

Effect of Irrigation Water Sources on Vegetables and Citrus Growth and Development: A Green House Study

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Introduction

- Greenhouse farming is a way of producing foods such as fruits, vegetables, and flowers that are under a controlled environment.
- Many farmers that grow in fields always run the risk of natural disasters occurring, not favorable temperatures, droughts, they all lose profit because of this.
- Greenhouse farmers compared to the field farmer's risk is reduced because of the optimal conditions a greenhouse farmer can control.
- Irrigation water sources and quality may impact the growth, development, and overall yield of crops grown in the greenhouse.

Objectives

- Determine the effect of irrigation water sources on vegetables and citrus root stock (sour orange) growth and development.

Methods and Materials

- Four different sources of water; well water from South Texas (TAMUK Citrus Center, Weslaco), Rio Grande River water collected from canal (use as irrigation source in Rio Grande Valley region), tap water from the TAMUK greenhouse, and water collected via Reverse osmosis process (TAMUK greenhouse).
- The reverse osmosis was used as a control.
- Two leafy vegetables/herbs (cilantro & spinach), two root vegetables (carrots & radishes), and a citrus rootstock sour orange.
- The vegetables and citrus root stock were planted in a randomized complete block design (RCBD) on containers/pots.
- Weekly height of the vegetables and citrus root stock was taken every week after germination
- The radish was harvested, and total biomass and yield were measured.

Results and discussion

- Based on the data collected from each crop, they all had their preferred irrigation source in which they benefited from. The leafy vegetables had the most growth development with the Reverse Osmosis irrigation treatment. As for the root crops, radish had the most growth when irrigated with the green house tap water while carrots preferred well water from the TAMUK University farm.

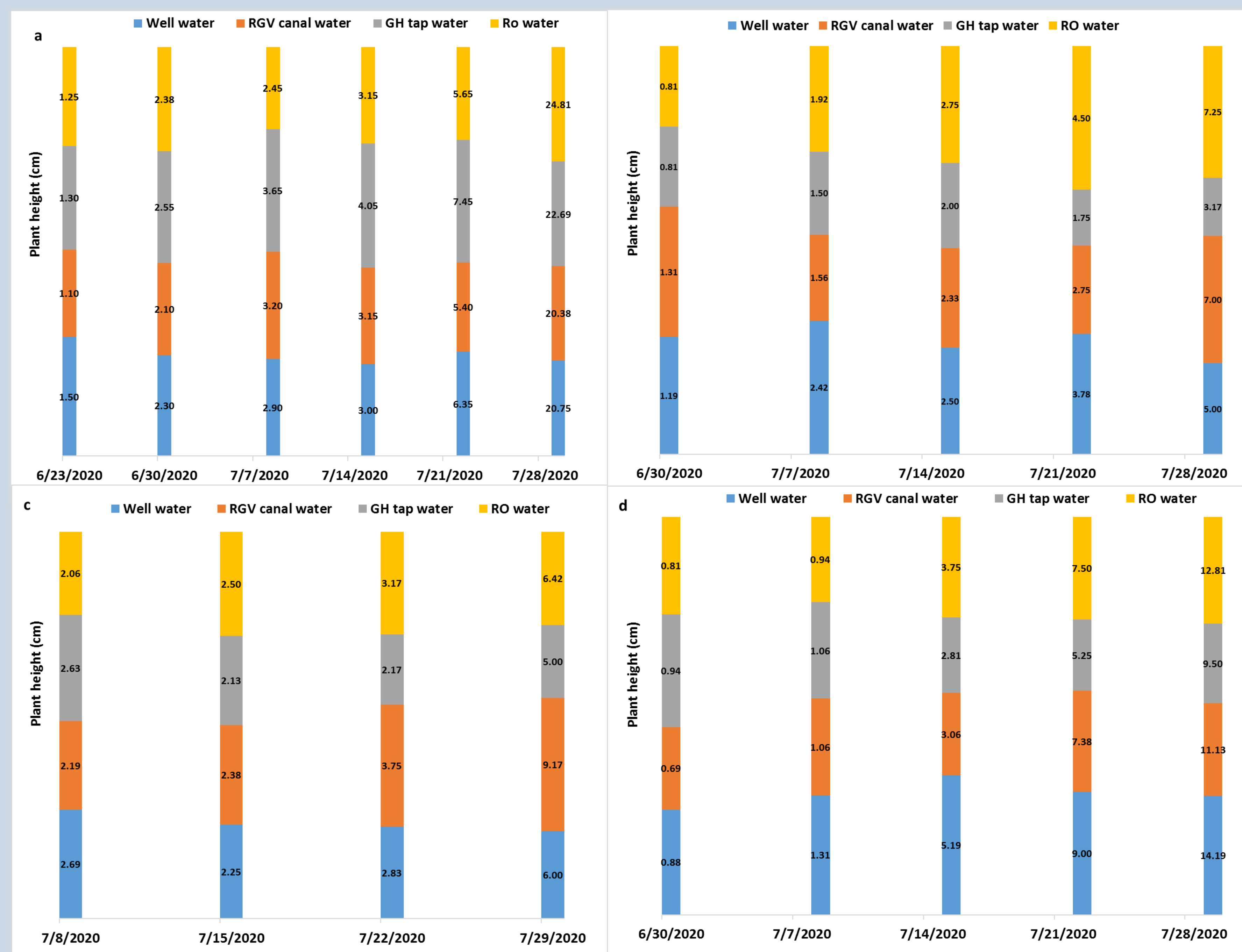
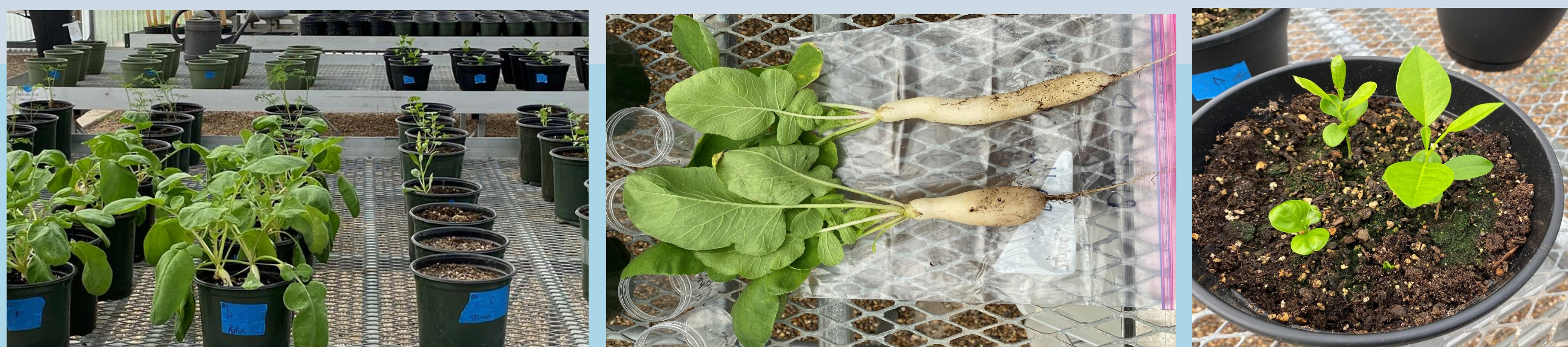


Figure 1. Vegetables height measured weekly based on water treatments. (1a radish; 1b carrots; 1c spinach; 1d cilantro)

Radish yield parameters at harvesting

Biomass (gram)	Yield (gram)	Diameter (cm)	Length 9cm
42	44	10	9
36	53	10	12
33	43	8	13
26	57	8	18



Results and discussion

- The SPAD chlorophyll meter readings based on water treatments were measured a week apart. The radish (Figure 2a.) had a trend where it had increased or stayed the same. The leafy vegetable spinach readings (Figure 2b.) increased after a week as for the trend of cilantro has decreased.

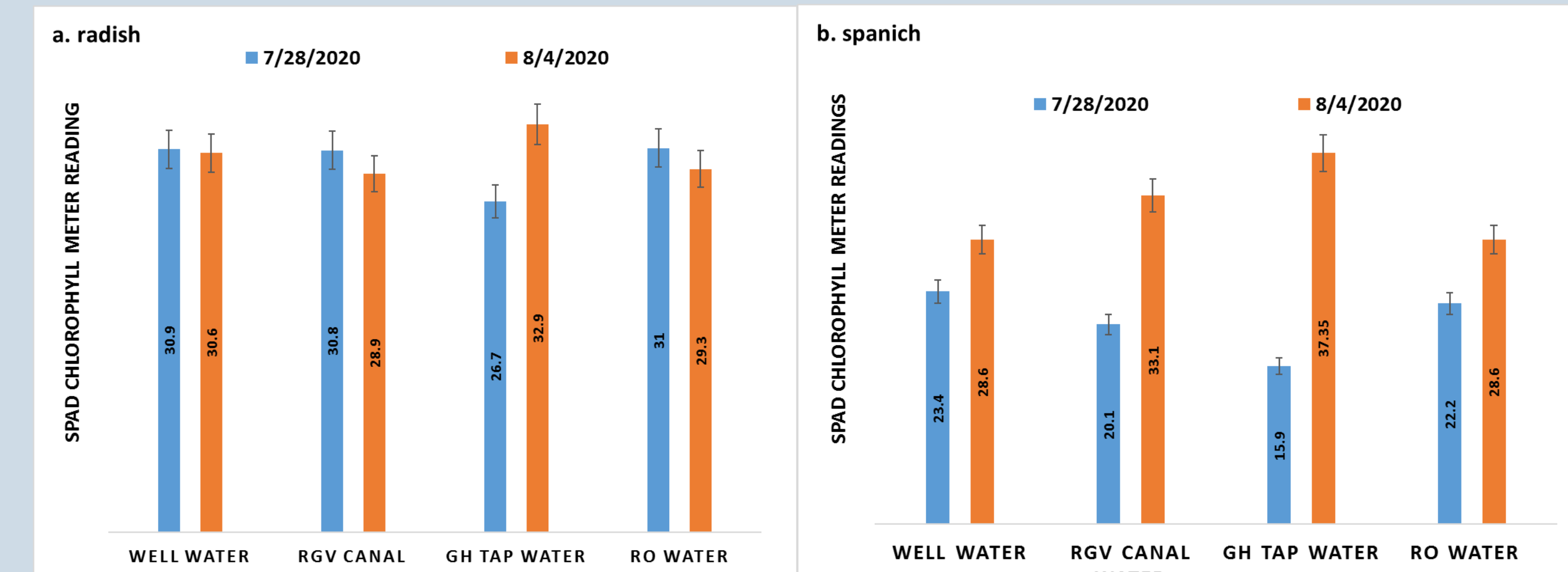


Figure 2. SPAD chlorophyll meter reading (2a. Radish; 2b. Spinach)

- The sour orange citrus height (3a) had the best growth development when watered with the Well water as well as the Greenhouse tap water. As for chlorophyll readings (3b), it mostly stayed the same except for the well water irrigated plants they decreased.

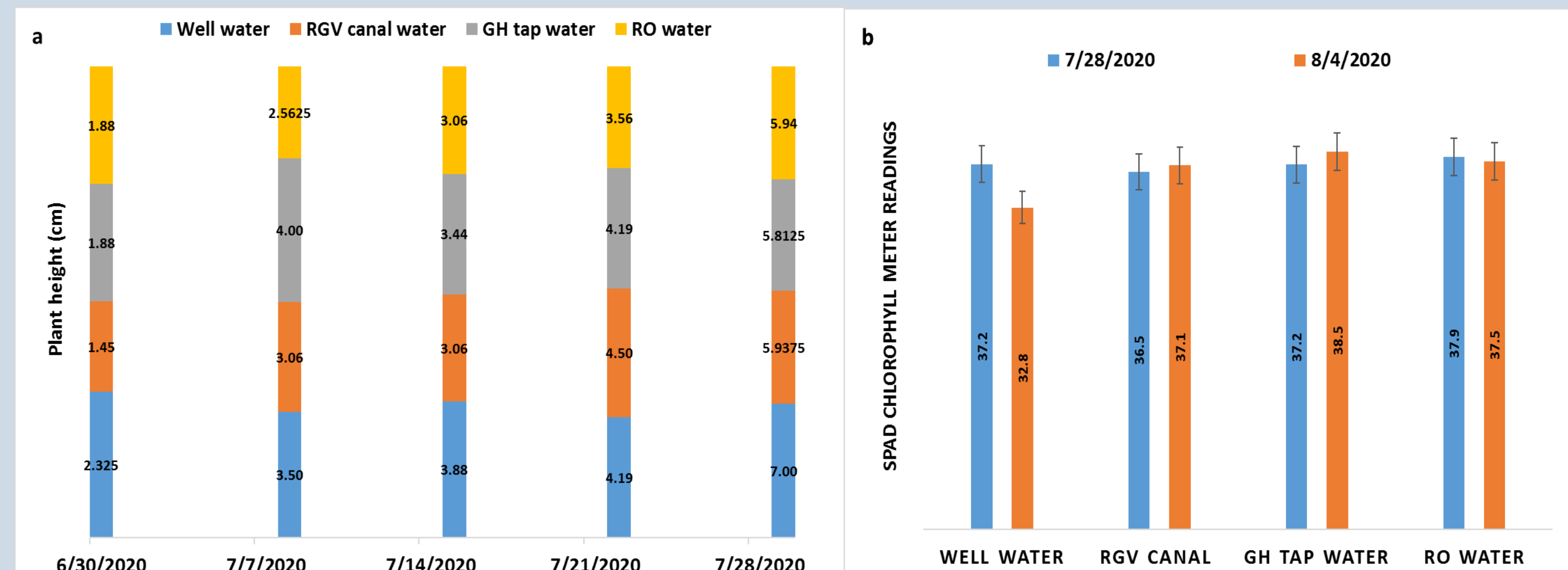


Figure 3. Sour orange height (3a.) and SPAD chlorophyll meter reading (3b)

Conclusions

- Based on this research results, different types of irrigation water sources can impact in vegetables and citrus rootstock (citrus) growth and development. The growth and development can impact chlorophyll content in leaves indicated by SPAD readings. Reverse osmosis (control) source had positive impacts on growth, development, and chlorophyll content. However, further study is required to quantify the extent of the effects of irrigation water sources on the growth and development of vegetable crops and citrus rootstock.

References

- *Greenhouse Farming: Pros and Cons*, www.grtrailers.com/greenhouse-farming-pros-cons/.
- Yasinzai, et al. "WHAT IS GREENHOUSE FARMING?" *GreenHouse Planter*, 16 Oct. 2019, greenhouseplanter.com/what-is-greenhouse-farming/.