

Water table control for increasing yield and saving water in cranberry production

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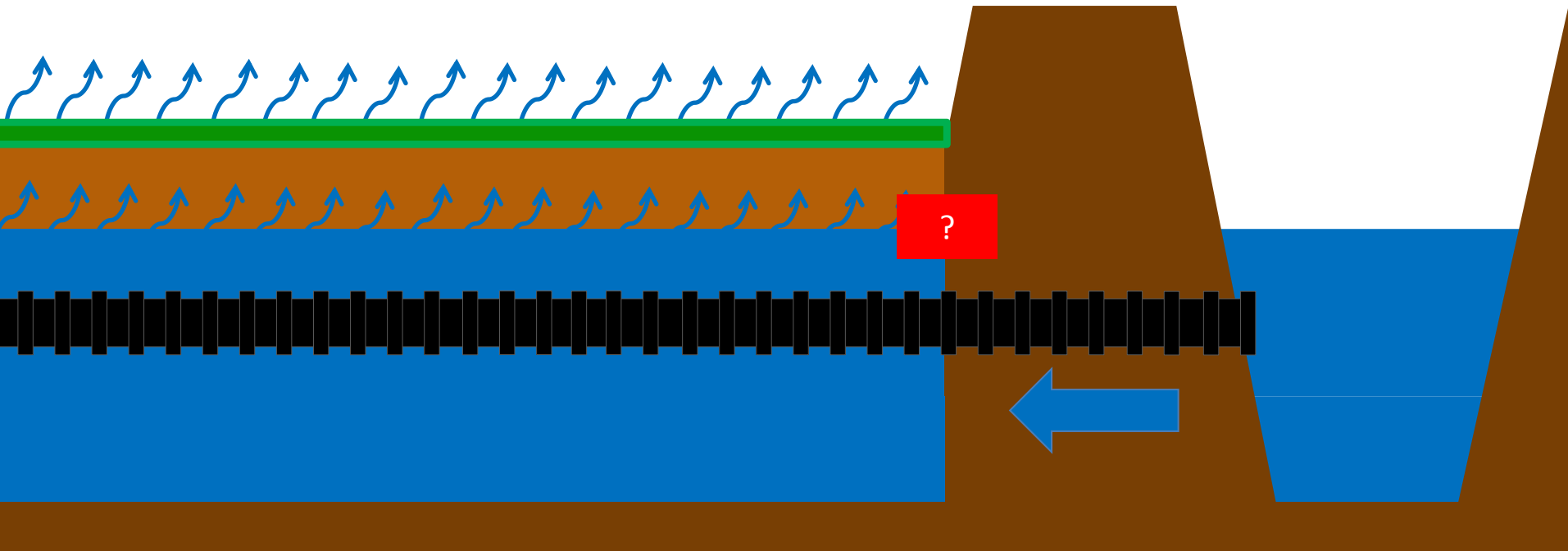
- ✓ Photosynthesis is maximized when Tension = 3.0-7.0 kPa (**Bonin, 2009**)
- ✓ Plant activity declined when water table depth (WTD) < 40 cm (**Laurent, 2015**)
- ✓ With sprinkler irrigation started at 7.5 kPa (**Pelletier et al., 2013; 2015**):
 - Improved water productivity
 - Water saving = 57% (vs wetter thresholds)
 - Yield increase = 11% (vs drier thresholds)



Great potential for subirrigation!

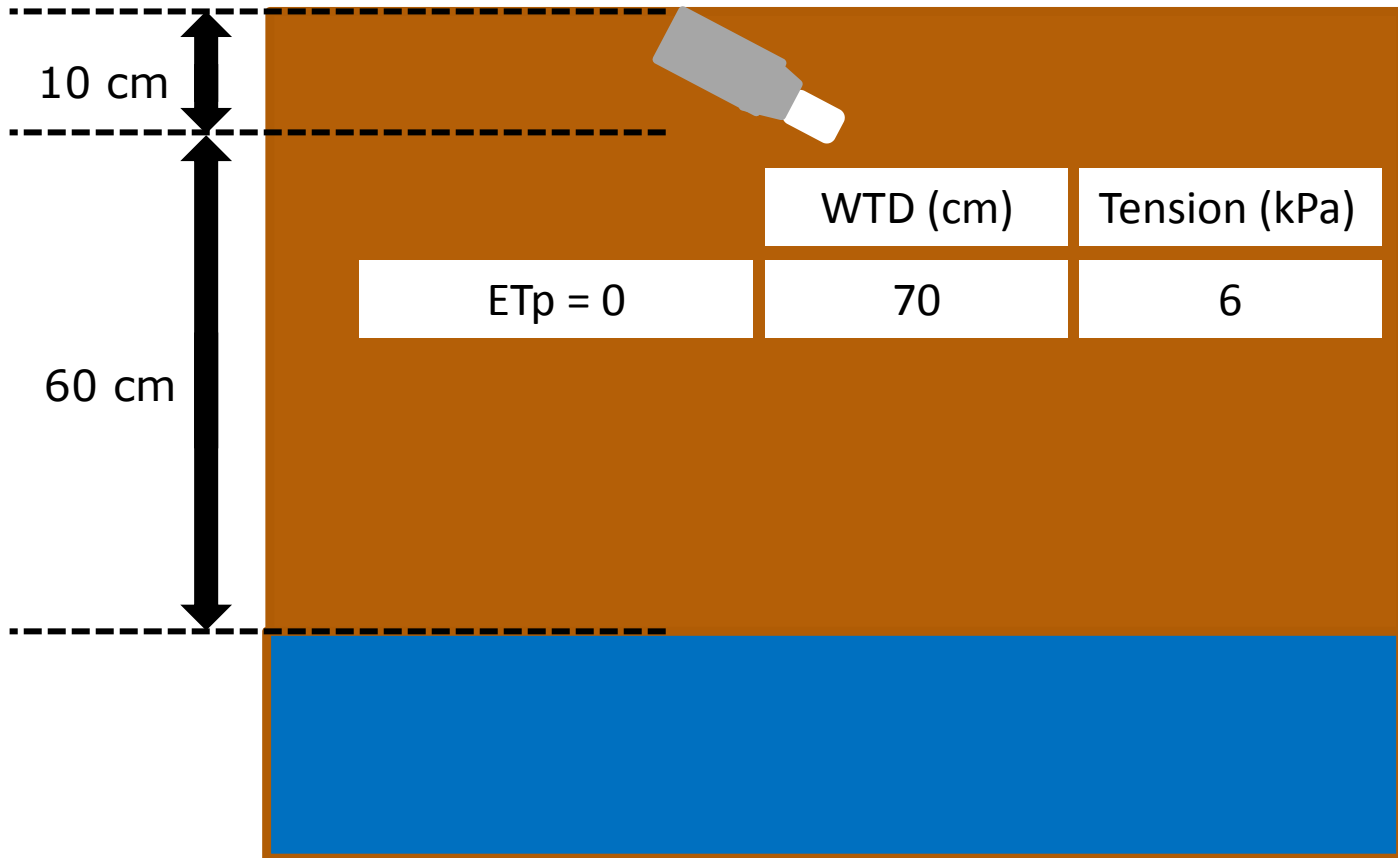
INTRODUCTION

SUBIRRIGATION



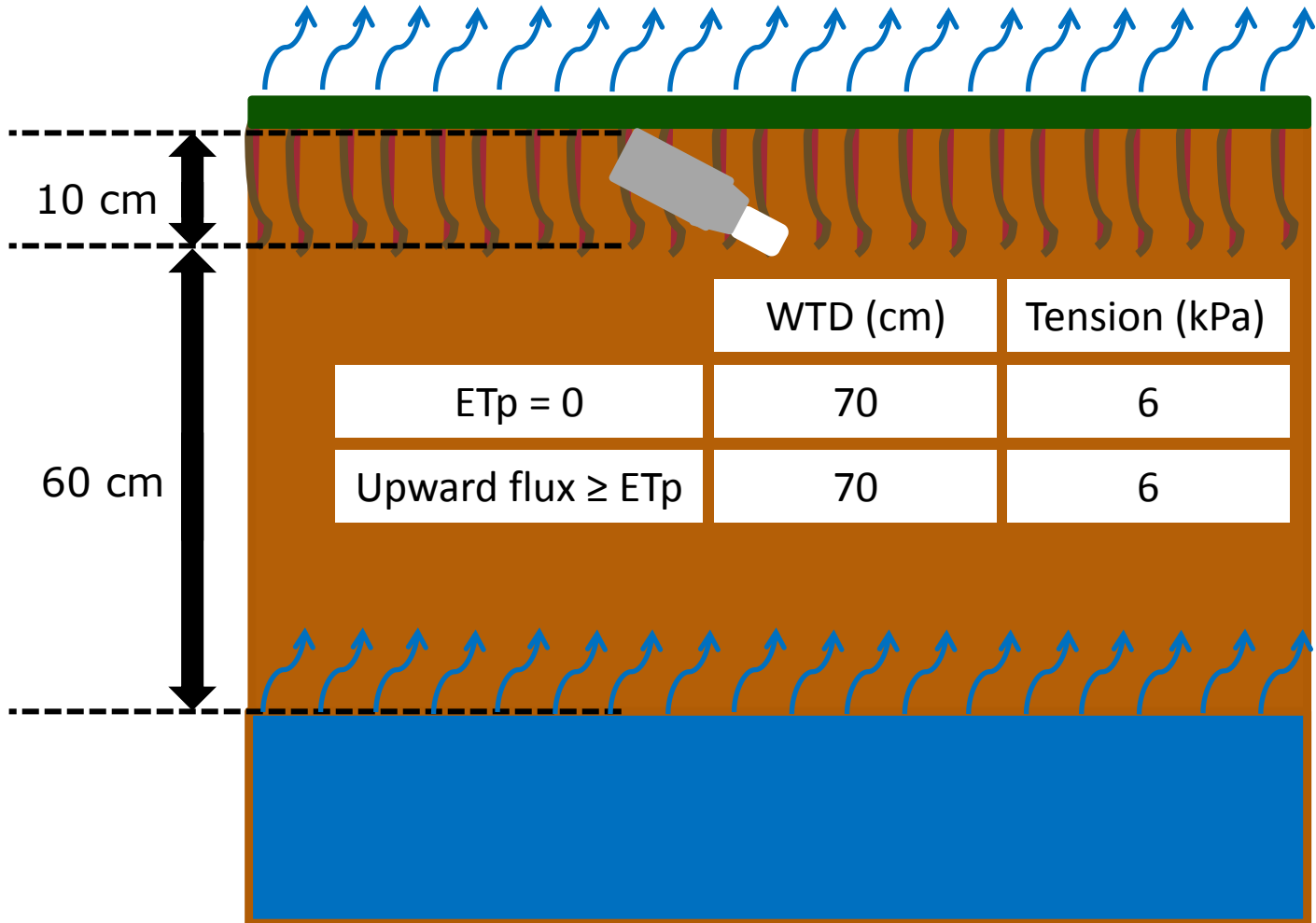
INTRODUCTION

TENSION VS WATER TABLE DEPTH



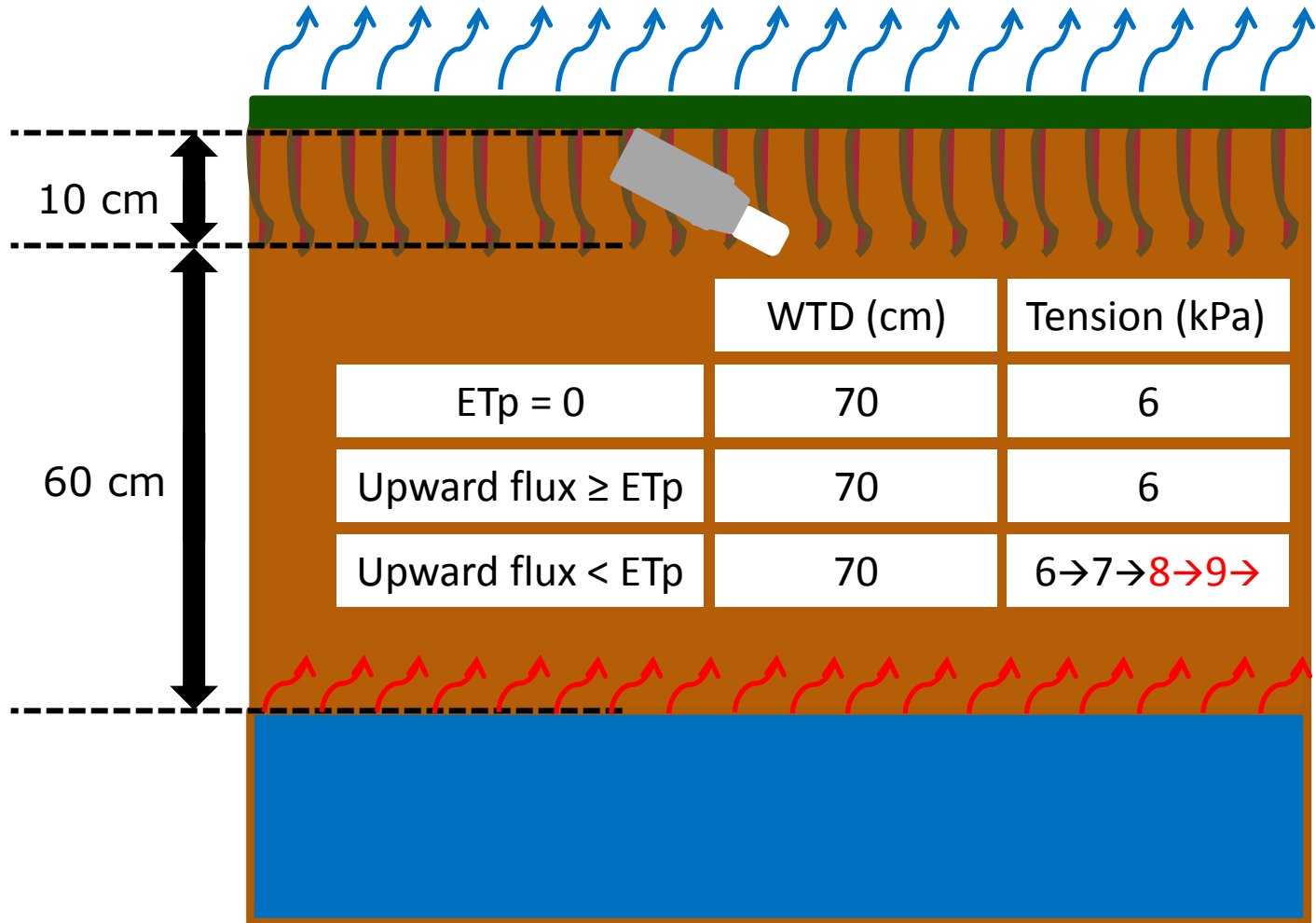
INTRODUCTION

TENSION VS WATER TABLE DEPTH



INTRODUCTION

TENSION VS WATER TABLE DEPTH



OBJECTIVE

The objective of this work was to determine the optimal WTD using three criteria:

1	YIELD	Maximizing yield without affecting the fruit quality
2	IRRIGATION	Minimizing the use of sprinkler irrigation
3	DRAINAGE	Ensuring fast drawdown of the water table

MATERIAL AND METHODS

Three experimental sites in the Province of Québec:

Testing WTD 50-90 cm

66 acres (Fine-Medium sand)

Two years (2013-2014)

1	YIELD	<ul style="list-style-type: none">• 1600 Yield samples (1075 cm²)• 36 Yield components samples (182 cm²)• 26 Fruit quality samples (Brix, TAcy, Titratable acidity, Brix/TA)
2	IRRIGATION	<ul style="list-style-type: none">• 24 Tensiometers (Hortau) → Sprinkler irrigation if Tension > 7.5 kPa
3	DRAINAGE	<ul style="list-style-type: none">• 200 Observation wells (Manual readings each week)• 20 Water level probes (HOBO)

MATERIAL AND METHODS

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Testing WTD 50-90 cm

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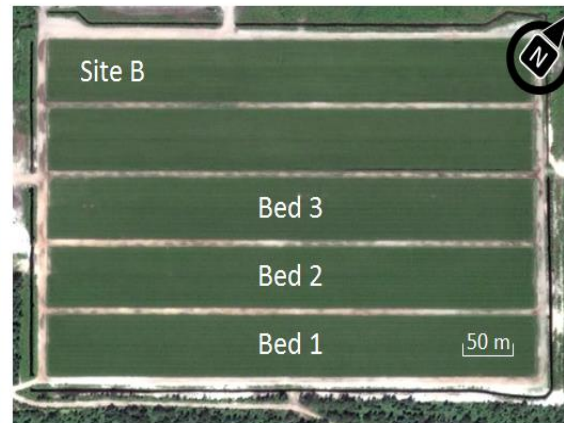
Two years (2013-2014)

Cultivar : Stevens

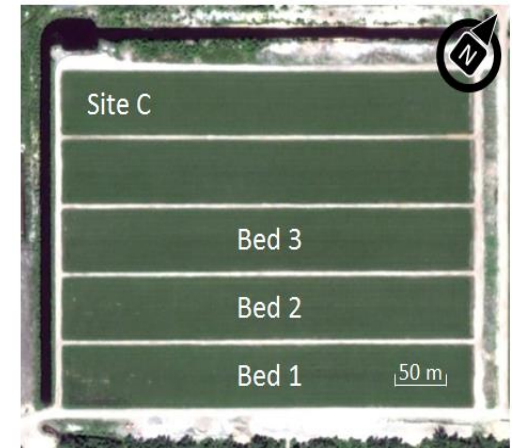
Conventiionnal



Organic



Organic



RESULTS

1

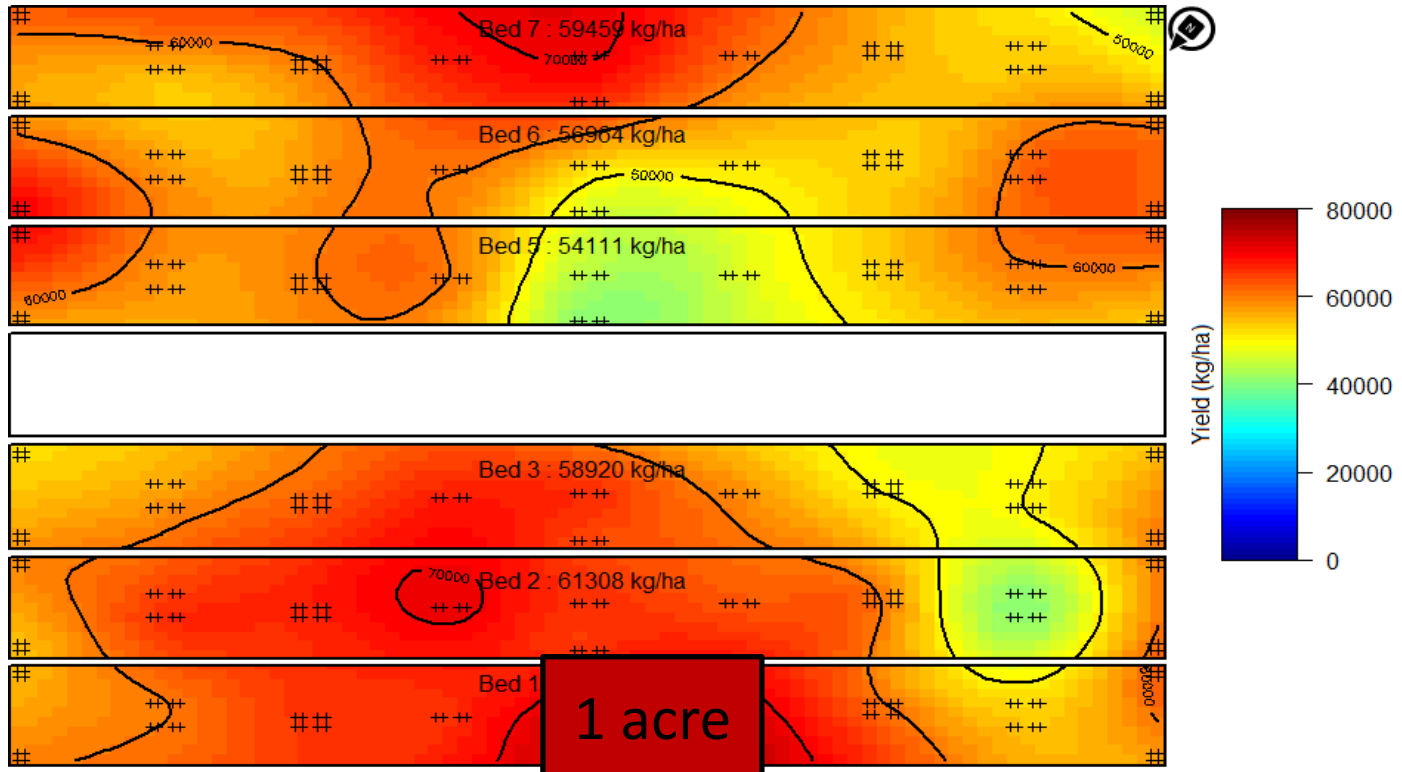
YIELD

Site
A

Average : 52 825 lbs/acre

Qc Conv. Ave. (2014) : 29 520 lbs/acre

>
44%



➔ 70 000 lbs/acre; Maximum: 85 028 lbs/acre

RESULTS

1

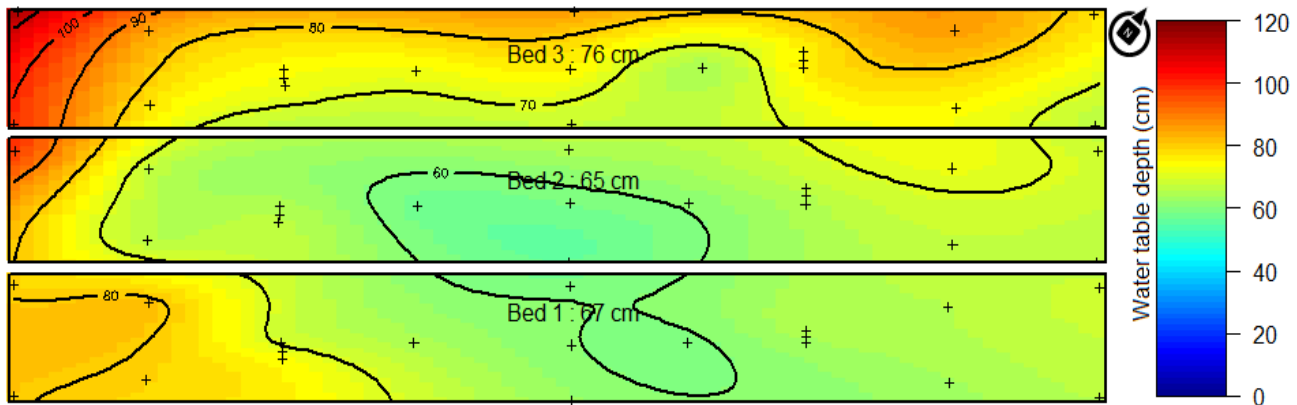
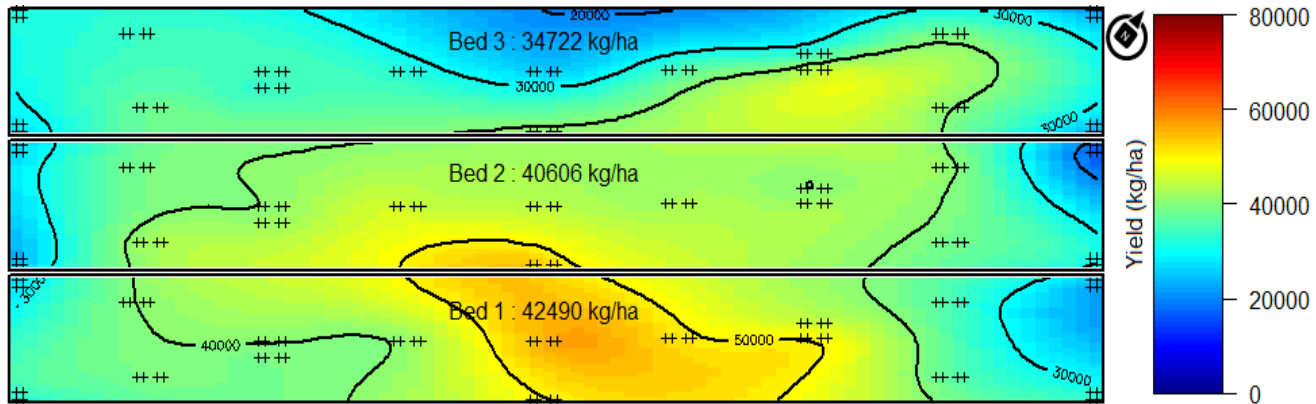
YIELD

Site
B-C

Average : 26776 - 35065 lbs/acre

Qc Org. Ave. (2014) : 21646 lbs/acre

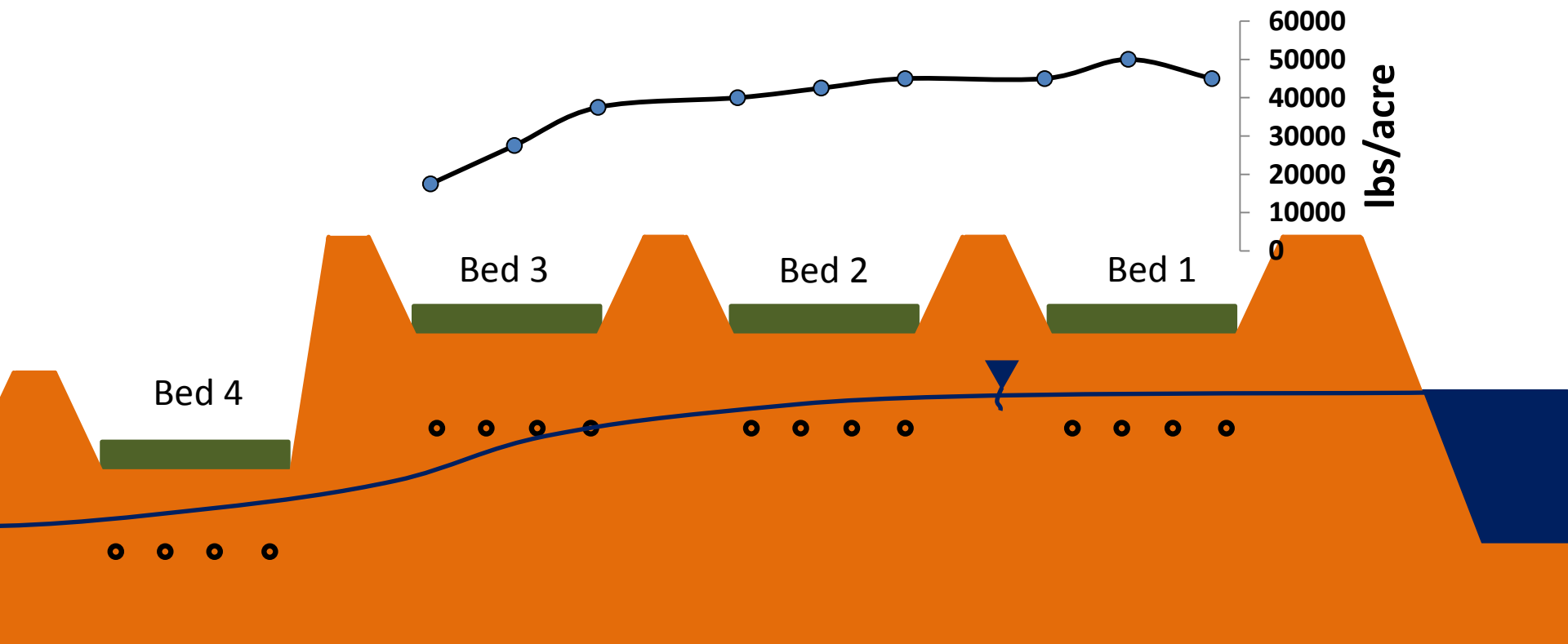
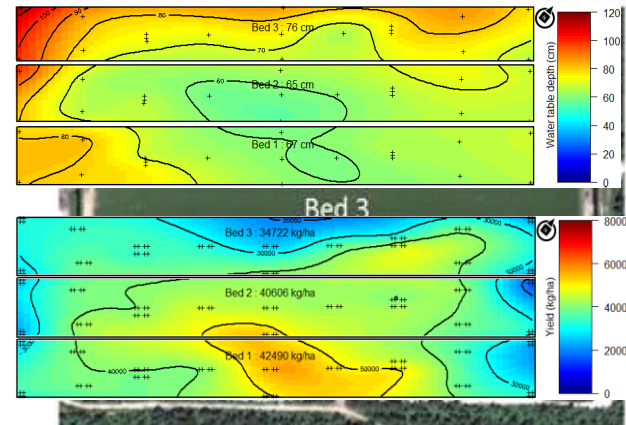
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43%



RESULTS

1

YIELD

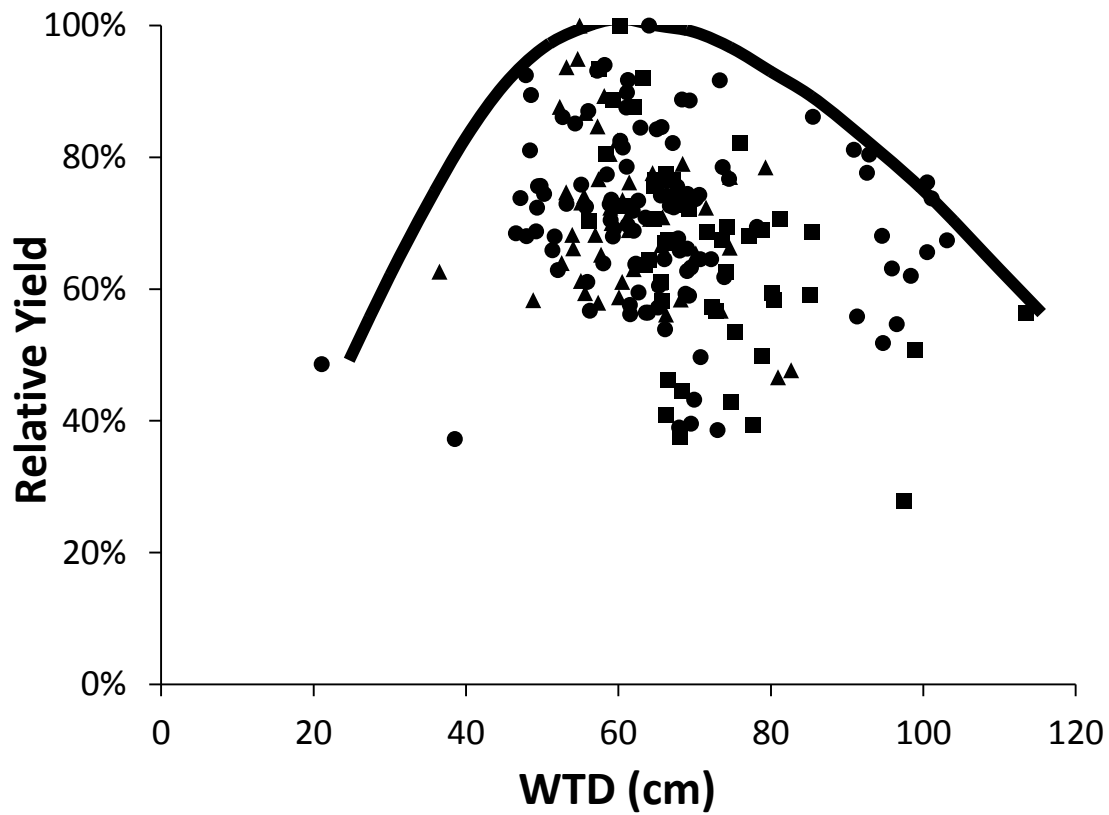


RESULTS

1

YIELD

— ■ Boundary line approach



RESULTS

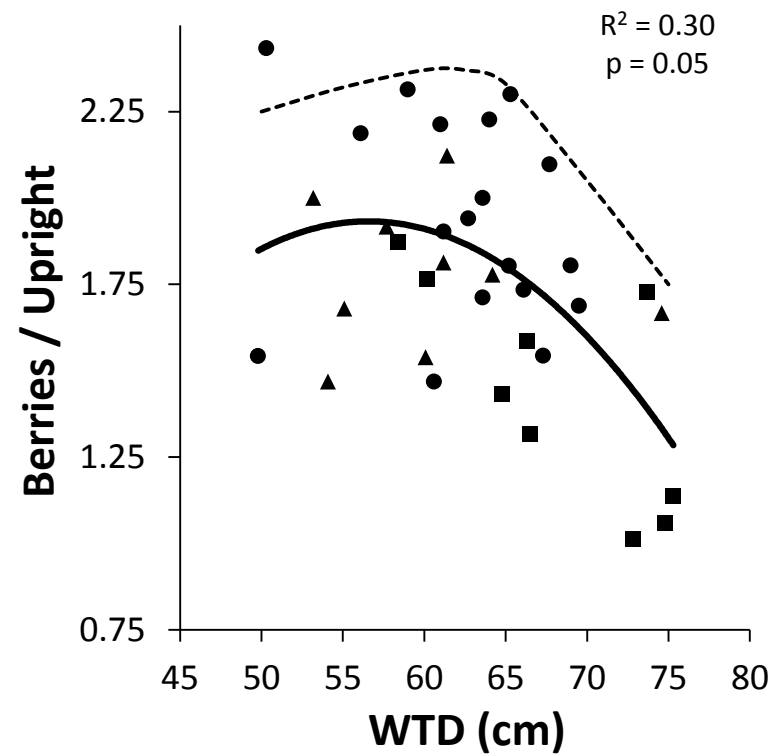
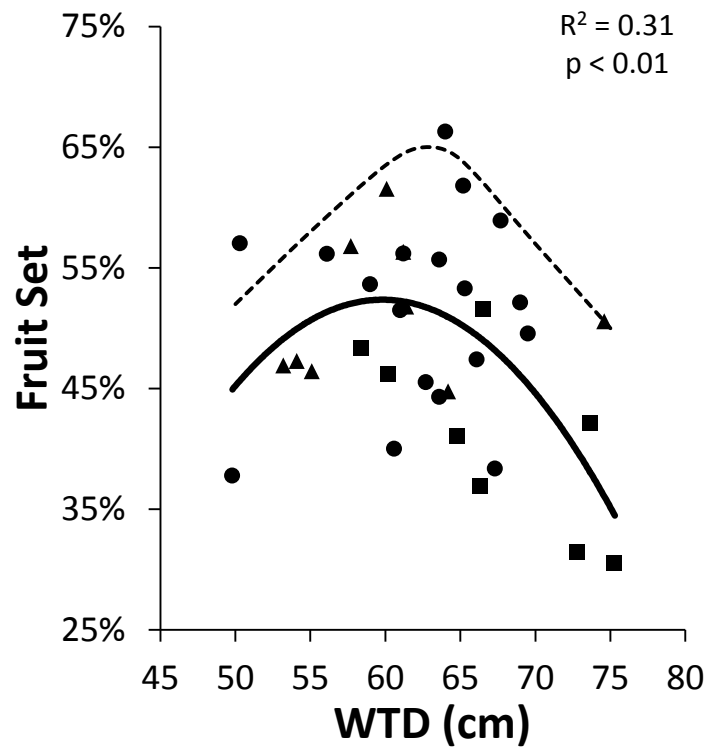
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YIELD

YIELD COMPONENTS

--- Boundary line approach

— Regression line



RESULTS

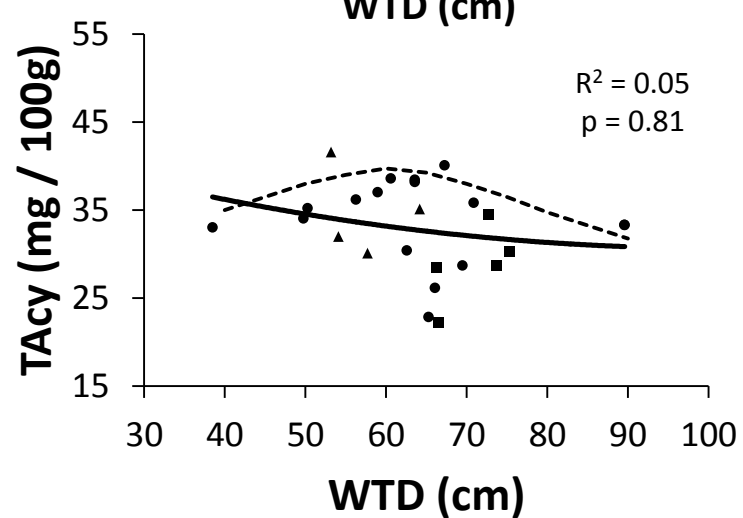
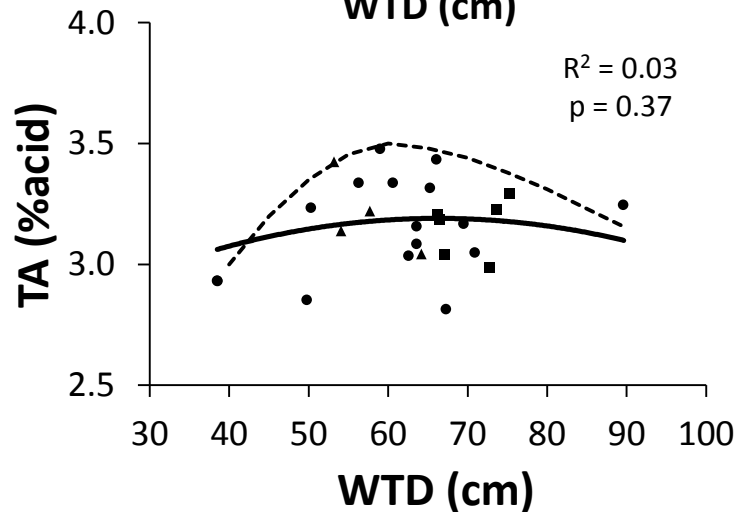
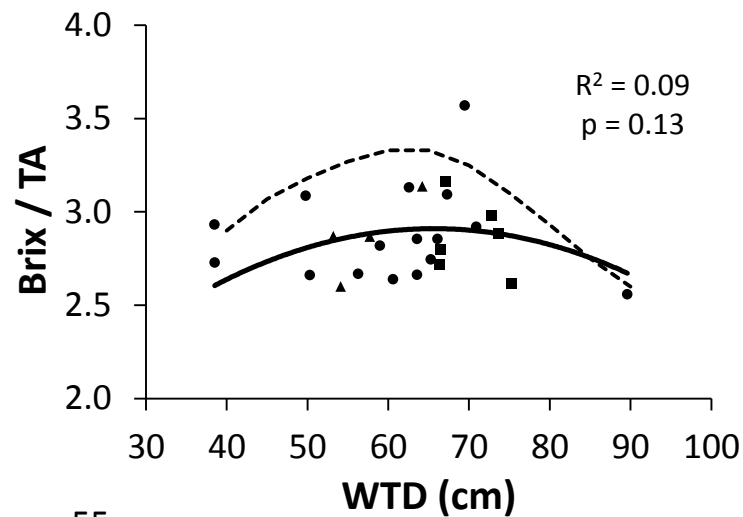
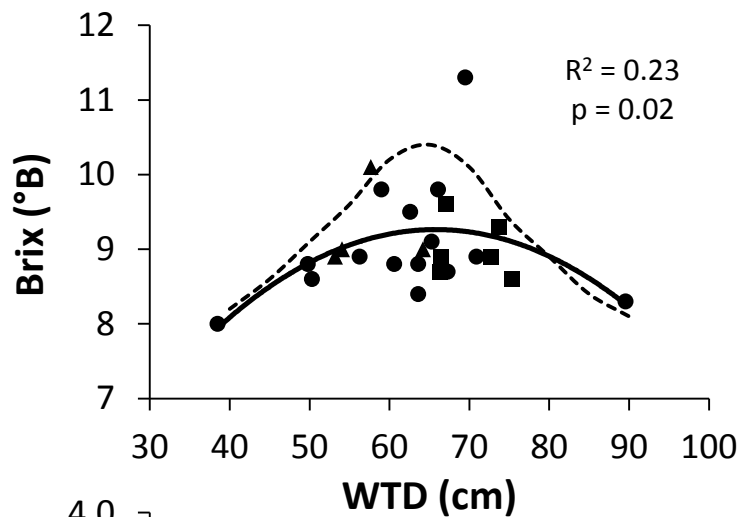
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YIELD

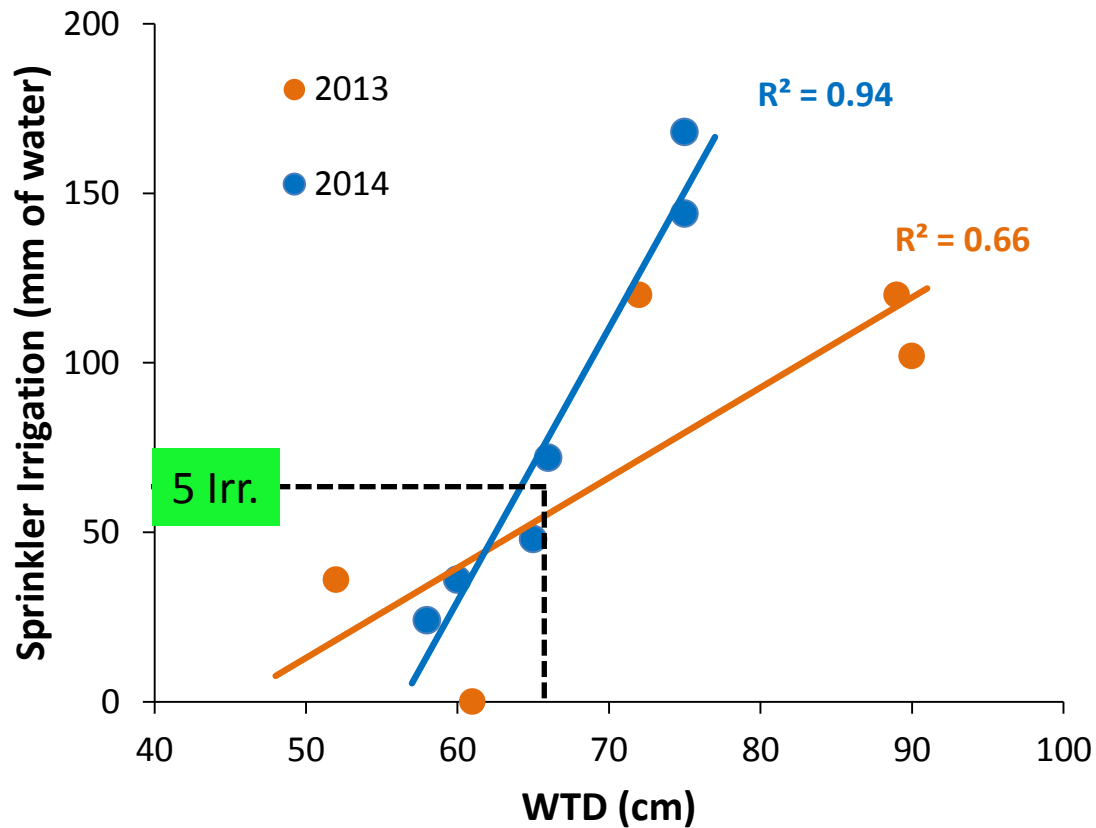
FRUIT QUALITY

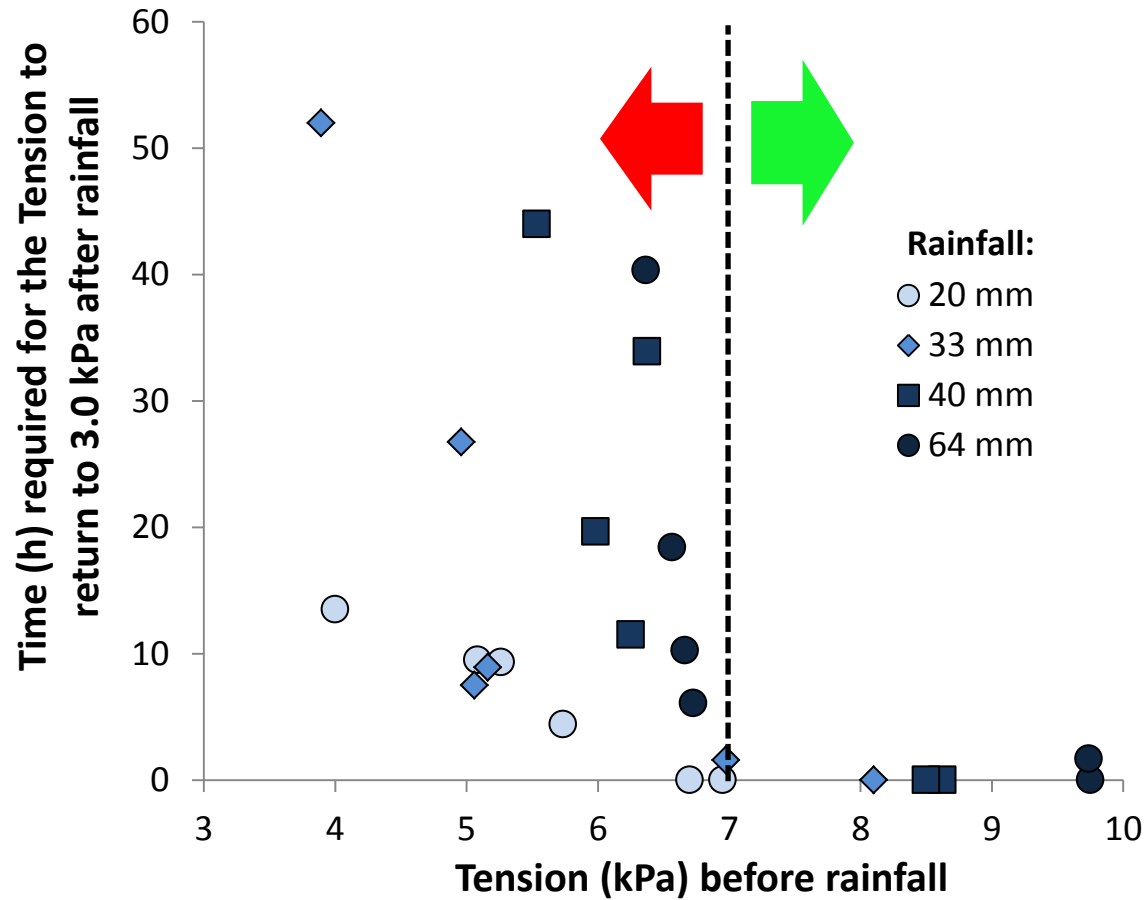
----- Boundary approach line

— Regression line



When WTD was on average 50-66 cm = Sprinkler water saving of **77 %**





CONCLUSION

From the 66 acres experiment on fine-medium sand:

1	YIELD	Yield and fruit quality were maximized at WTD=60 cm
2	IRRIGATION	Water saving of 77% when WTD < 66 cm
3	DRAINAGE	WTD should be lowered to 80 cm before rainfall



The beds on a same level must be surrounded by canals.



Further work : Using DRAINMOD

- to determine the optimal WTD in other soil types
- to design optimal drainage systems

ACKNOWLEDGMENTS

