



MOVING FORWARD TOGETHER

Macadamias South Africa (NPC)
(SAMAC)



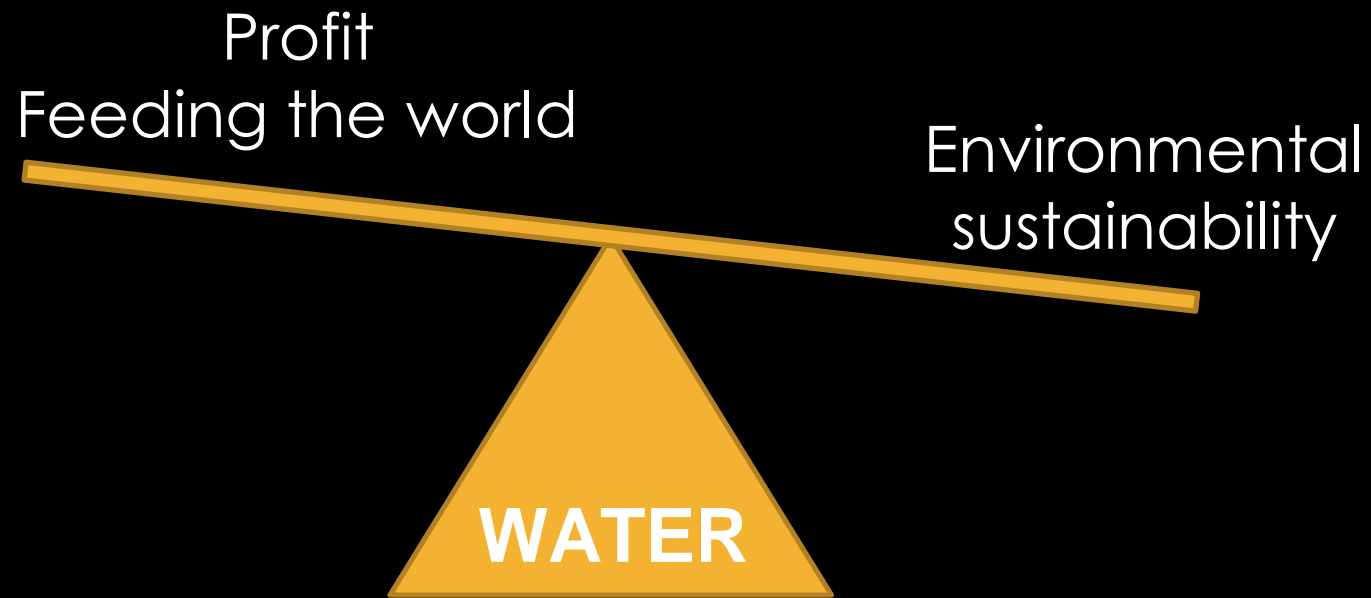
Making every drop
count: efficient and
sustainable water use
into the future

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What is efficiency and sustainability?



$$\text{Water use efficiency} = \frac{\text{Total water use}}{\text{Irrigation} + \text{Rainfall}}$$

$$\text{Crop water productivity} = \frac{\text{Yield}}{\text{Total water use}}$$



How do we make every drop count?

$$\text{Crop water productivity} = \frac{\text{Yield}}{\text{Total water use}}$$

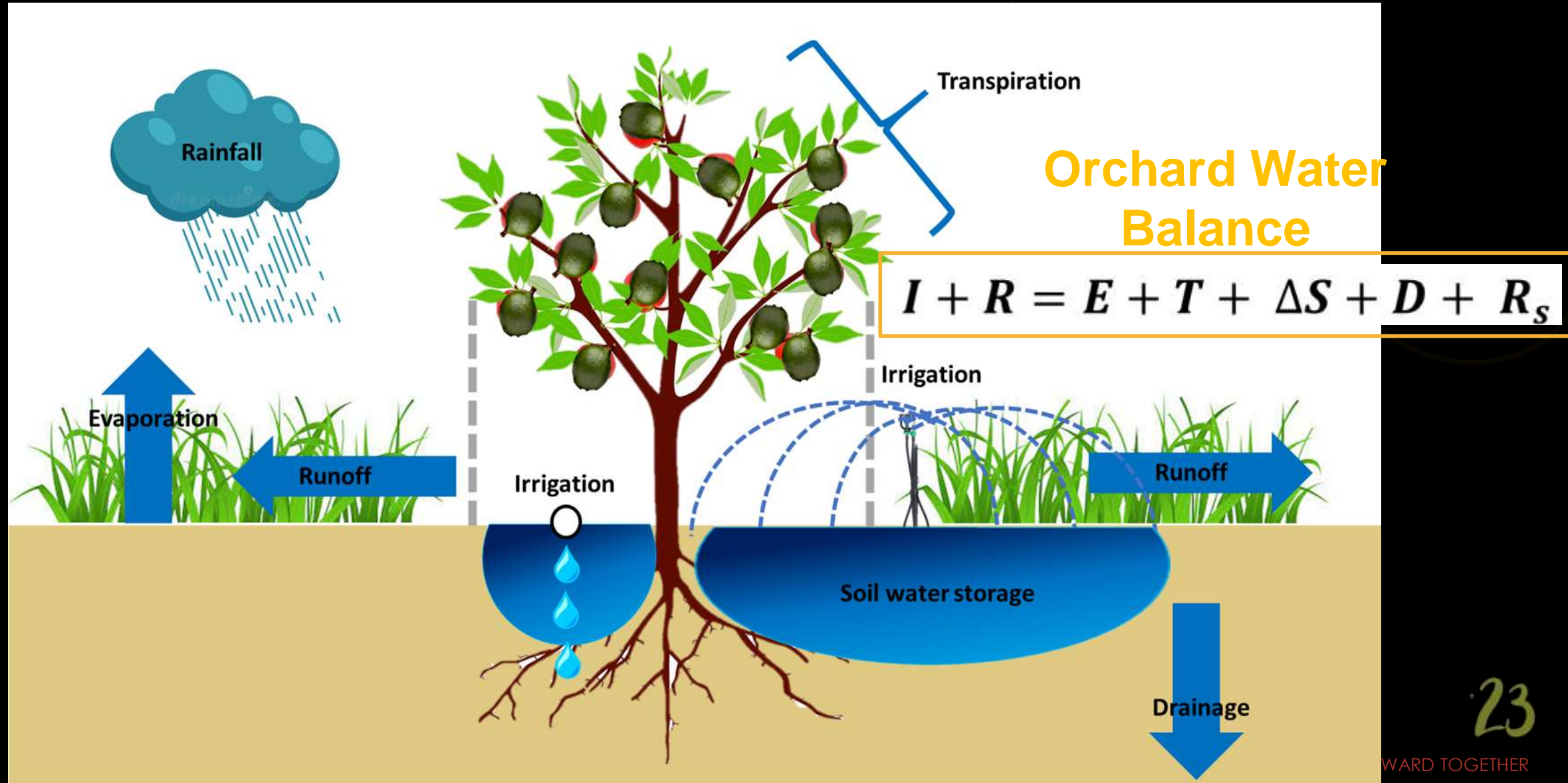
1. Higher yield with less water

1. Higher yield with the same amount of water

1. Same yield with less water



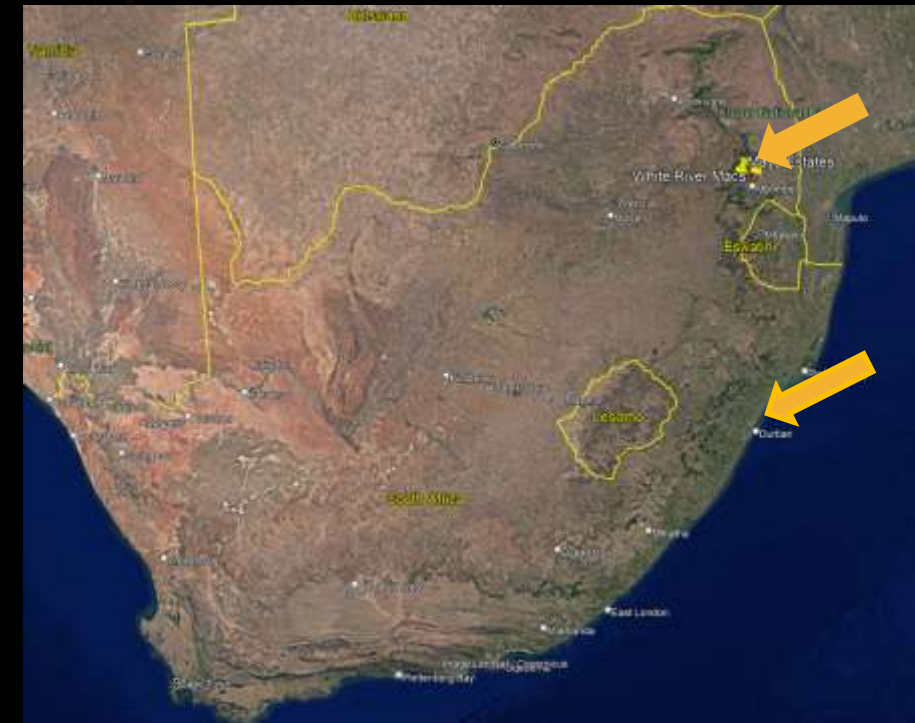
Where does the applied water go?



Do we know water requirements of macadamia orchards?

Orchard	Fractional canopy cover	Seasonal transpiration (mm)
White River Mature	0.75	460
Schagen Valley	0.6	330
Schagen Valley	0.3	180

Measurements in 4 orchards and two seasons close to Nelspruit



Why are these values orchard specific? How do I make this information relevant for me?



What role does canopy size play?



Mature orchard
Canopy cover = 0.75



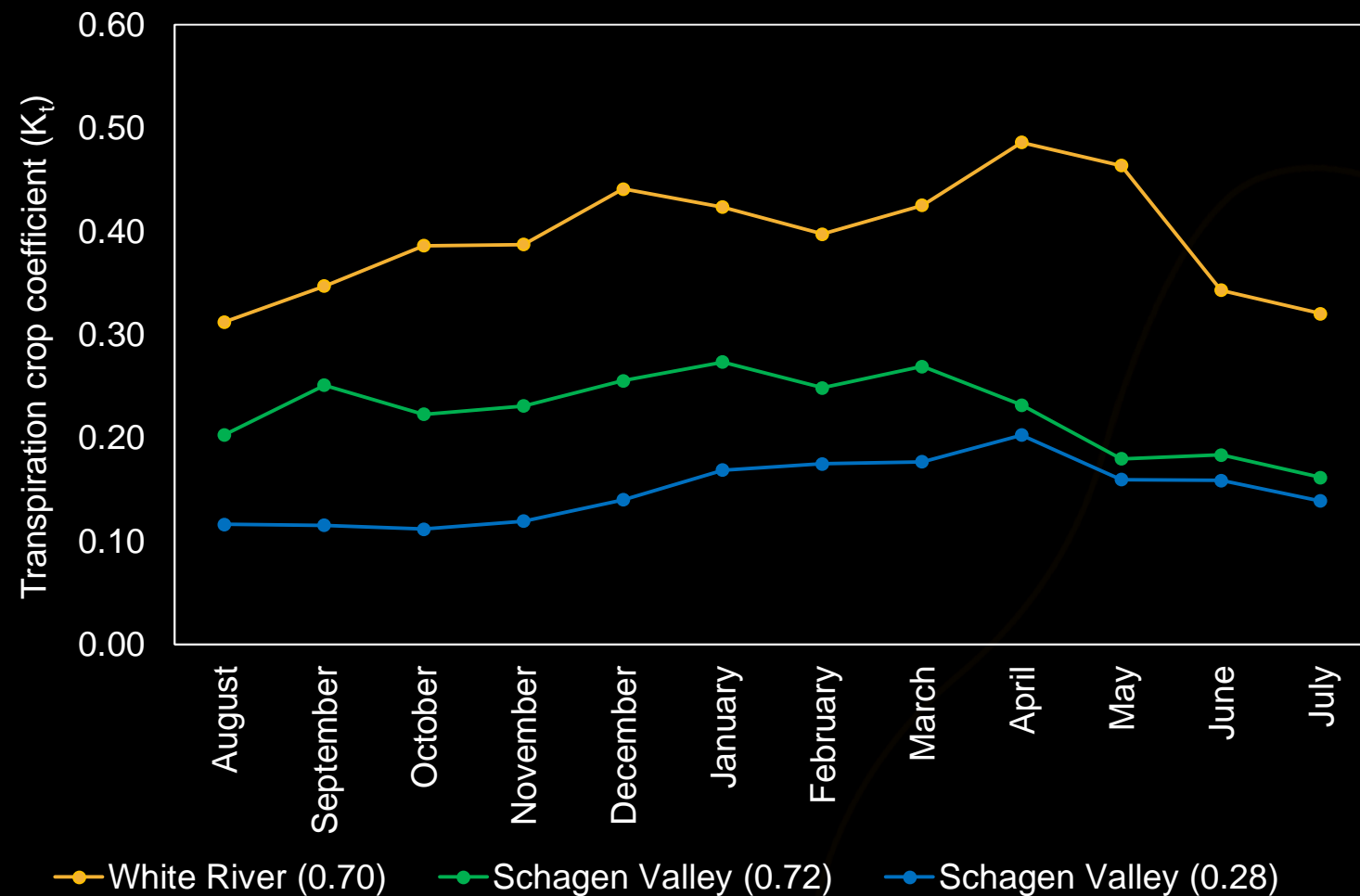
Mature orchard
Canopy cover = 0.60



Intermediate orchard
Canopy cover = 30

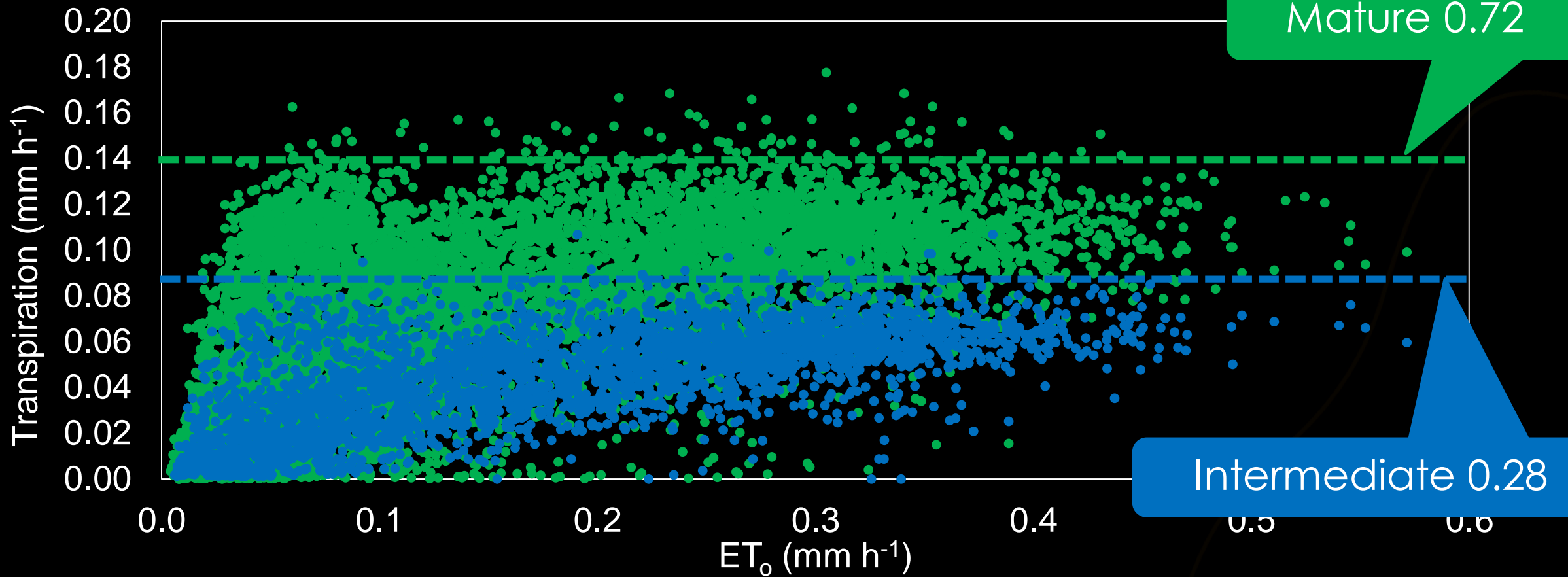
Determining orchard transpiration?

$$\text{Transpiration} = K_t \times ET_o$$



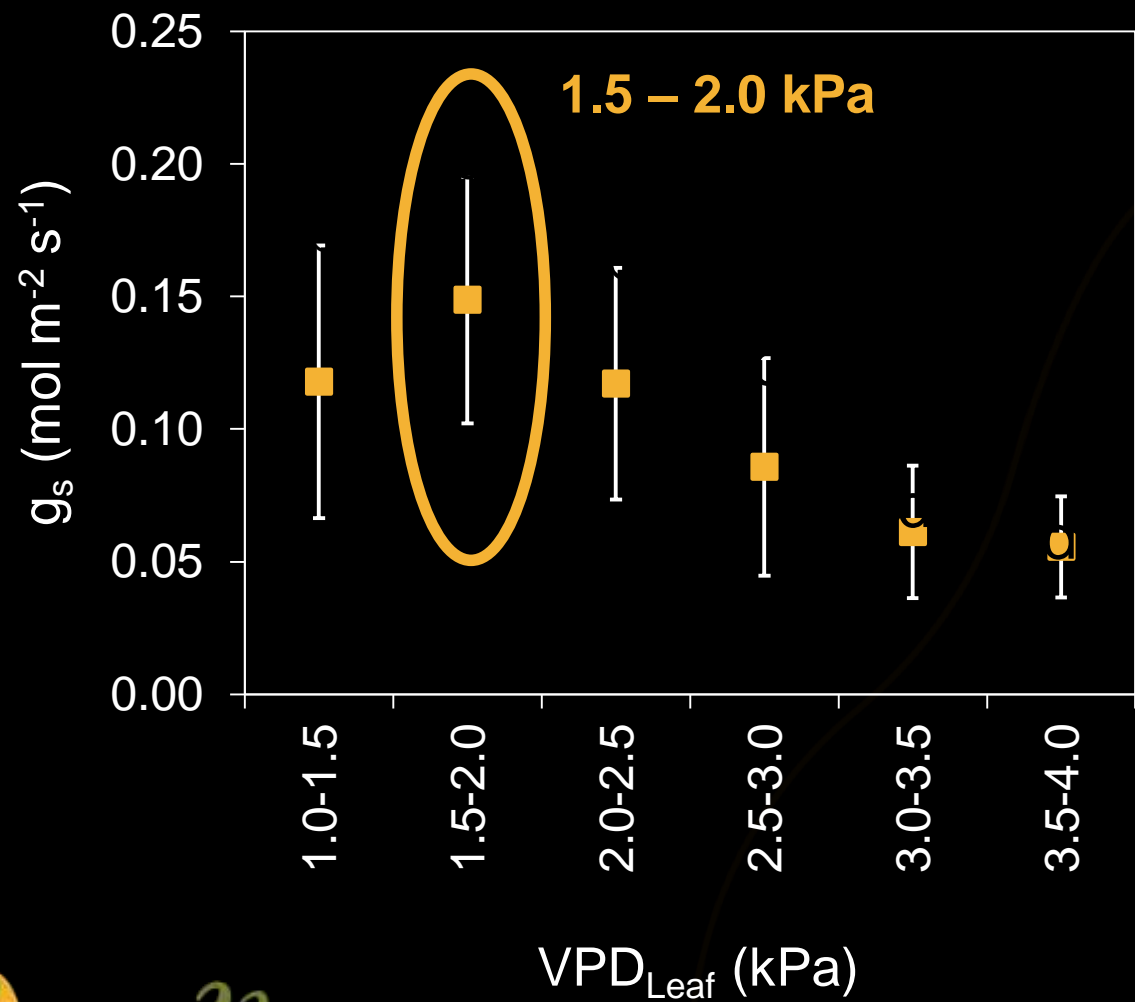
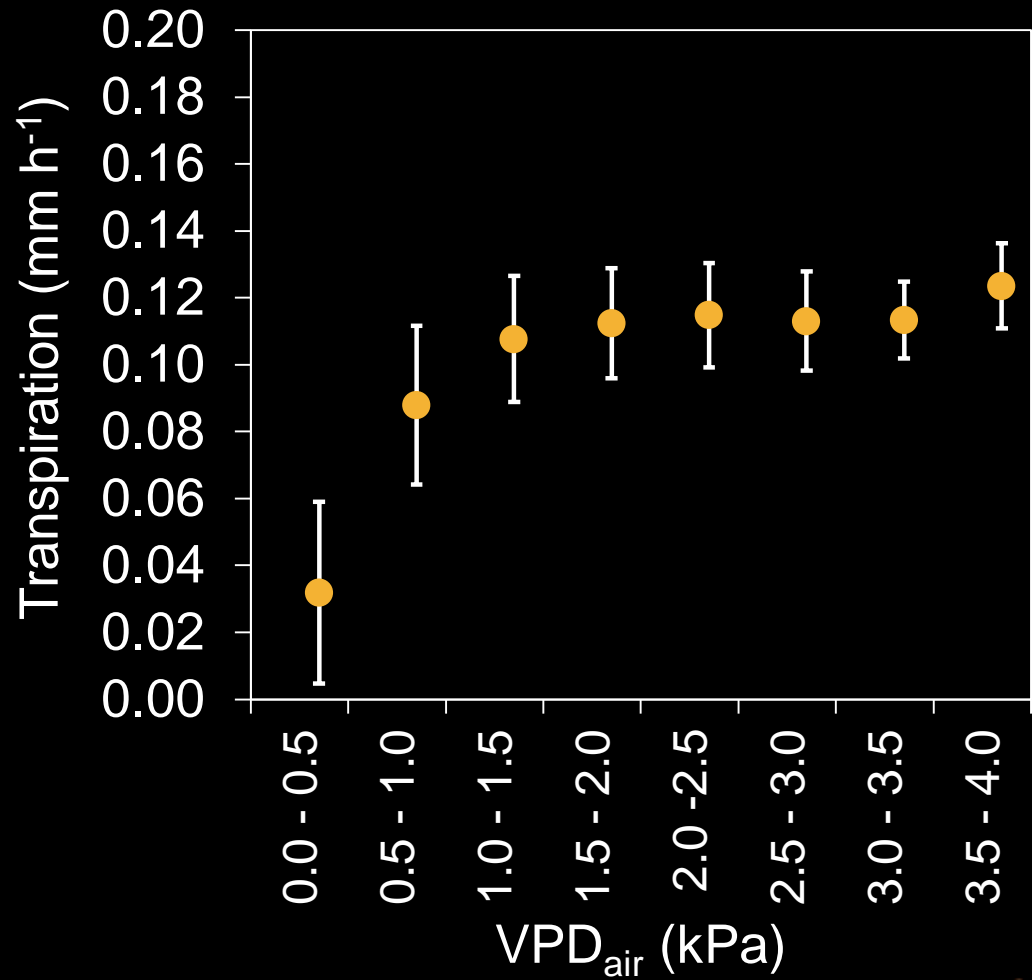
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Hot & dry \neq more transpiration?



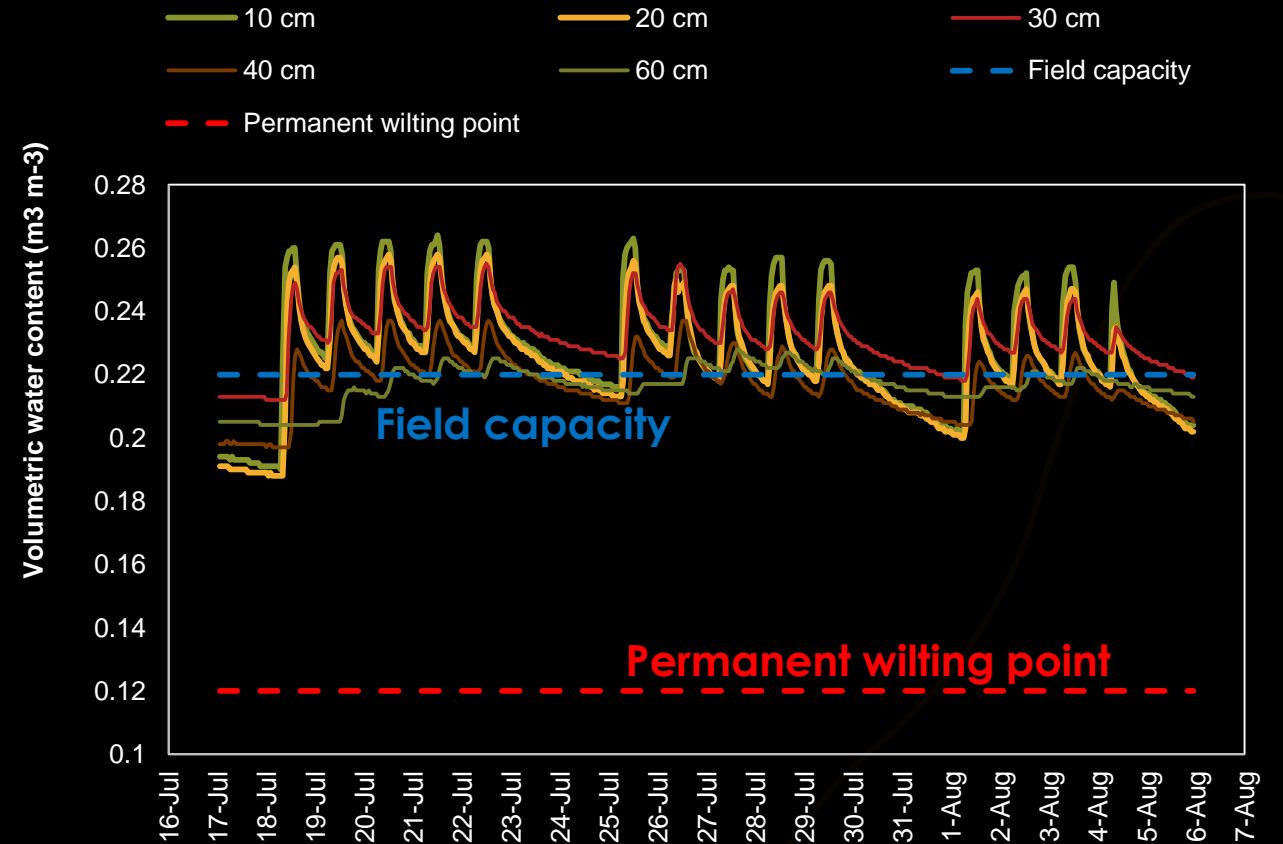
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Why does T not increase with ET_o ?



Making every drop count?

Do you know how much water you apply during each irrigation event?

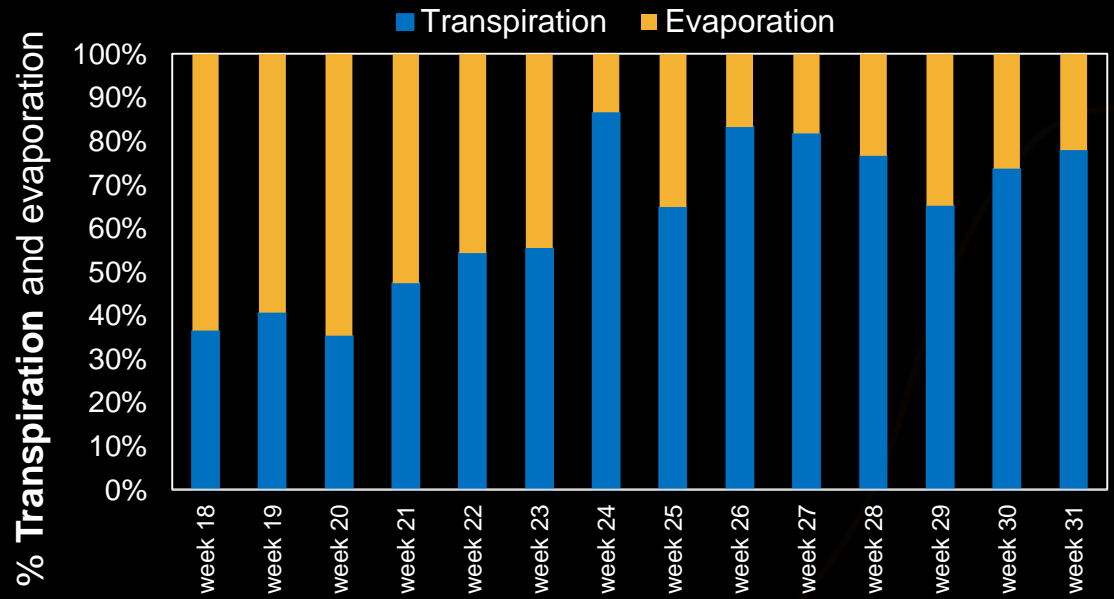
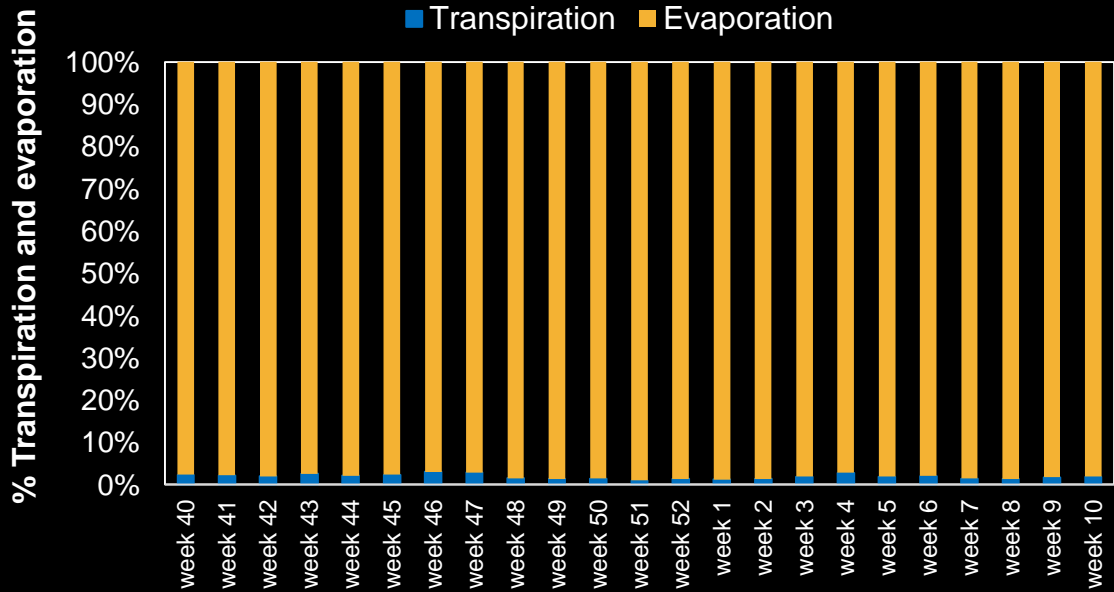


Do you know what is happening in your soil?



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How much water is being lost via evaporation?

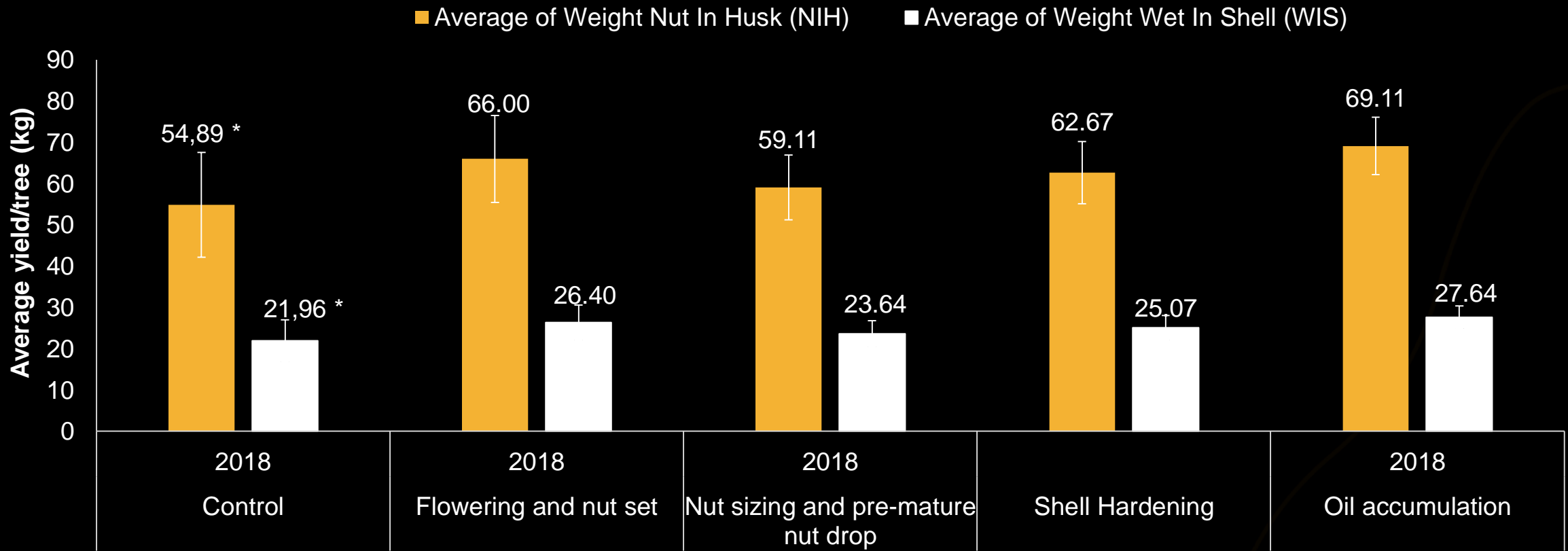


98% of ET is evaporation



40% of ET is evaporation

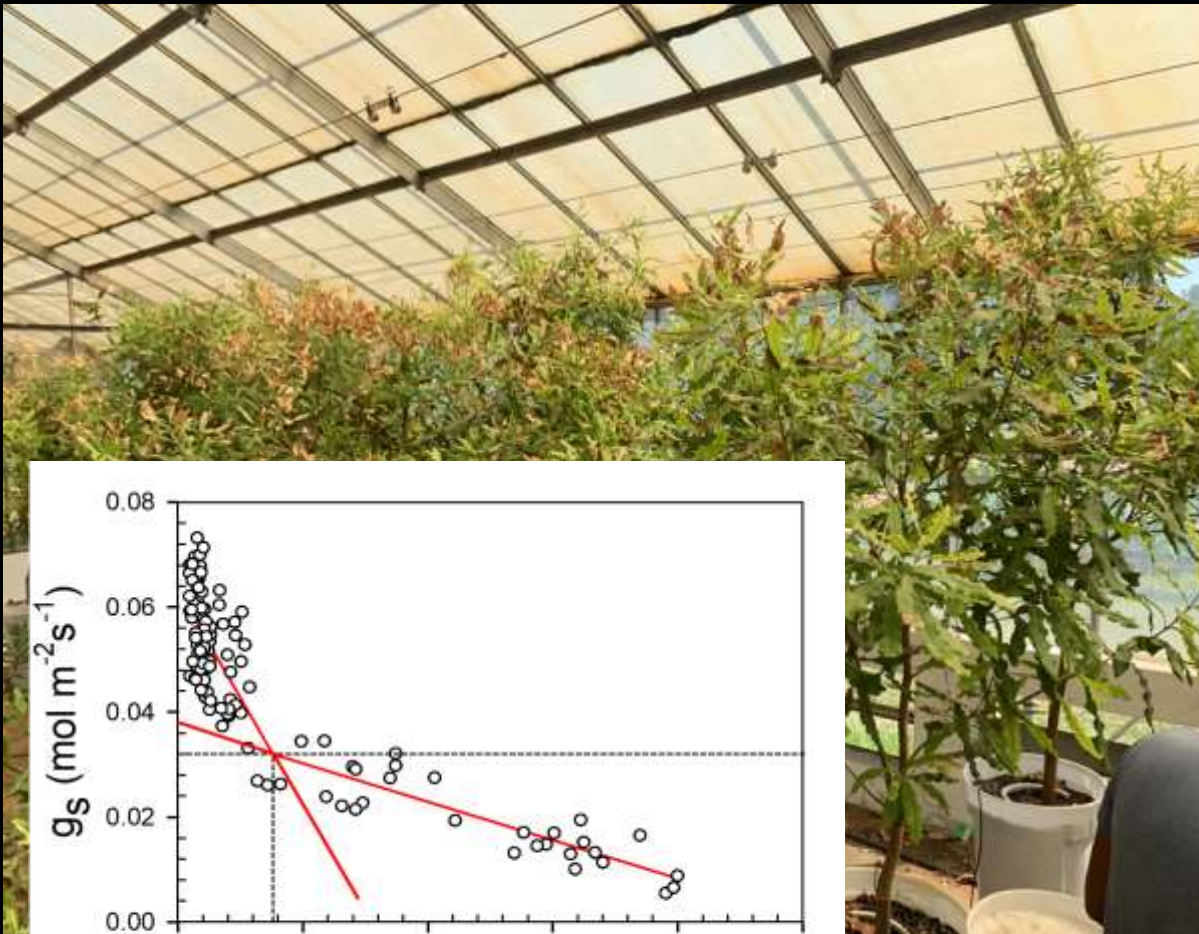
What happens if there is not enough water?



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And what about the future?

Determining thresholds for stress



Irrigation and water stress trials

Optimising irrigation scheduling using crop coefficients

- drip
- microsprinkler

Evaluating other water use models

Evaluating dendrometers

Impact of water stress on yield and quality

Stressing at different phenological stages

Remote sensing to determine spatial tree stress



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Efficient and sustainable water use?

- Be quantitative and measure irrigation and rainfall
- Adjust irrigation volumes for canopy size and weather conditions
- Know where the water is going in the soil

What about the future.....

- Testing water use models to optimise irrigation management
- Evaluating remote sensing tools to improve spatial management of water



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QUESTIONS ?