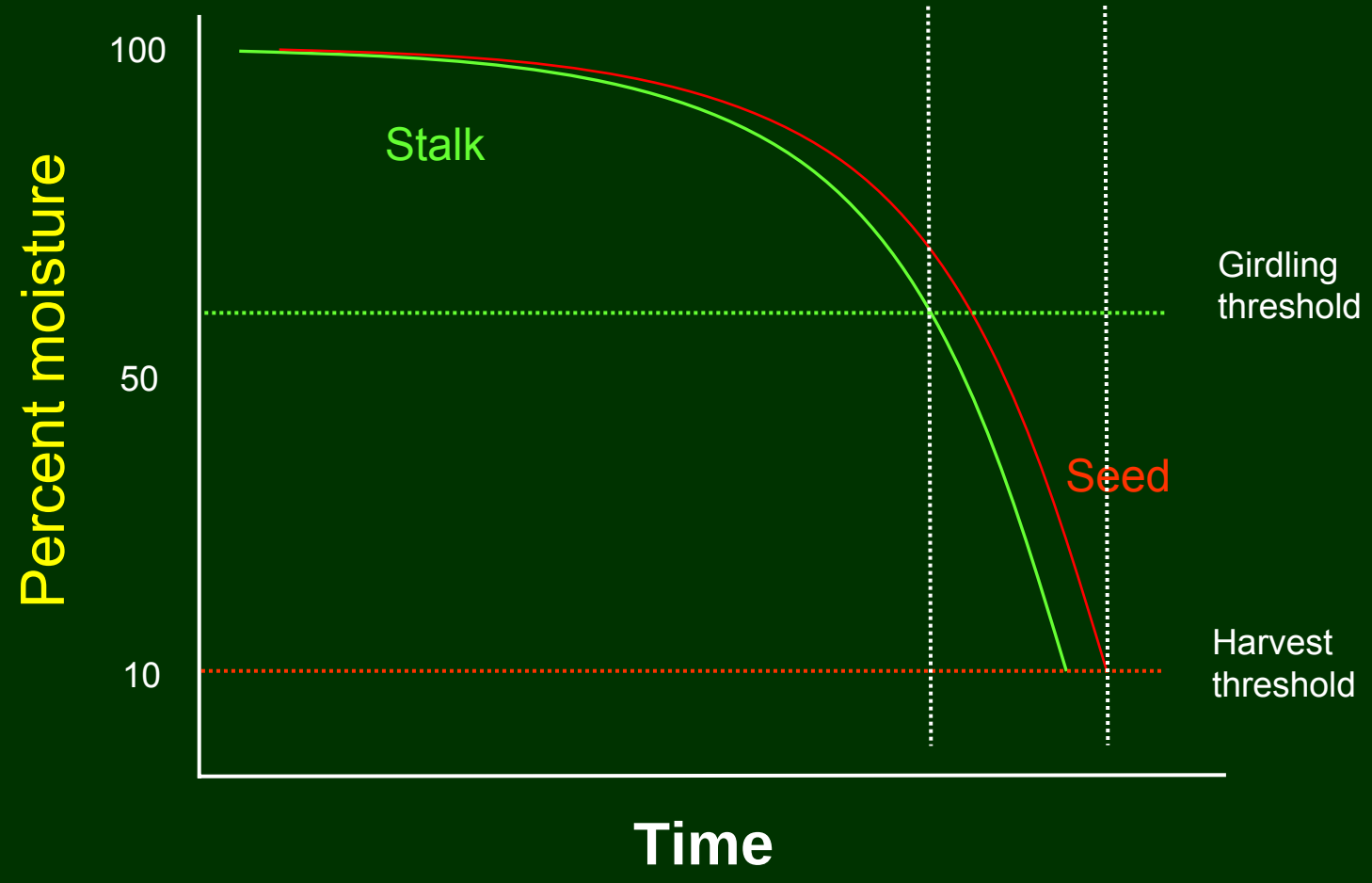
Rainfall at Hays, 2006 versus 2007



Worst Lodging Scenario:
Small plants + dry summer:

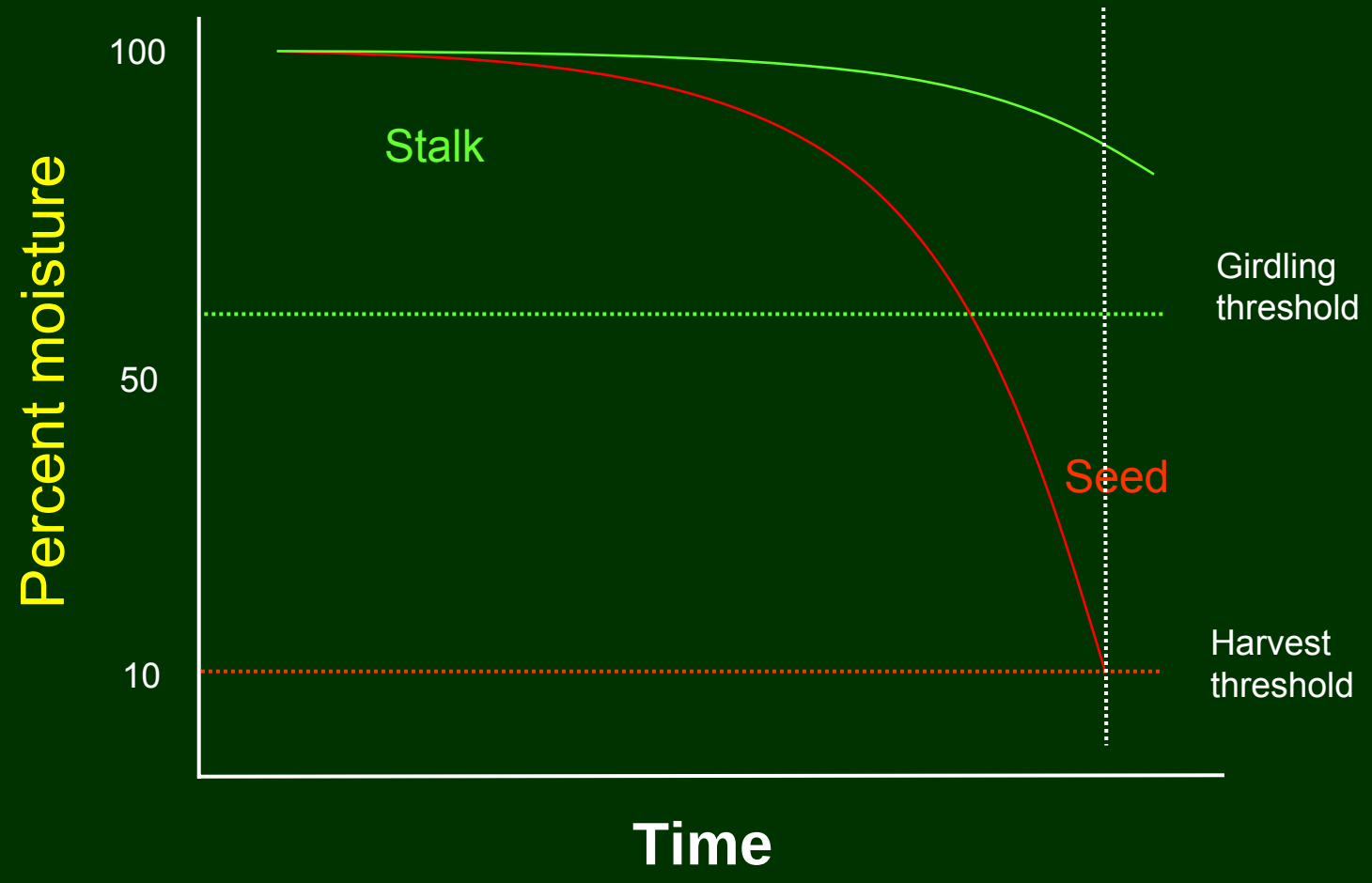


Not-so-bad scenario:
Large plants + dry summer:



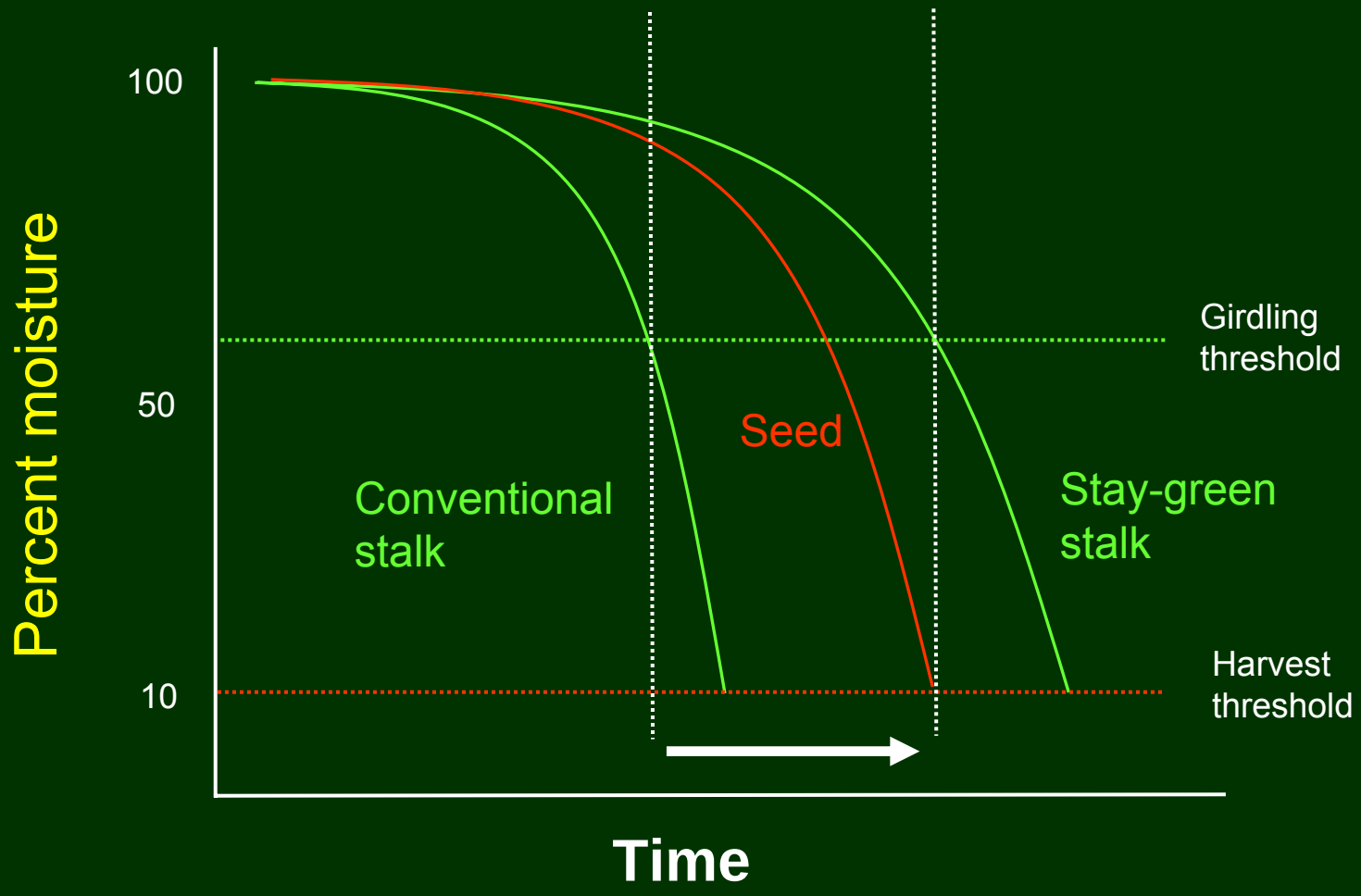
Wet Summer (2008, 2009):

Stalk desiccation is decoupled from seed desiccation post-maturity



What we are still trying to quantify:

1) How stalks desiccate as a function of their diameter
2) How much the stay-green trait delays stalk desiccation



Questions ?

K-STATE Research and Extension
Kansas State University