Stalk and Seed Desiccation as Independent Processes and their Significance to Mitigation of Yield Losses Caused by *Dectes texanus*

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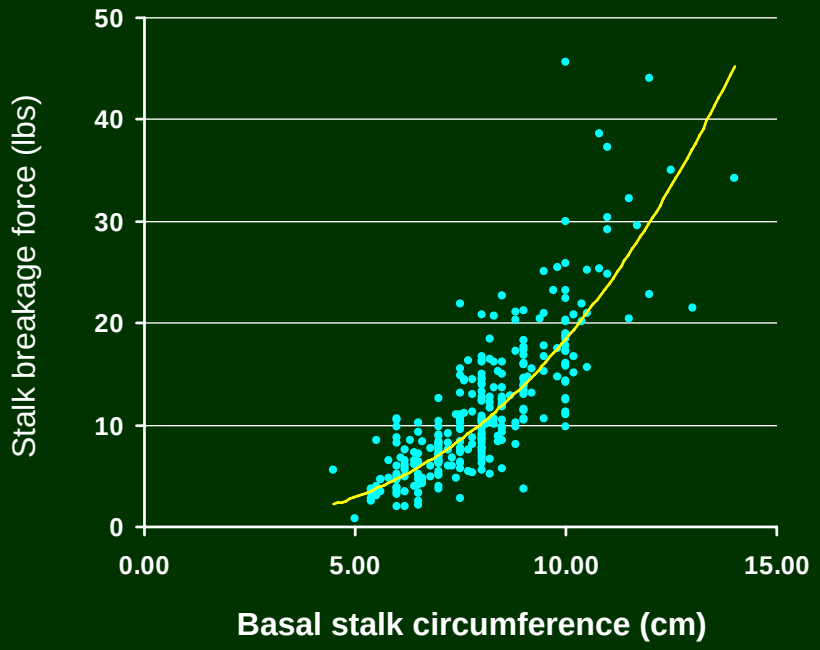
Biology of *Dectes texanus*

- one generation per year, but emergence protracted and adults long-lived
- both soybean and sunflower are infested
- 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

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

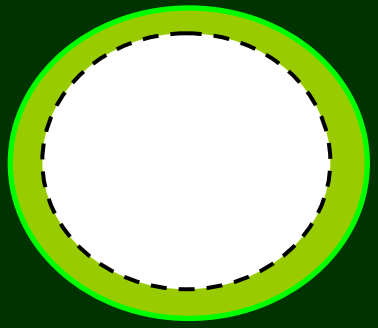
Stalk diameter affects losses to *D. texanus* in at least 3 ways…

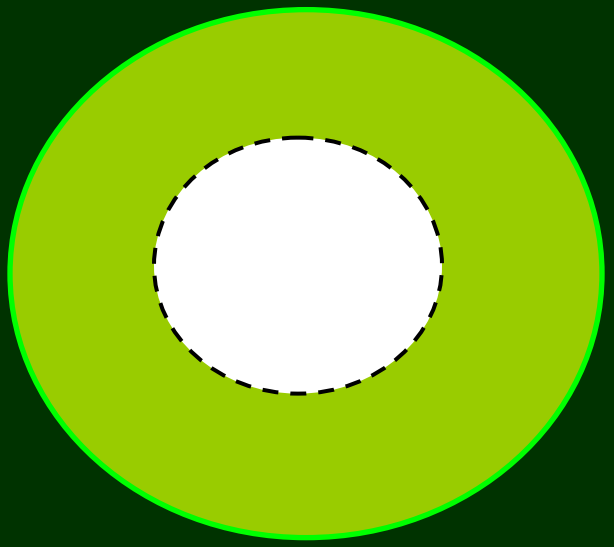


1. Larger stalks are stronger

2. Larvae are limited to 1 inch diameter girdle

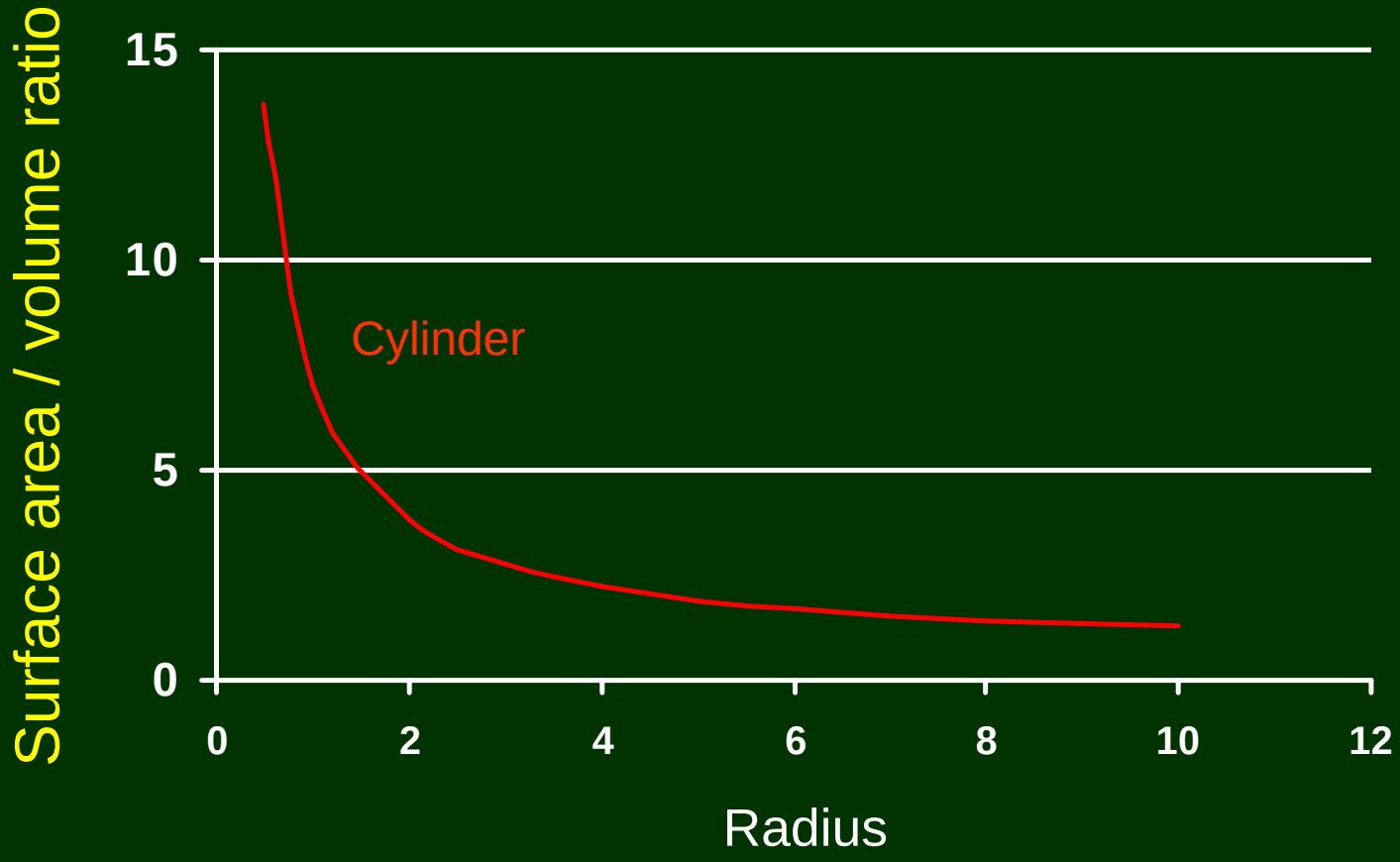
- Plant size can be manipulated by plant spacing
- Yield is relatively independent of plant population (10,000 – 20,000 ppa)

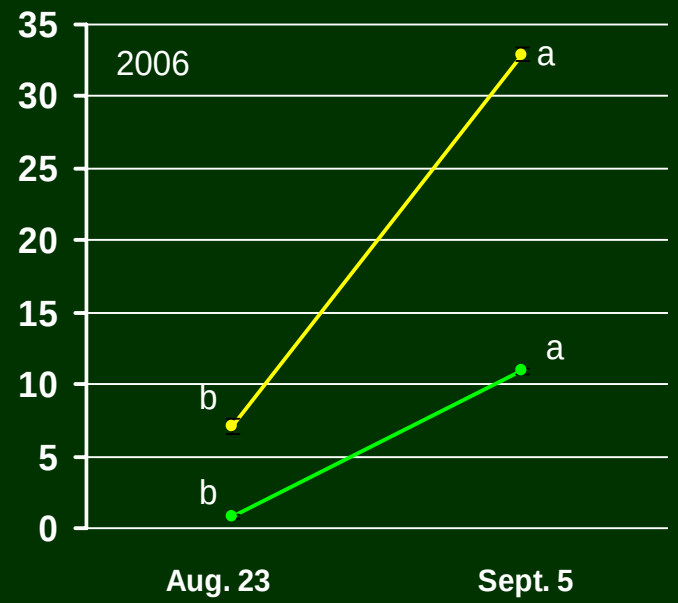




3. Slender stalks desiccate faster than stout ones

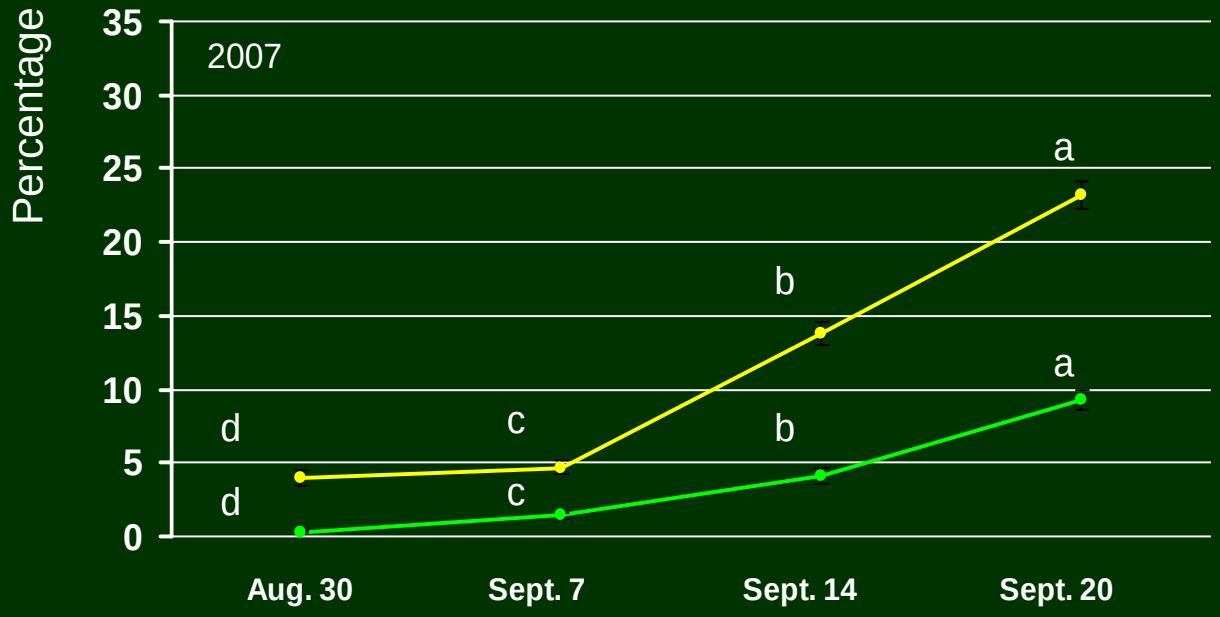
Because the surface area : volume ratio of a cylinder increases rapidly with decreasing radius





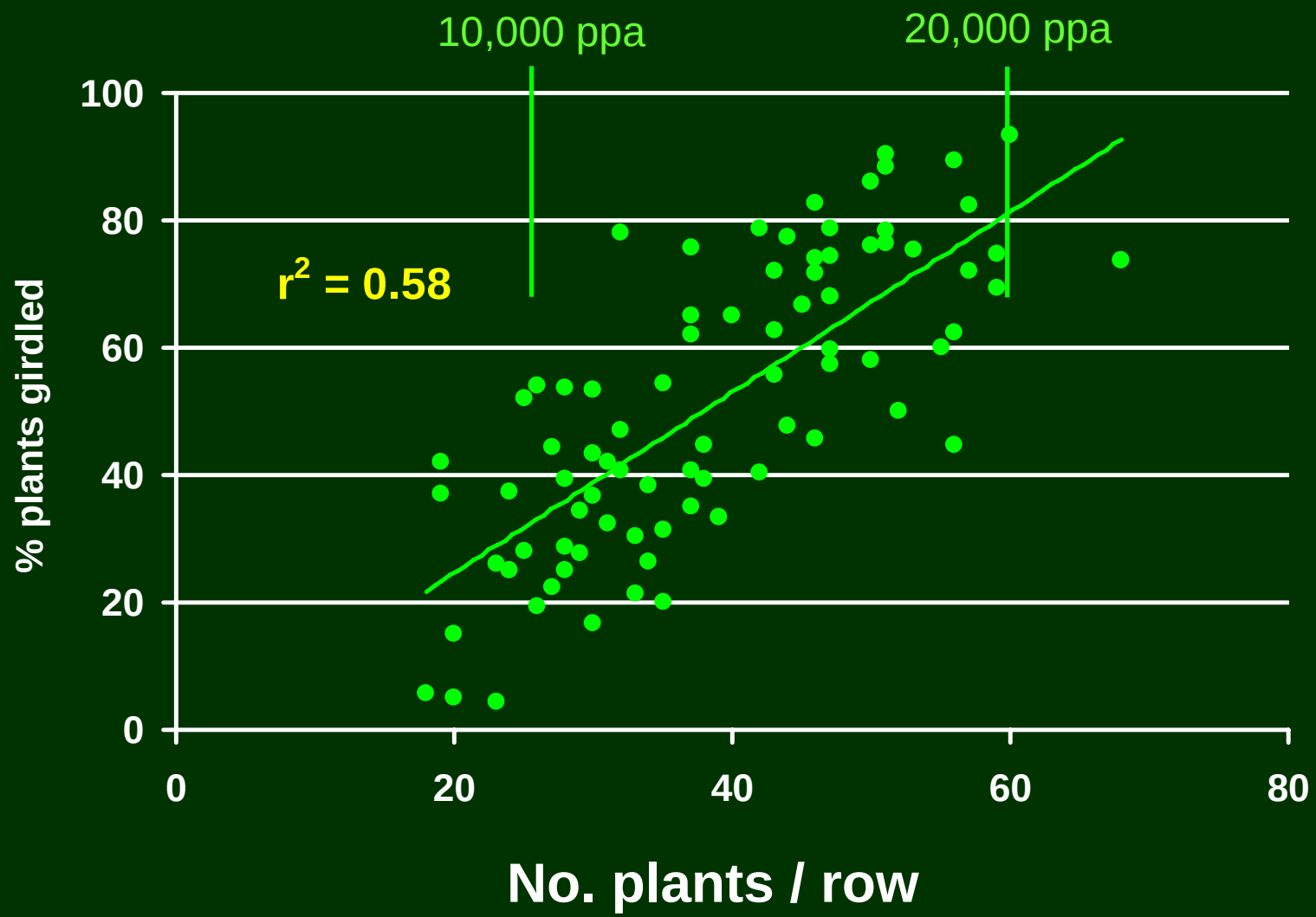
< - Low soil moisture

Progression of larval girdling in low density (10,000 ppa) and high density (15,000 ppa) plots in each of 2 years
(Triumph 660CL)

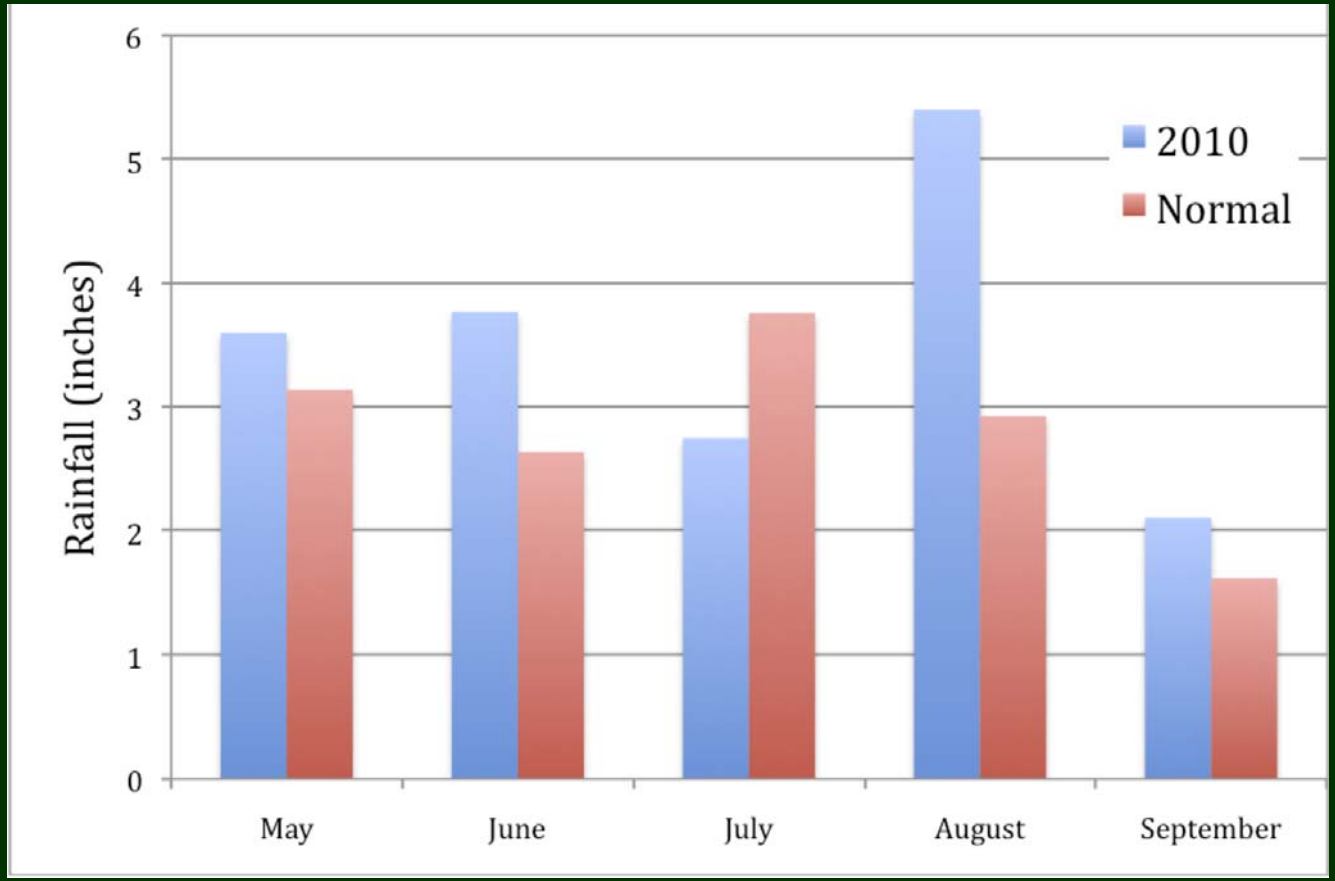


< - Higher soil moisture

Dectes girdling as a function of no. plants / row, Sept. 5, 2006



Summer 2010: High rainfall in August followed by cool temperatures in September led to wet soil conditions during the period of crop maturity

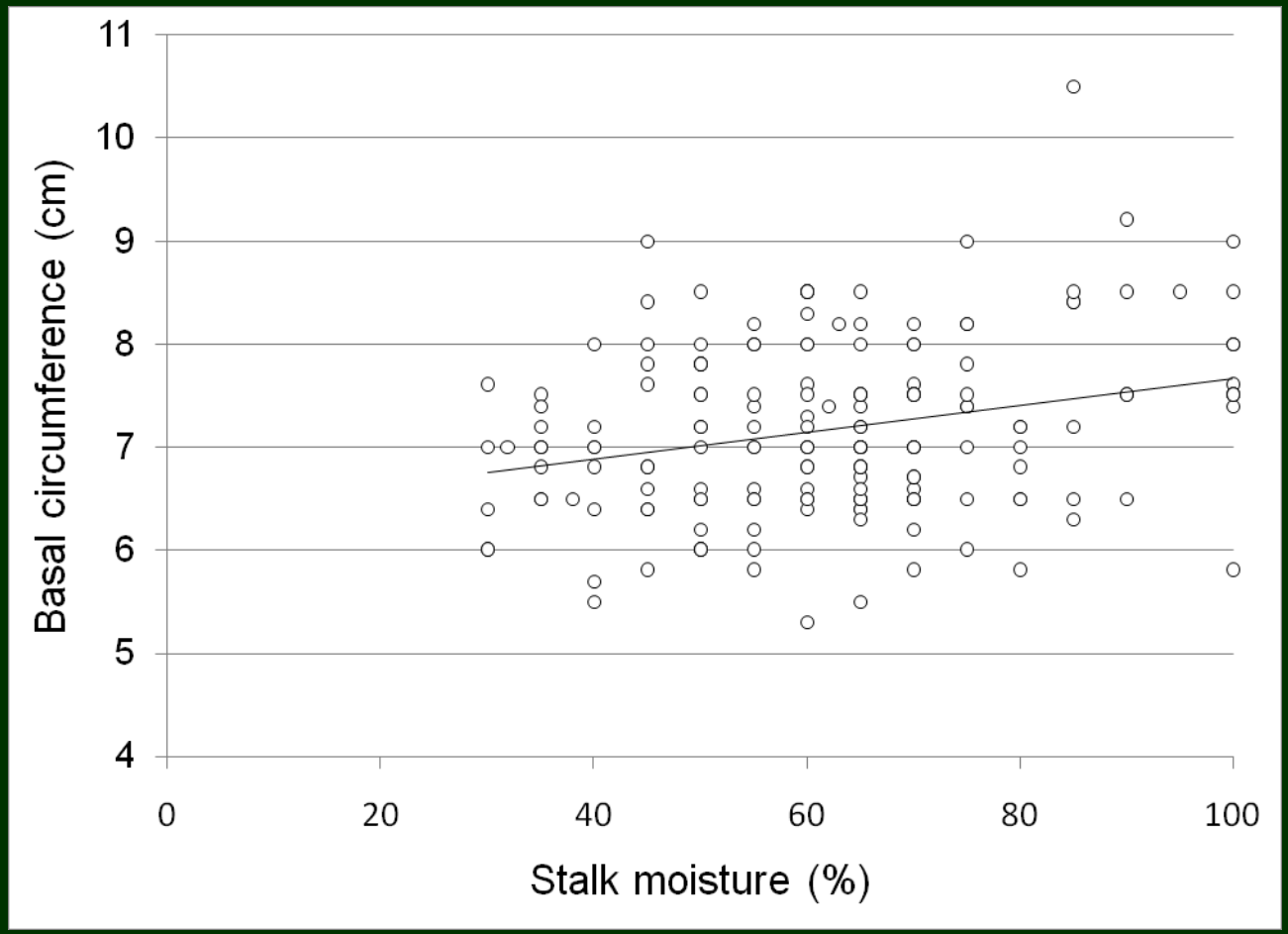


Summer 2010: High rainfall in August followed by cool temperatures in September led to wet soil conditions during the period of crop maturity

Cultivar	% stalks brown Sept. 7	% stalks brown Sept. 13
T-665	0	1
369DM	2	10
378NS	<1	5

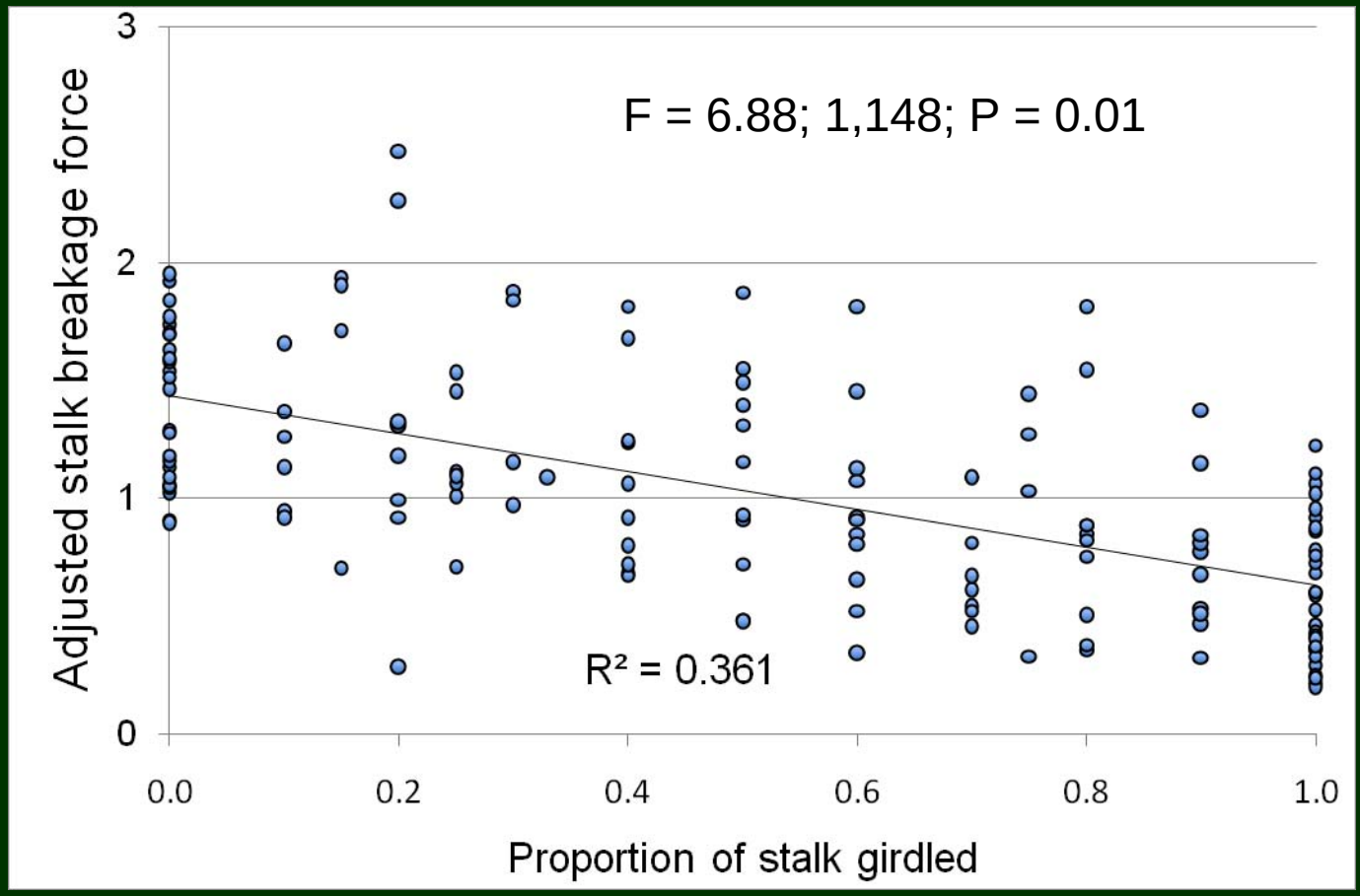
Seed moisture (%):	7.2
	8.1
	6.0

Stalk moisture as a function of basal girth



Stalk moisture post-maturity is a function of TWO processes

Stalk strength as a function of proportion girdled



Girdling explained 1/3 of the variation in adjusted stalk breakage force.

Girdling as a function of stalk moisture

All larvae had sealed their tunnels with frass,
i.e., they had finished girdling

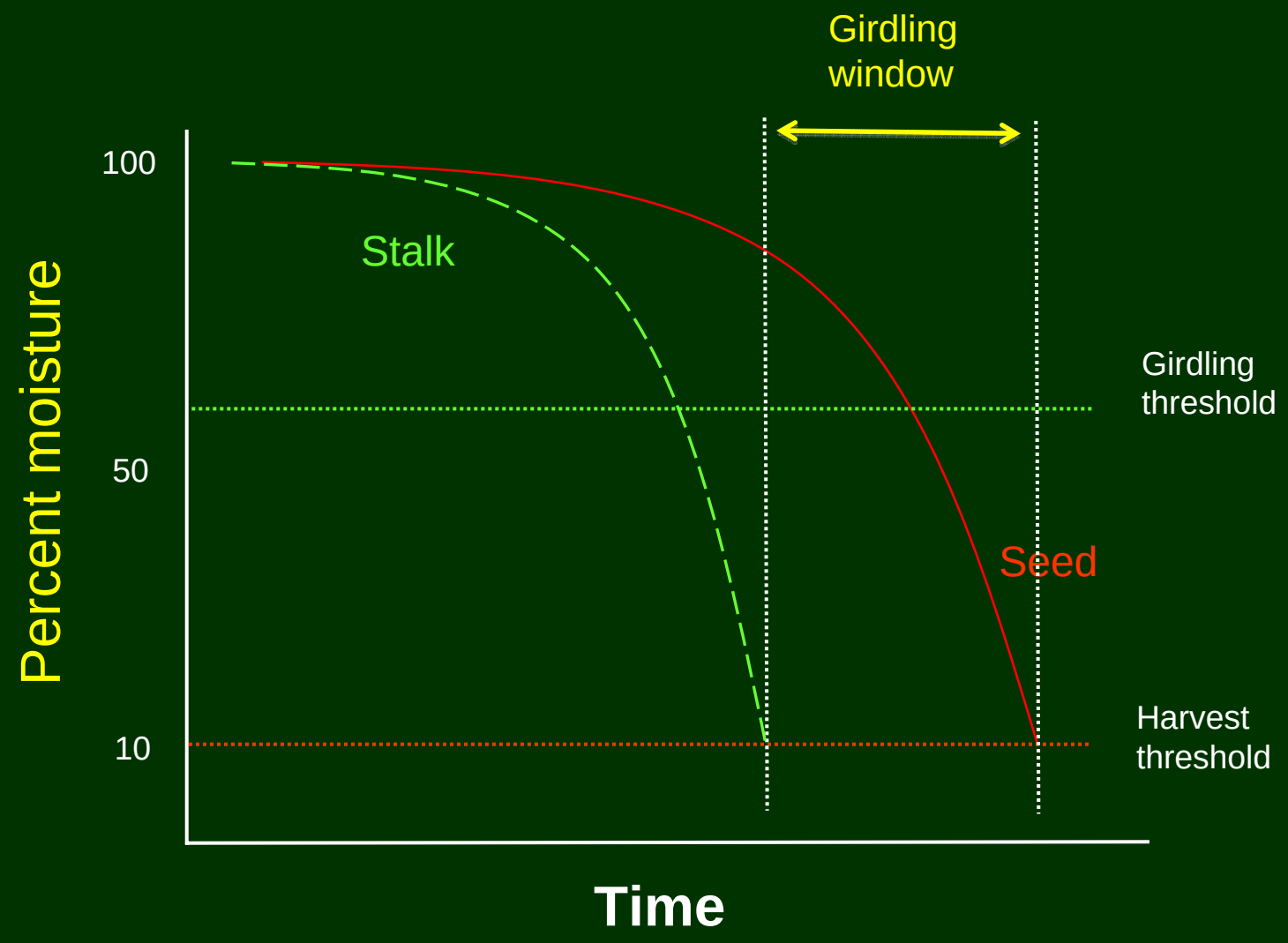
Only 20% of larvae completed girdles
-> 17% did not girdle at all.

Mean stalk moisture for completed girdles was 52%
Mean stalk moisture for non-girdling larvae was 70%

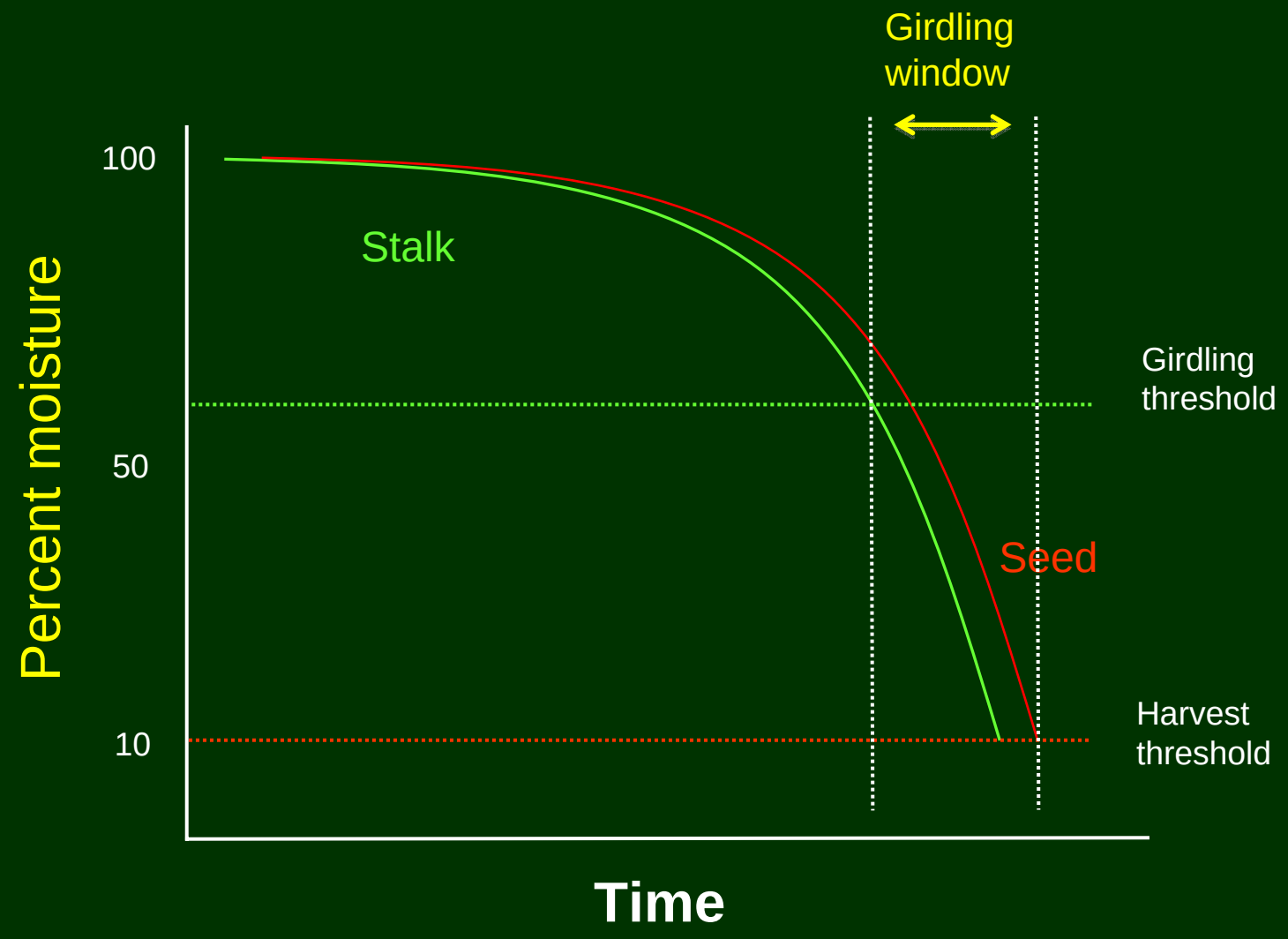
Conclusions:

1. High soil moisture delays girdling without affecting seed moisture
2. The longer girdling is delayed, the less likely it is to be completed.

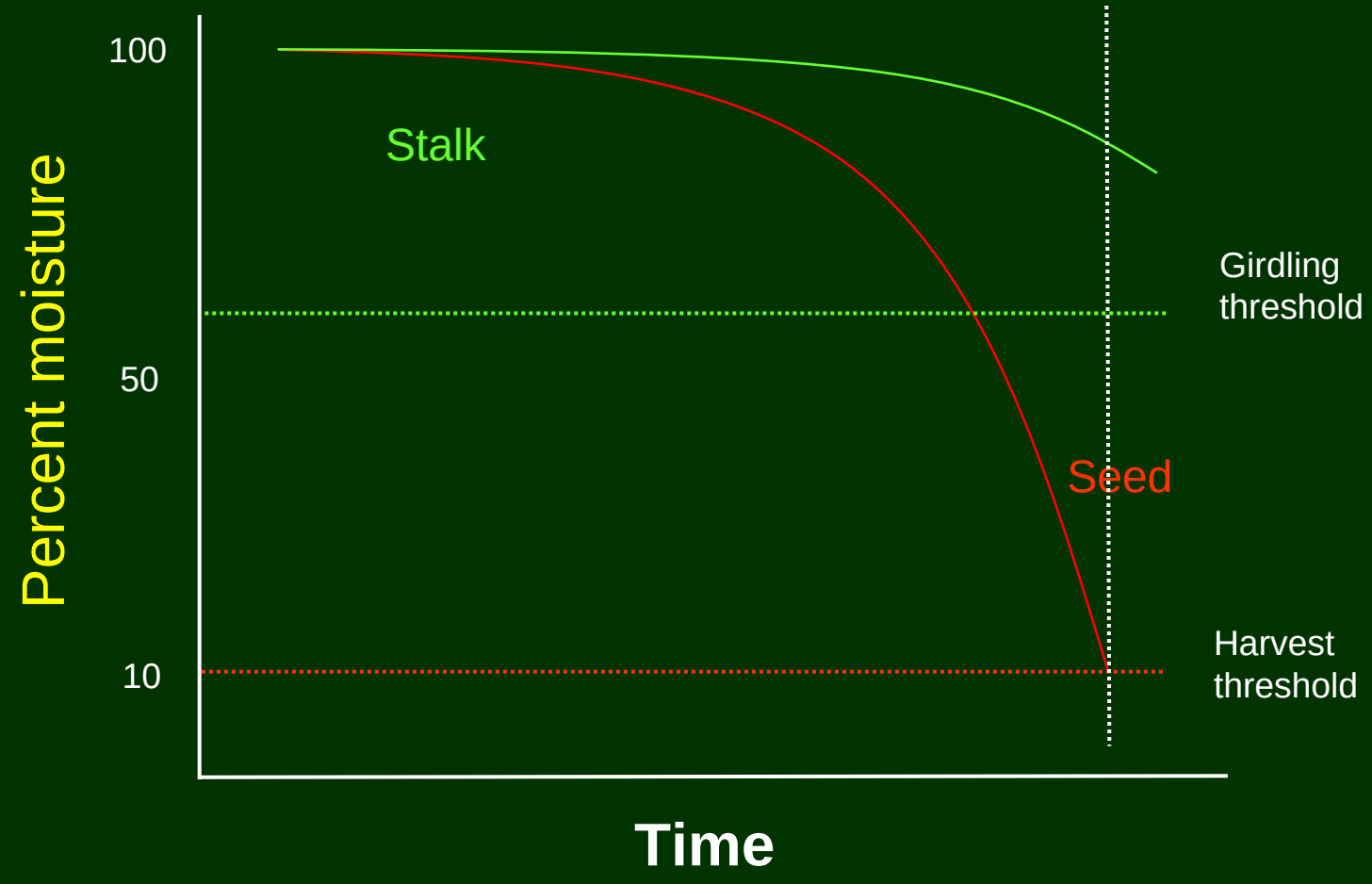
Dectes: Worst Case Scenario
Small plants + dry summer:



Not-so-bad Scenario:
Larger plants + moderate soil moisture

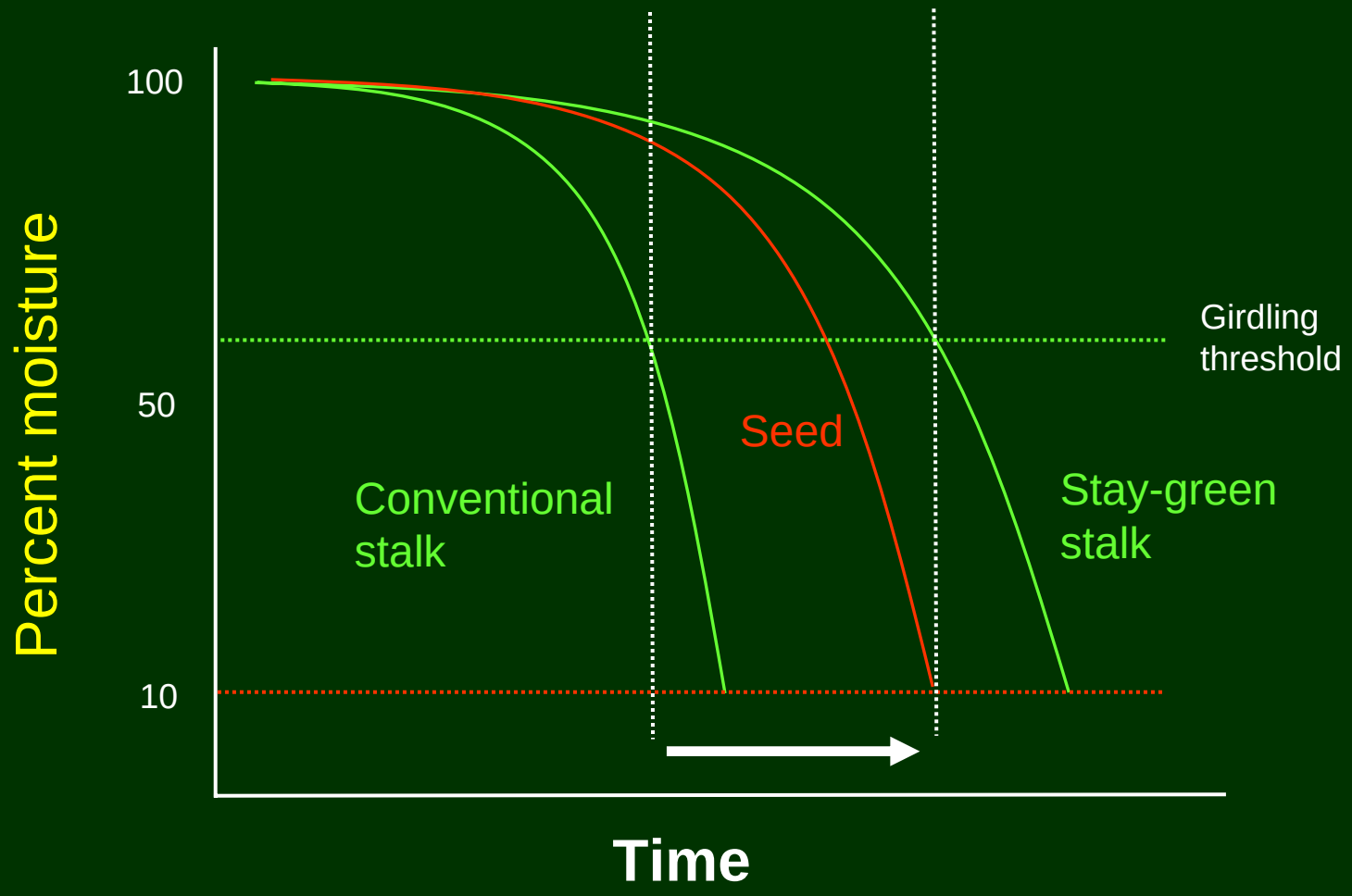


High soil moisture (2008, 2009, 2010):
Stalk desiccation and girdling are delayed



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 ?

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