Irrigating almonds through the summer

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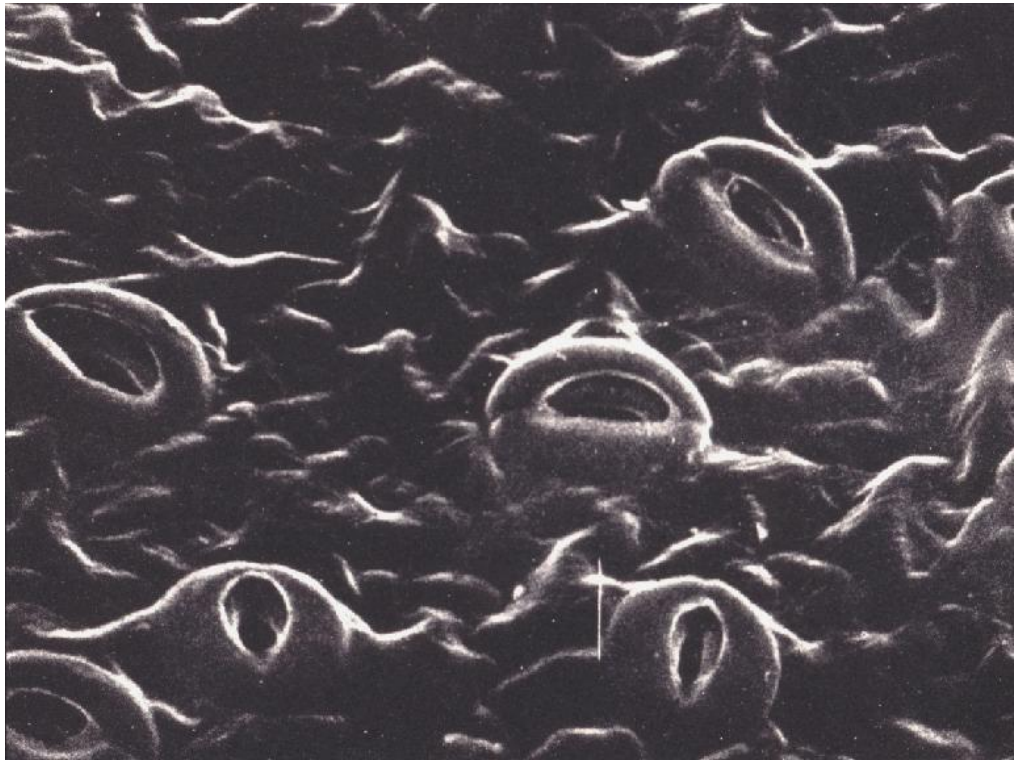
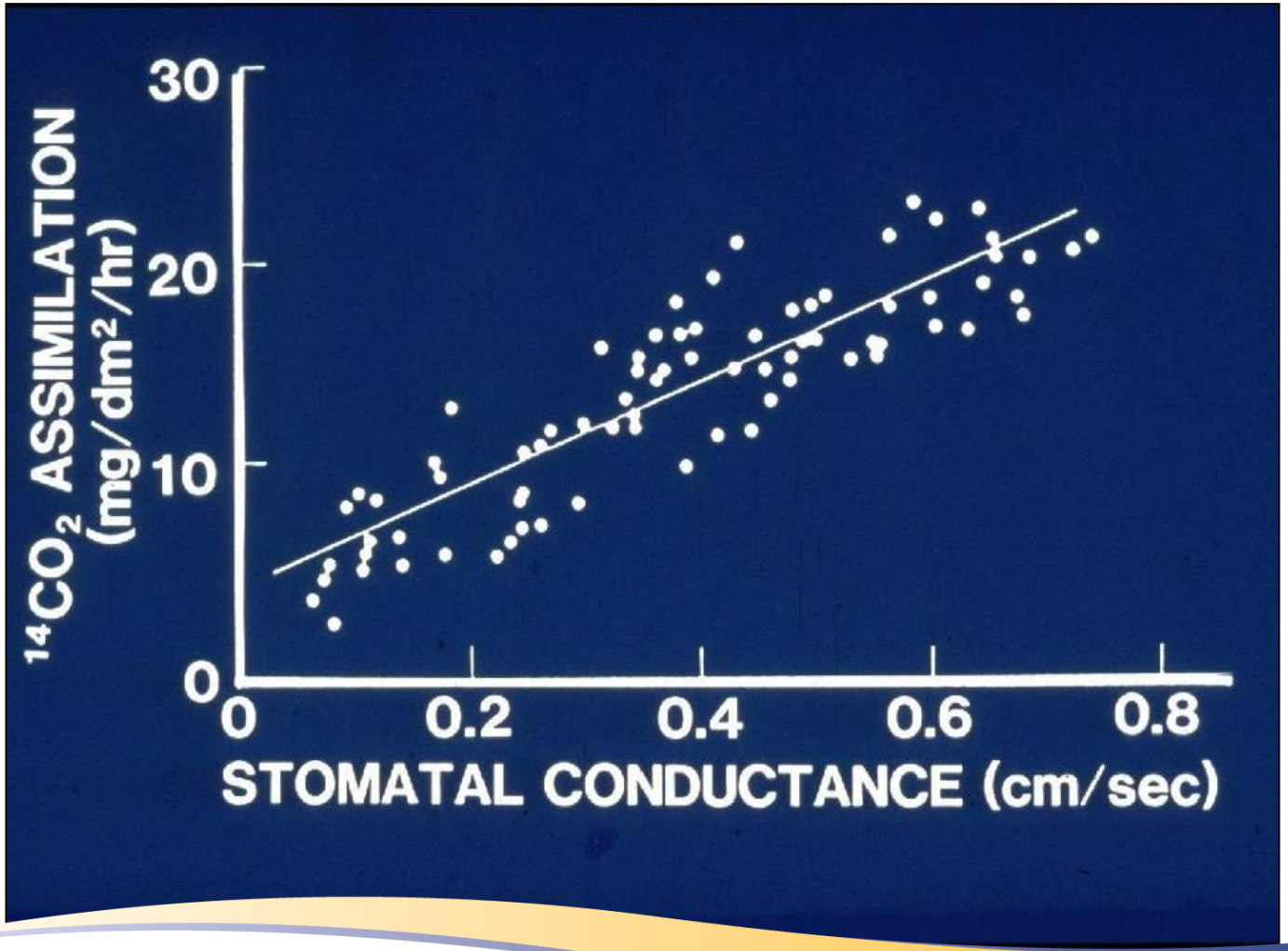
Reducing Stress to Maximize CHO

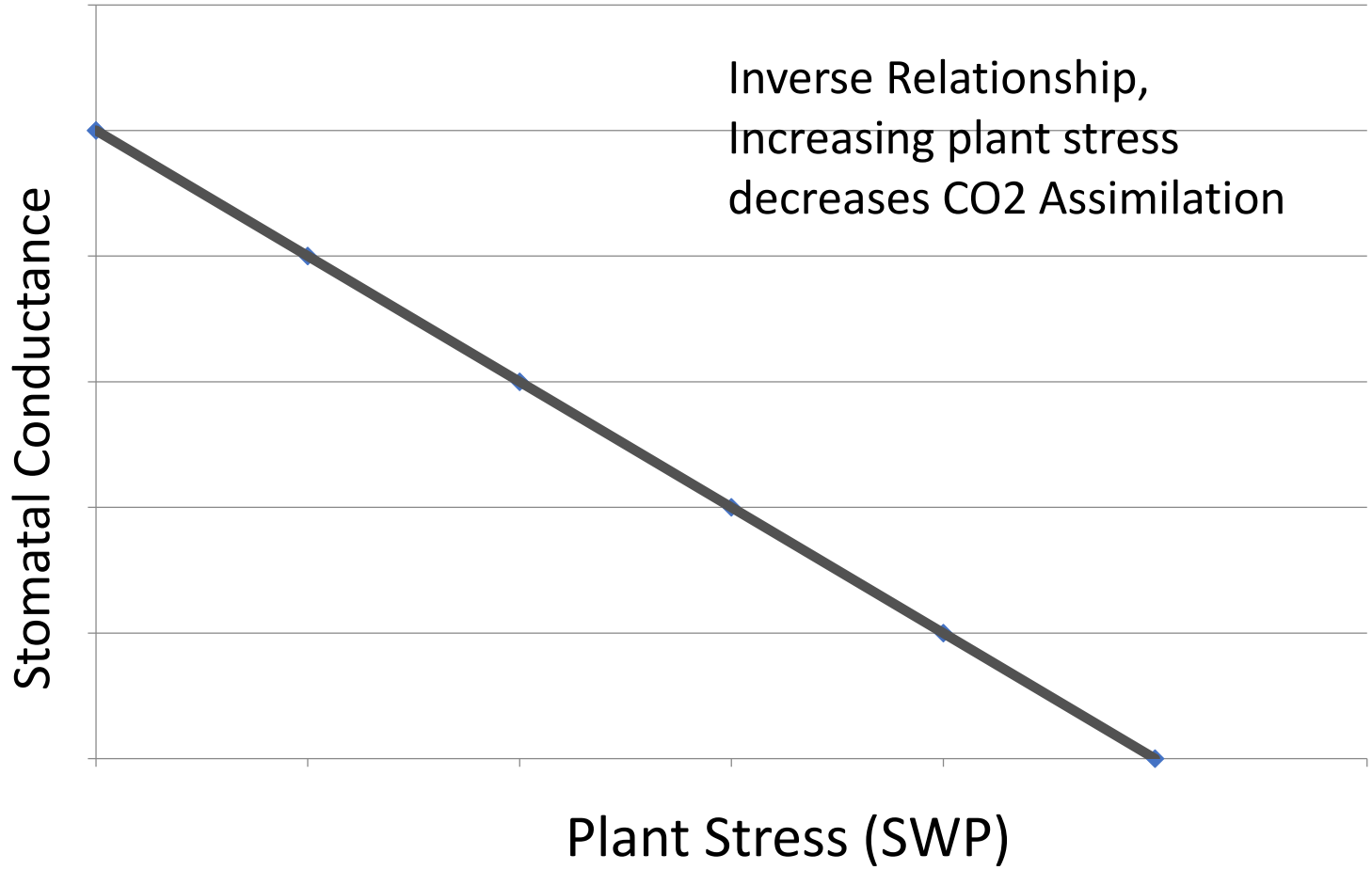
Our goal: To let the plant do what it can do at the best of its ability.



Reducing Stress to Maximize CHO



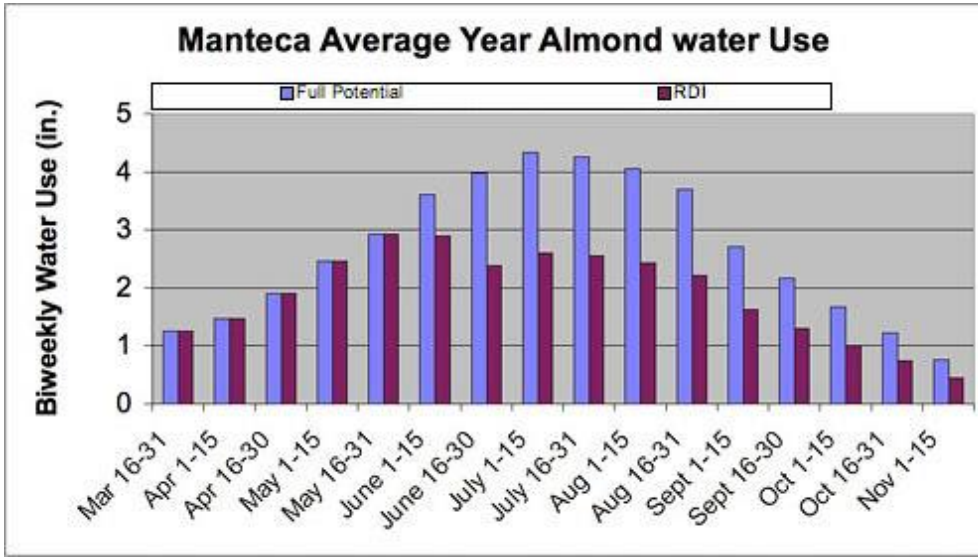
Reducing Stress to Maximize CHO



Irrigating Almonds Through the Summer

Challenges:

- High water use (~2”/week)
  - Lack of irrigation system performance
  - Poor DU
  - Poor design
- Variable pump flows
- Managing hull-split and harvest



Irrigating Almonds Through the Summer

GOAL: To reduce hull-rot and ease the harvest process without impacting next year's crop.

Applying a moderate water deficit at 1% hull-split for 2 weeks to reduce hull-rot.

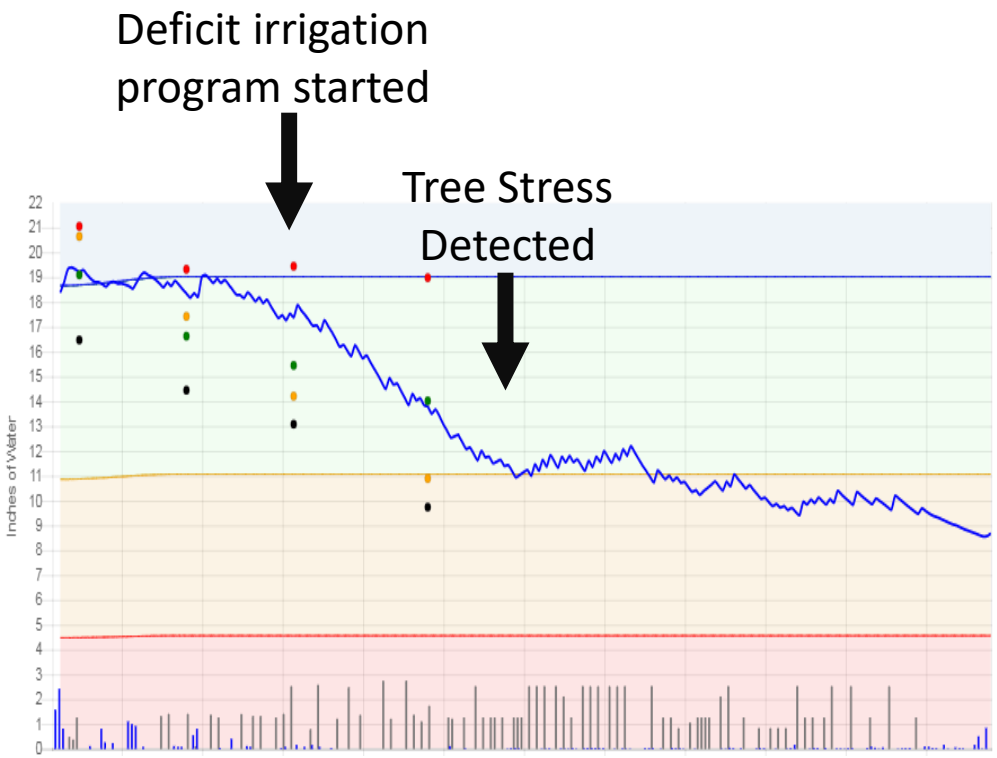
Provide the trees with near-to-full irrigation after this period for a few weeks prior to starting harvest.

Harvest at the correct time to reduce shaker damage while achieving maximum nut removal.

Keep the trees fully irrigated after harvest to reduce stress.

Summer Irrigation: Deficit and Stress

- Premise of deficit irrigation is to reduce stored soil moisture reserves so stress can be applied when needed
- Reducing water applications may not lead to immediate stress



Example of soil moisture status through season

Image Courtesy of Irrigation for the Future

Summer Irrigation: Deficit and Stress

- Differing soils and irrigation systems may take longer for stress to occur;
- Over-irrigation through the spring increases the time to “dry-out” while reducing fine feeder root development.

Examples from field studies:

System	Soil Type	Cond-itions	Days until -16 SWP
Microsprinklers	Loam	Normal	14 days
Flood	Clay loam	Normal	36 days
Drip	Loam	Wet	49 days

Ken Shackel, et al, 2006

Summer Irrigation: Deficit and Stress

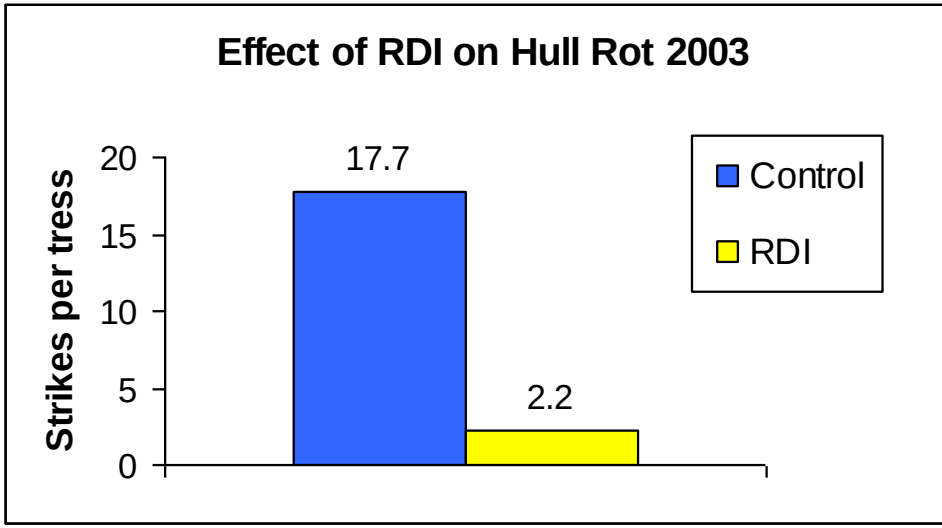
A reduction in irrigation water applied (i.e.; deficit) **DOES NOT** mean stress

A deficit is applied until the target stress level is achieved.

Summer Target: -15 Mid-day SWP at 1% Hullsplit

Summer Irrigation: Why We Stress

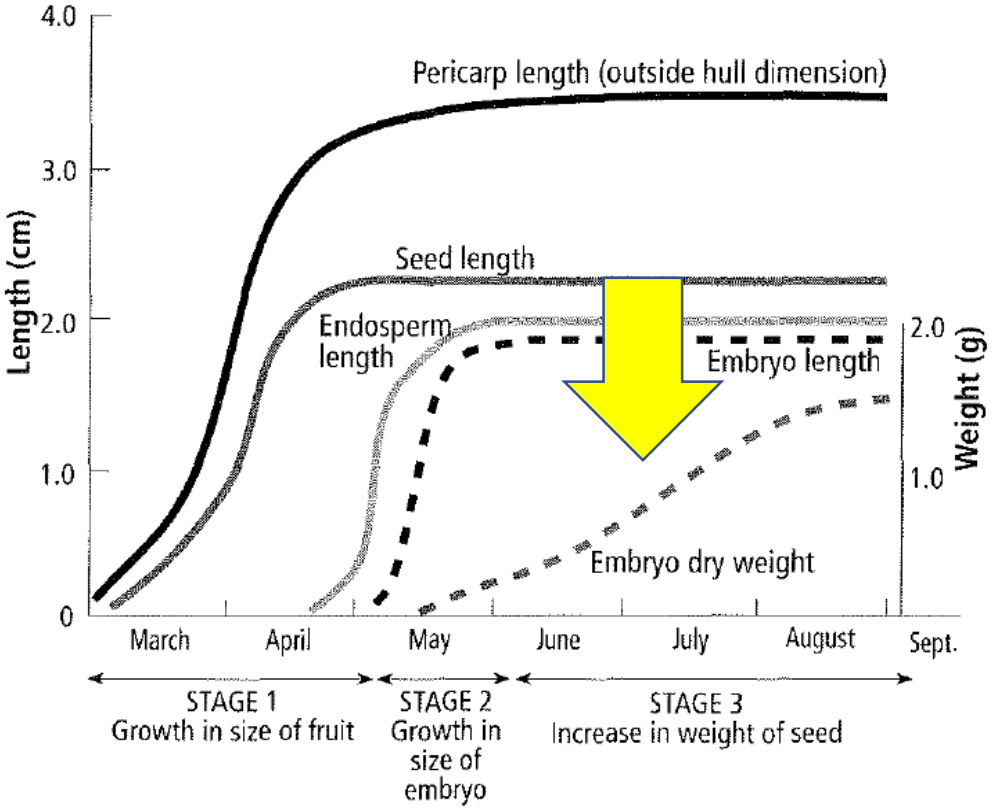
- Moderate levels of stress at the ONSET of hull-split can reduce hullrot;
- Stress should be maintained for two weeks, then full irrigation;
- This makes harvest easier.



If no issues with hull-rot, keep stress reduced.

Summer Irrigation: But not too much stress

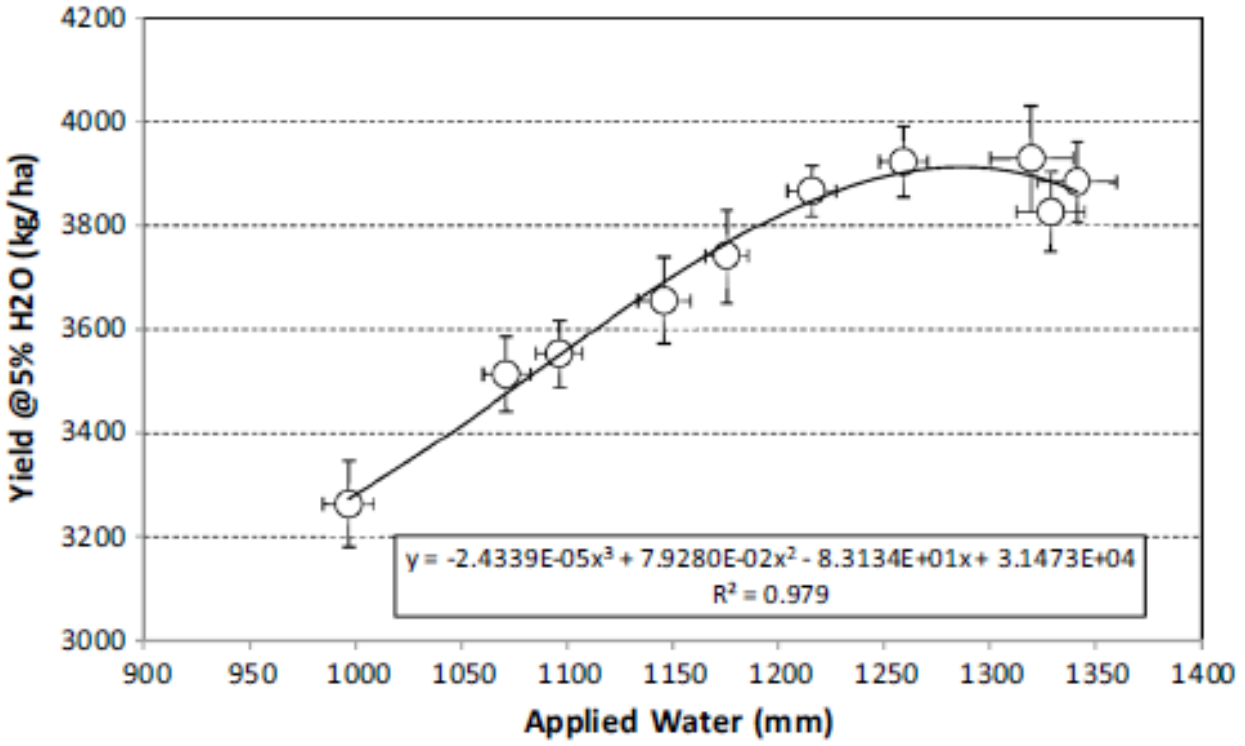
- Almond yield is affected by summer stress;
  - Weight accumulation begins in June, ends just before harvest;
  - Requires energy from photosynthesis.
- It also reduces vegetative growth impacting future yields.



Summer Irrigation: But not too much stress

Increased water applications lead to increased yield.

- In-season effects
- Next/future season effects

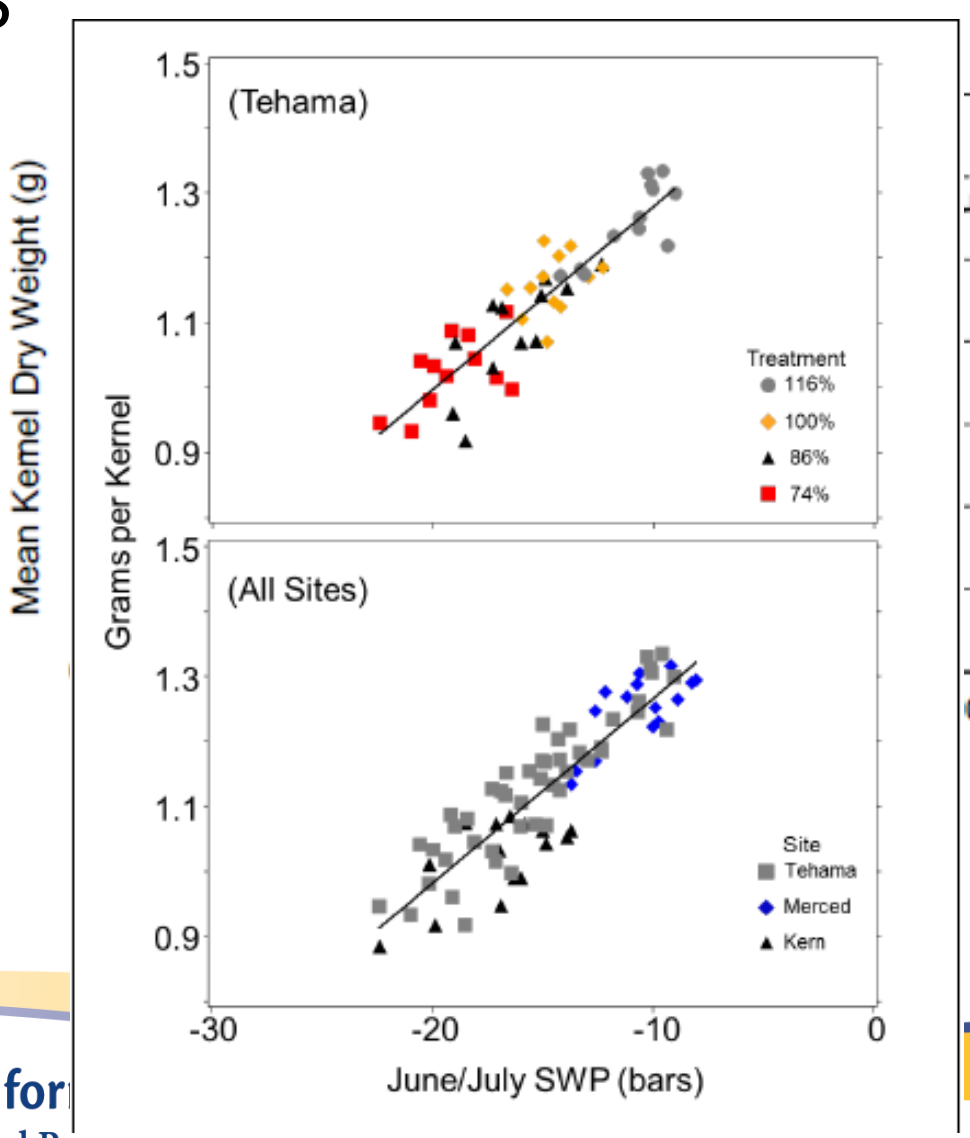


Goldhamer and Fereres, 2017

Summer Irrigation: But not too much stress

In-season water shortages influence kernel size and weight.

Size is influenced by summer stress which reduces accumulation of fats.



Summer Irrigation: But not too much stress

ost 25% of
rop due to
eing cheap!

Recap: Irrigating up to harvest

- Gradually reduce water until -15 bars of SWP at 1% hull-split. This will vary based on soil type and irrigation system;
- After two weeks of moderate stress, resume full irrigation. Maintaining a longer stress will not force nuts to split, only will reduce kernel size;
- Keep in mind that stored soil moisture reserves will be depleted and trees will stress easier.

Irrigation: Preparing for harvest

- A moderate to severe stress level at harvest is usually sufficient to reduce barking;
- Bark damage typically occurs in wettest areas of the field due to delayed ripening of the crop (POOR DU!);
- Stored soil moisture will indicate how long water should be off prior to shaking.

Basic Schedule

1. July 4th: 1% hullsplit, ~10-20% water reduction to achieve -15 SWP
2. July 18th – Full irrigation resumed
3. 1-2 weeks prior to harvest, apply a 10-20% deficit to bring trees to around -15 -- -18 bars SWP.
4. Irrigate ASAP!

Irrigation: Postharvest

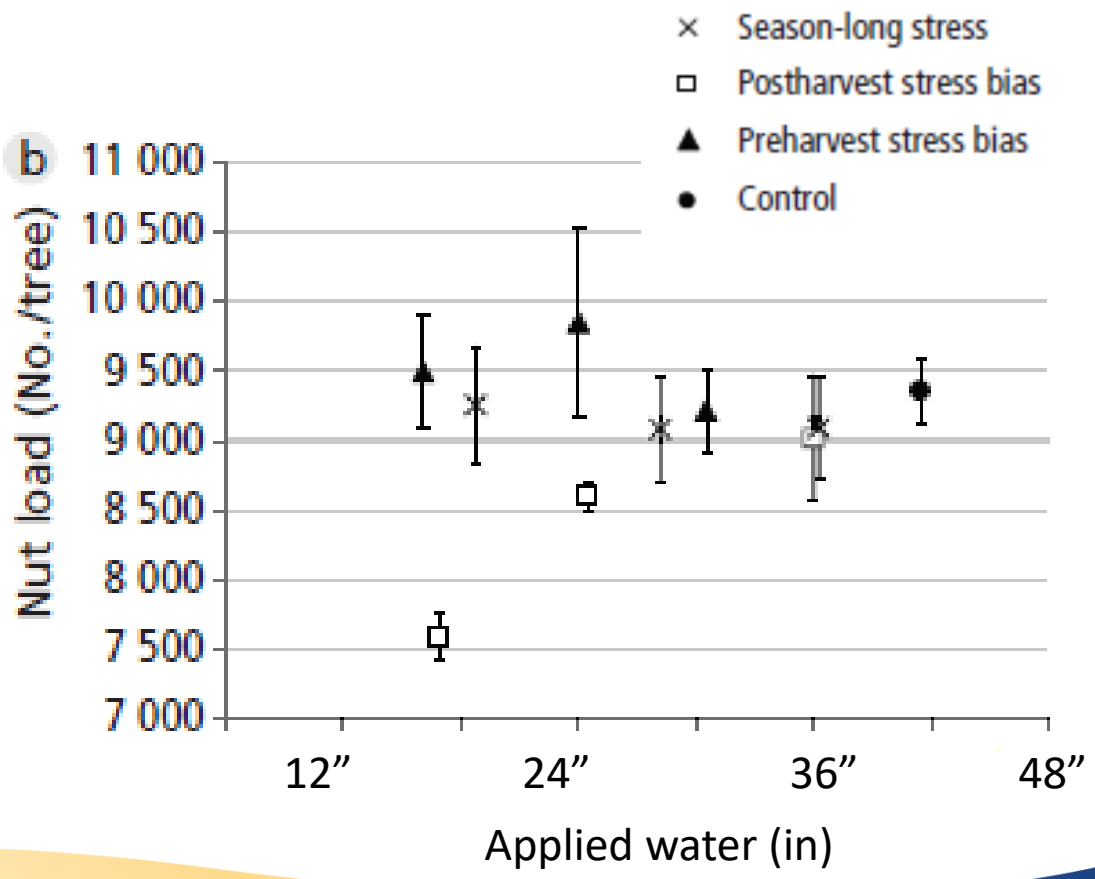
- Irrigate to match full demand as soon as possible;
- Research has shown maximal yields are achieves with a target application of 8” of water by end of September
- If wetting nuts is a concern, make a single sweeper pass or run or install a single drip line.

Almond Water use – Next Season's Effects

Post-harvest Irrigation

Stress during the postharvest decreases nut counts the following year.

Not enough carbohydrates to set the nut.



Irrigating Almonds Through the Summer

- Water stress decreases photosynthate which can lead to reduced growth and kernel size;
- Stress through the summer should be carefully managed to reduce hull rot and speed harvest while minimally impacting kernel weights;
- Strategies are not “one-size-fits-all” and soil, depth of profile and irrigation system should be considered.
- As soon as harvest is complete, re-apply water to reduce tree stress, increasing energy for bud development