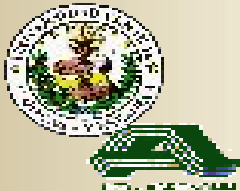




Arid and Semi Arid Development through Water Augmentation  
December 13-17 2010, Valparaiso, Chile

# Use of synthetic (hydrogel) and organic soil conditioners to improve the water use efficiency in Green Pepper cultivation



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## Objective:

to evaluate the effect of a water absorbent (hydrogel) soil conditioner and other organic conditioners on the water use efficiency and biomass production of green pepper plants in two localities in Venezuela



**Lat: 0° 45' - 12° 11' 46" N**

**912.050 km<sup>2</sup>**

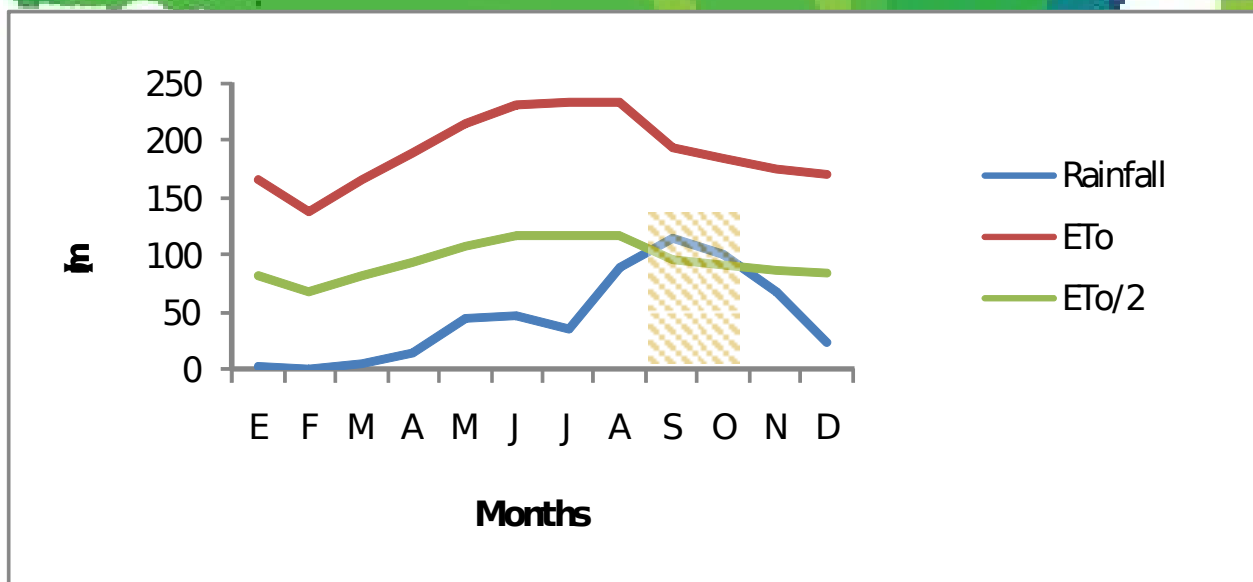
Zulia State

Falcón State



Regimen Hidrico

- Hyper-hydric
- Hydric
- Hyper-humid
- Humid
- Sub-humid
- Semi-arid
- Arid
- Hyper-arid



### **Zulia State:**

Ustic Haplargids sandy ( $\approx 80\%$  sand)

Low fertility

Low water retention

pH 5,7

Low organic carbon

### **Falcón State:**

Haplargids sandy ( $> 80\%$  sand)

Low fertility

Low water retention

Very low organic carbon

pH 7,7

## At Falcón state soil

- ❑ Soil + 'Bocashi' (BK) mixed with the soil in a 3:1 volume ratio ( 3 soil/1 compost).
- ❑ Soil + 'Terracottem®' hydrogel (TC): two dose 4 g per kg of soil (TC1) and 2 g per kg of soil (TC2).
- ❑ Soil + NPK fertilizer (18-18-18) (FQ) at a doses of 8,6 g/pot.
- ❑ A control treatment (SS) (without conditioner or fertilizer) was included in the experiment

## At Zulia state soil

- Soil + Terracottem®:  
mixture of hydroabsorbent  
polymers + fertilizers  
(5% N; 1% P<sub>2</sub>O<sub>5</sub>; 4% K<sub>2</sub>O).  
Dose 3 g kg<sup>-1</sup> **(STC)**



- Soil + Cow Manure:  
equivalent dose 13 t ha<sup>-1</sup>,  
+ urea (1,58 g/pot) +  
K<sub>2</sub>SO<sub>4</sub> (1,27 g/pot) **(SEB)**



- Soil + Chemical Fertilizer:  
0,391g urea (1,8 g N);  
0,254 g SPT (1,17 g P<sub>2</sub>O<sub>5</sub>) y



# Irrigation doses

- **100 % 'pot' capacity (100)** (similar to field capacity FC).
- **80 % 'pot' capacity (80)**

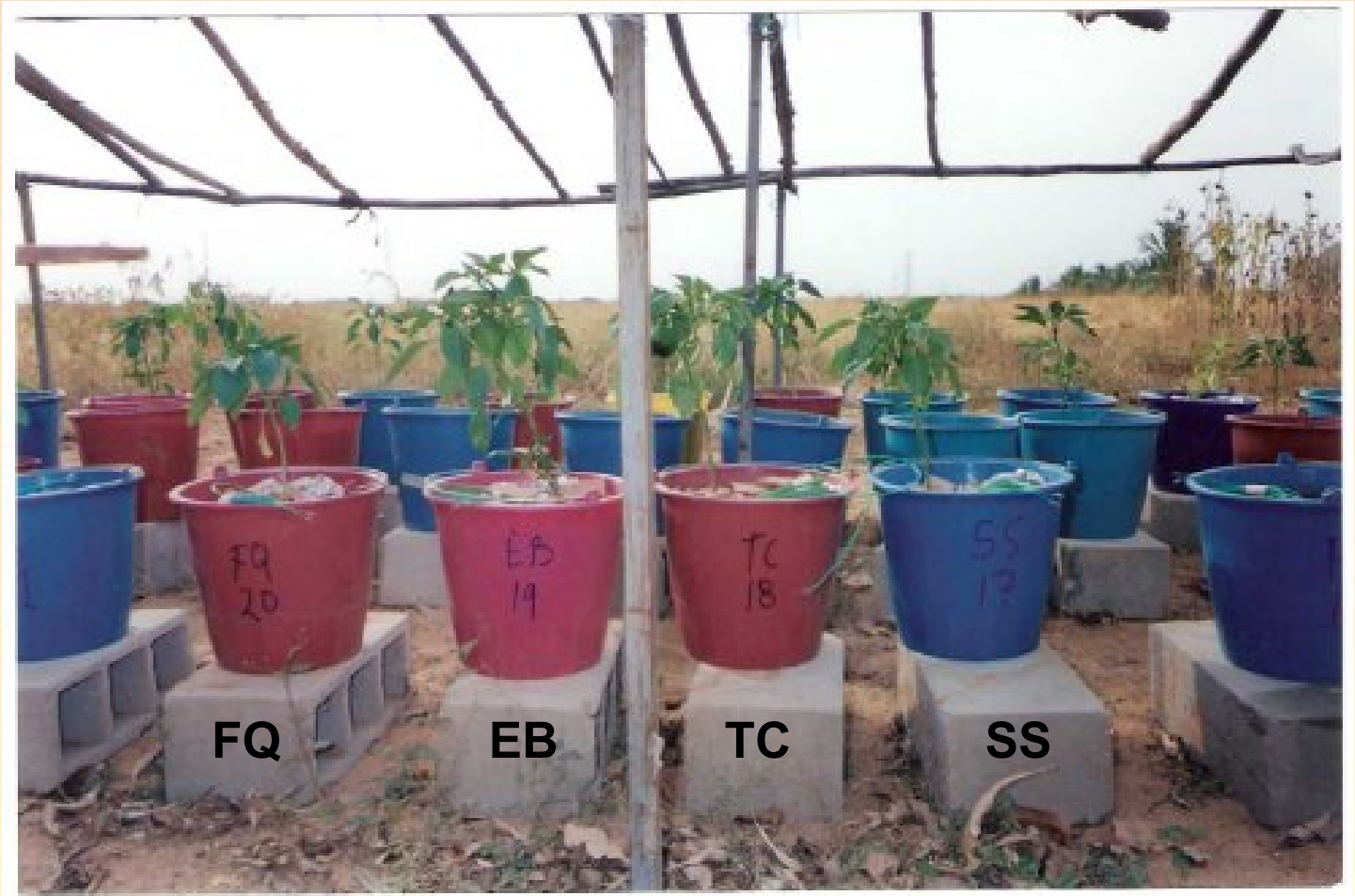
## Crop

**Green Pepper (*Capsicum annuum* L.)**

**California wonder**



**var.**



**FQ**

**EB**

**TC**

**SS**

- 🌶️ the total volume of applied irrigation water
- 🌶️ Interval of irrigation

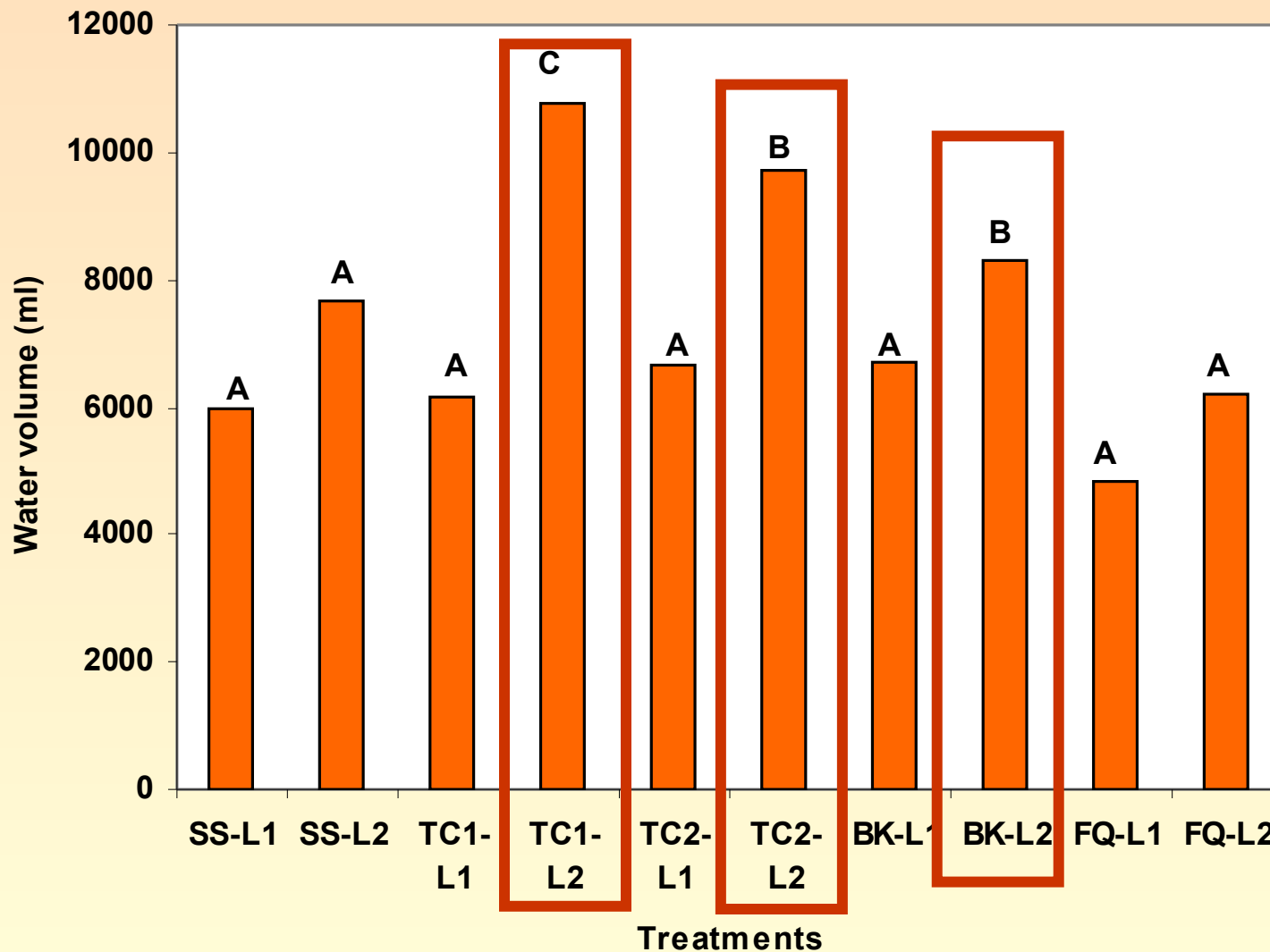
## In crop

- 🌶️ plant height
- 🌶️ above ground and root biomasses
- 🌶️ yield

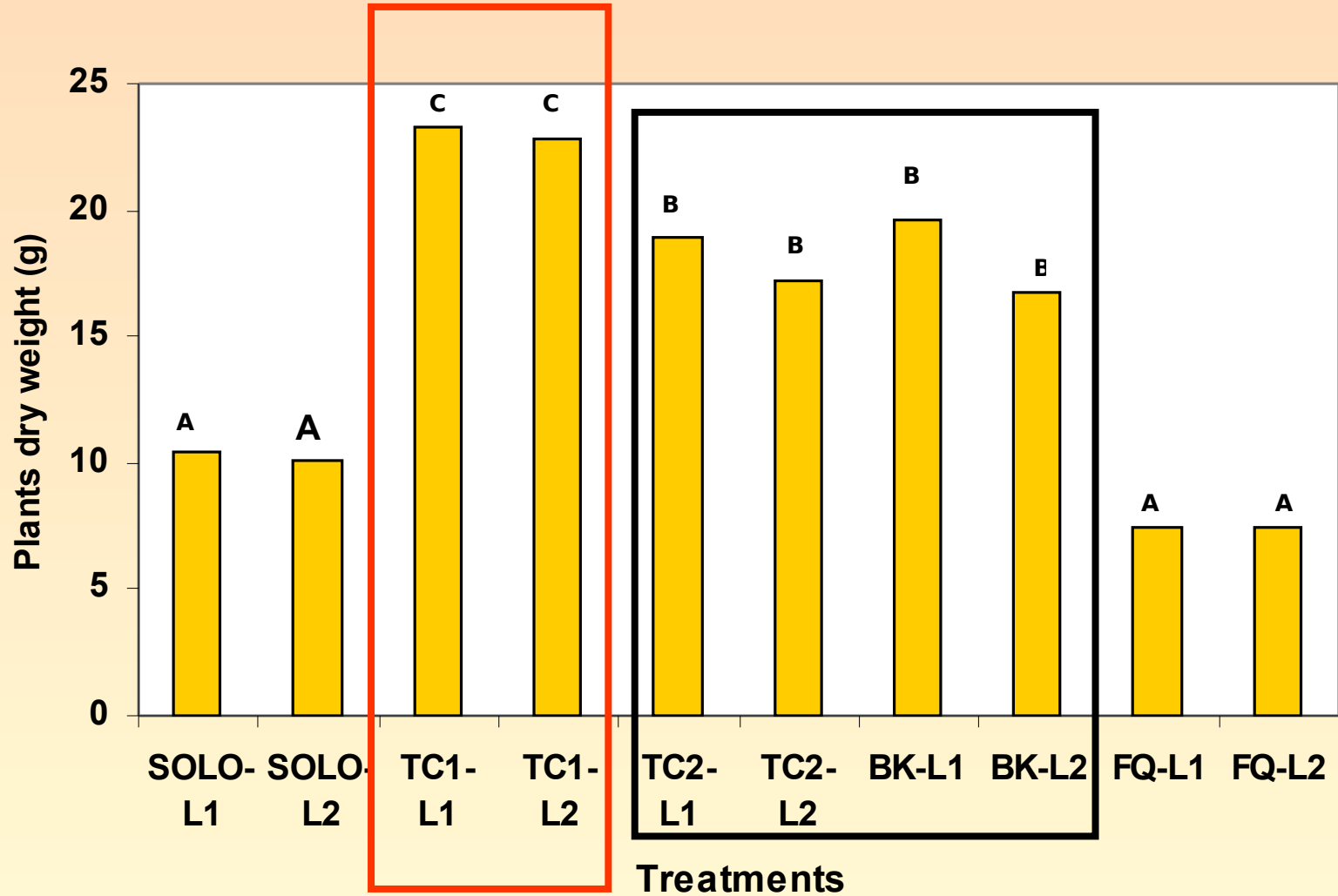


# Results

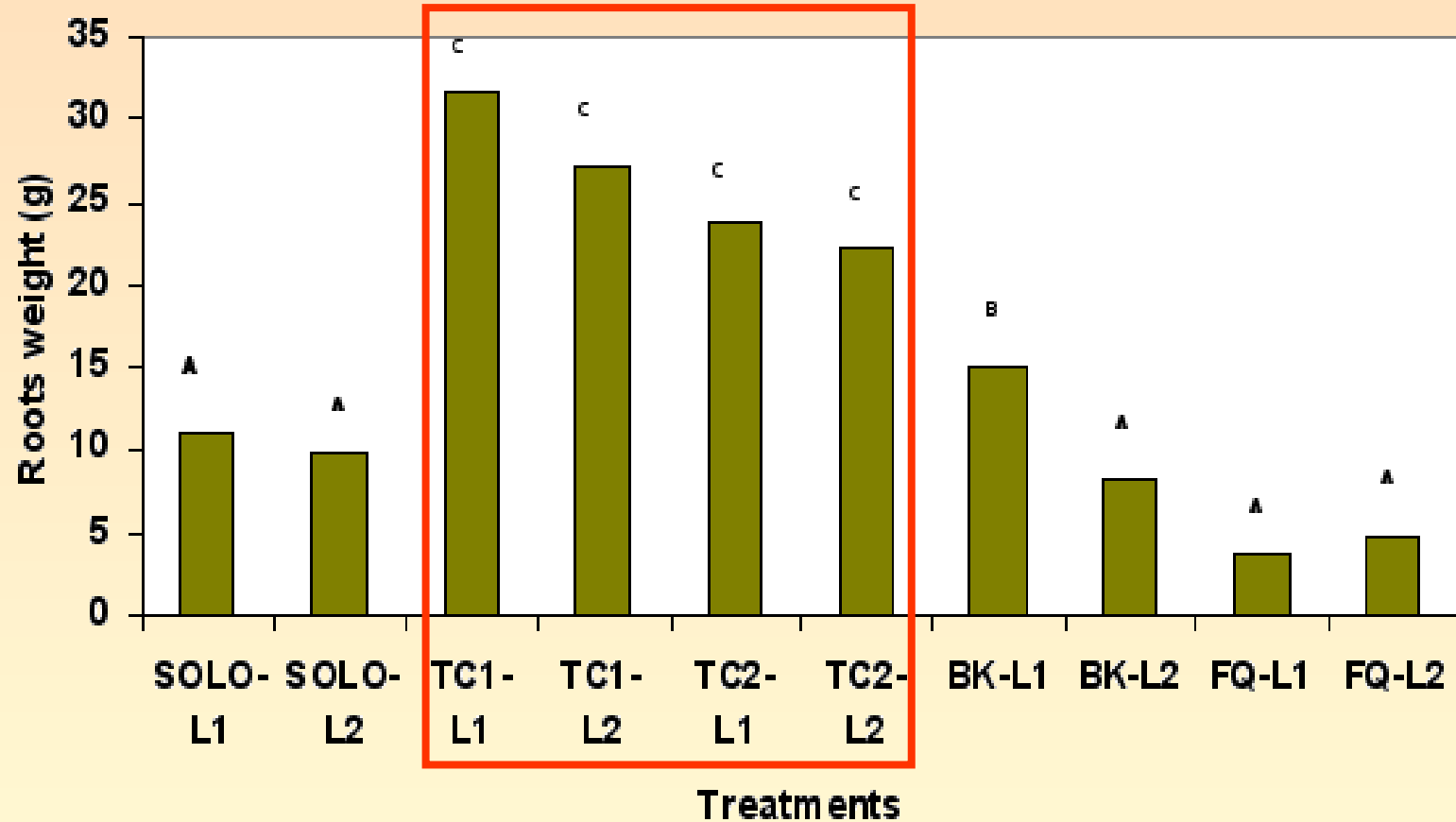
## Total water consumption after 28 days of green pepper cultivation at Falcón state soil



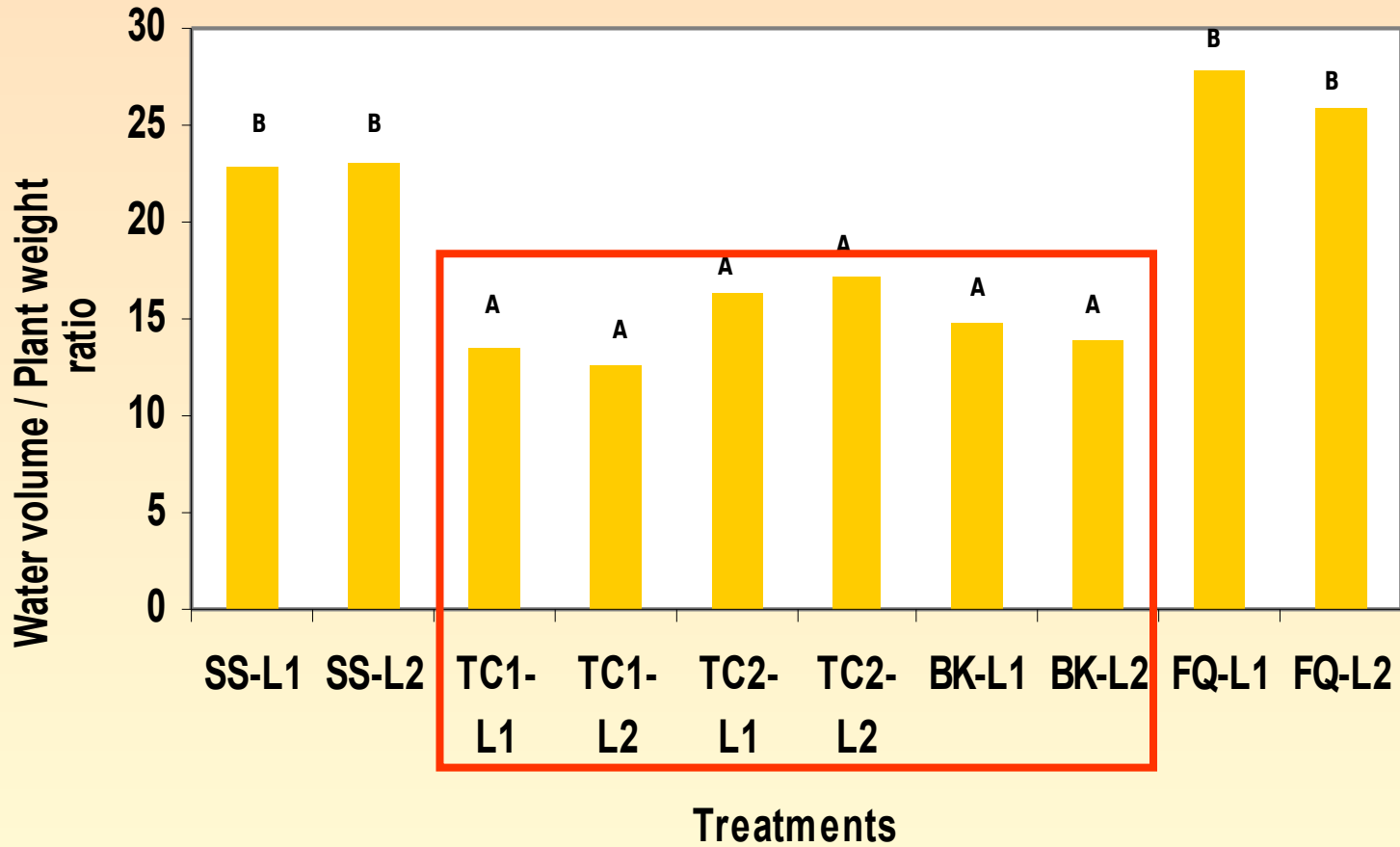
# Above ground biomass production at Falcón state soil



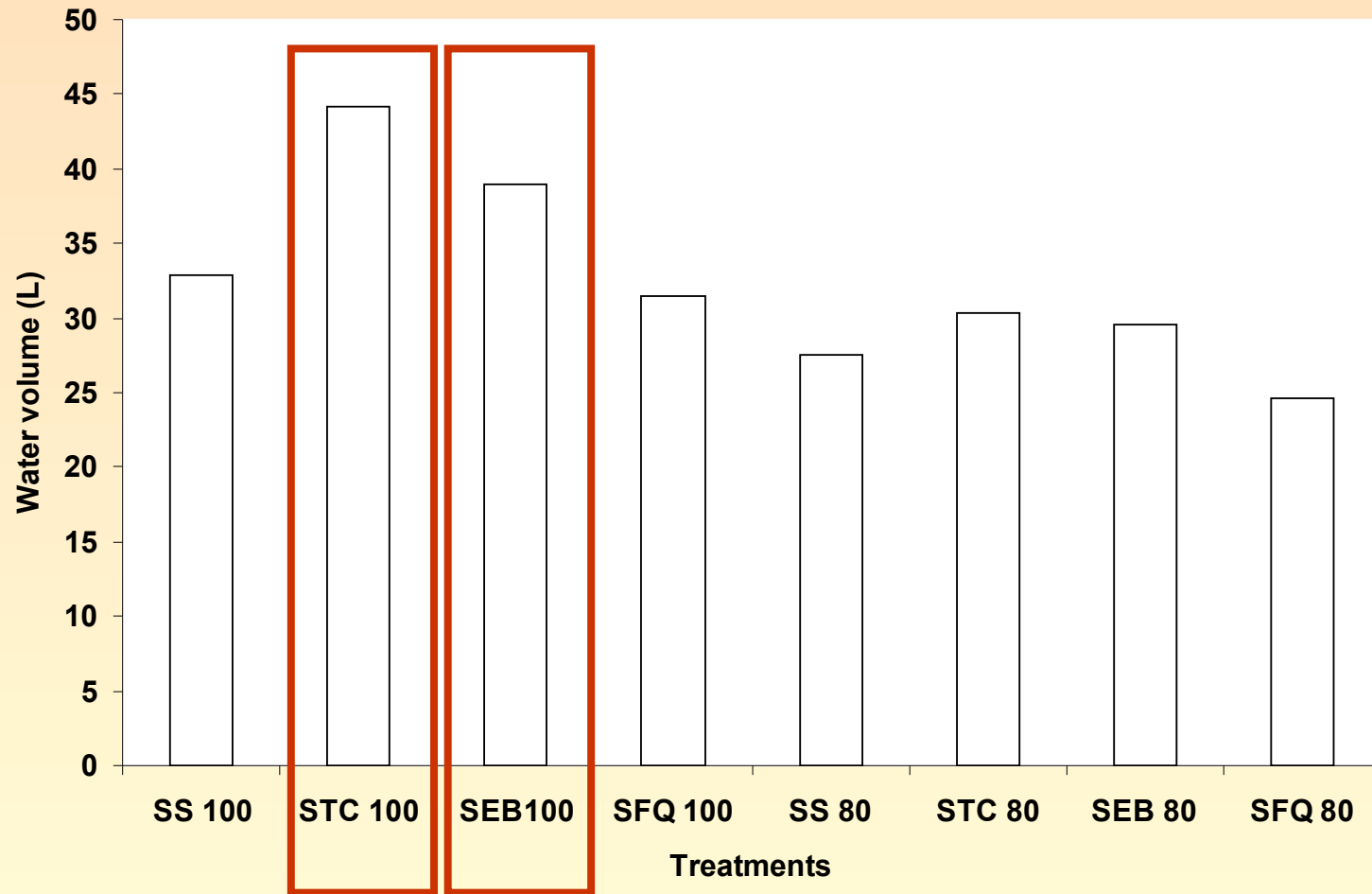
# Root biomass at Falcón state soil



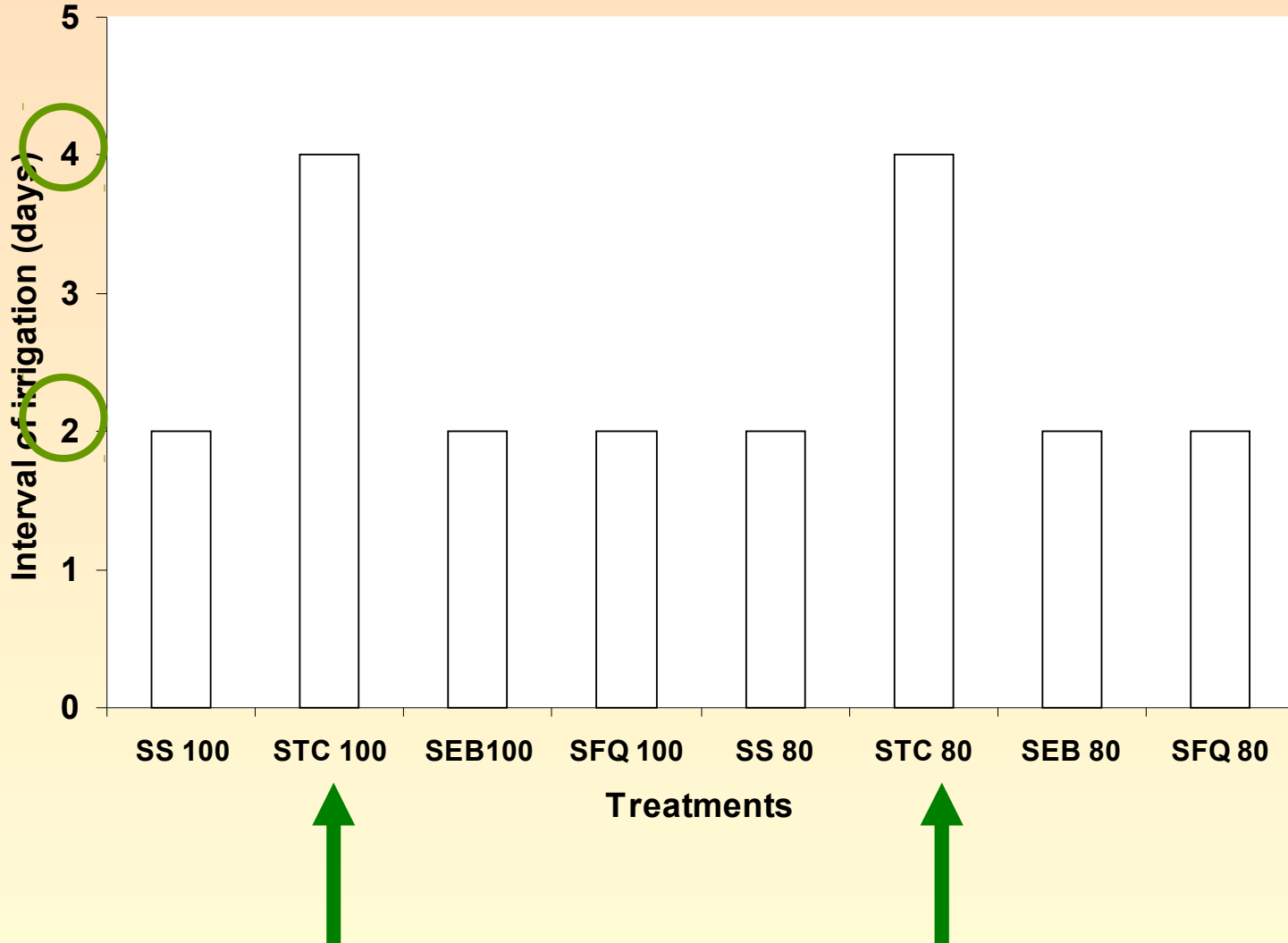
# Water consumption per unit of above ground biomass at Falcón state soil



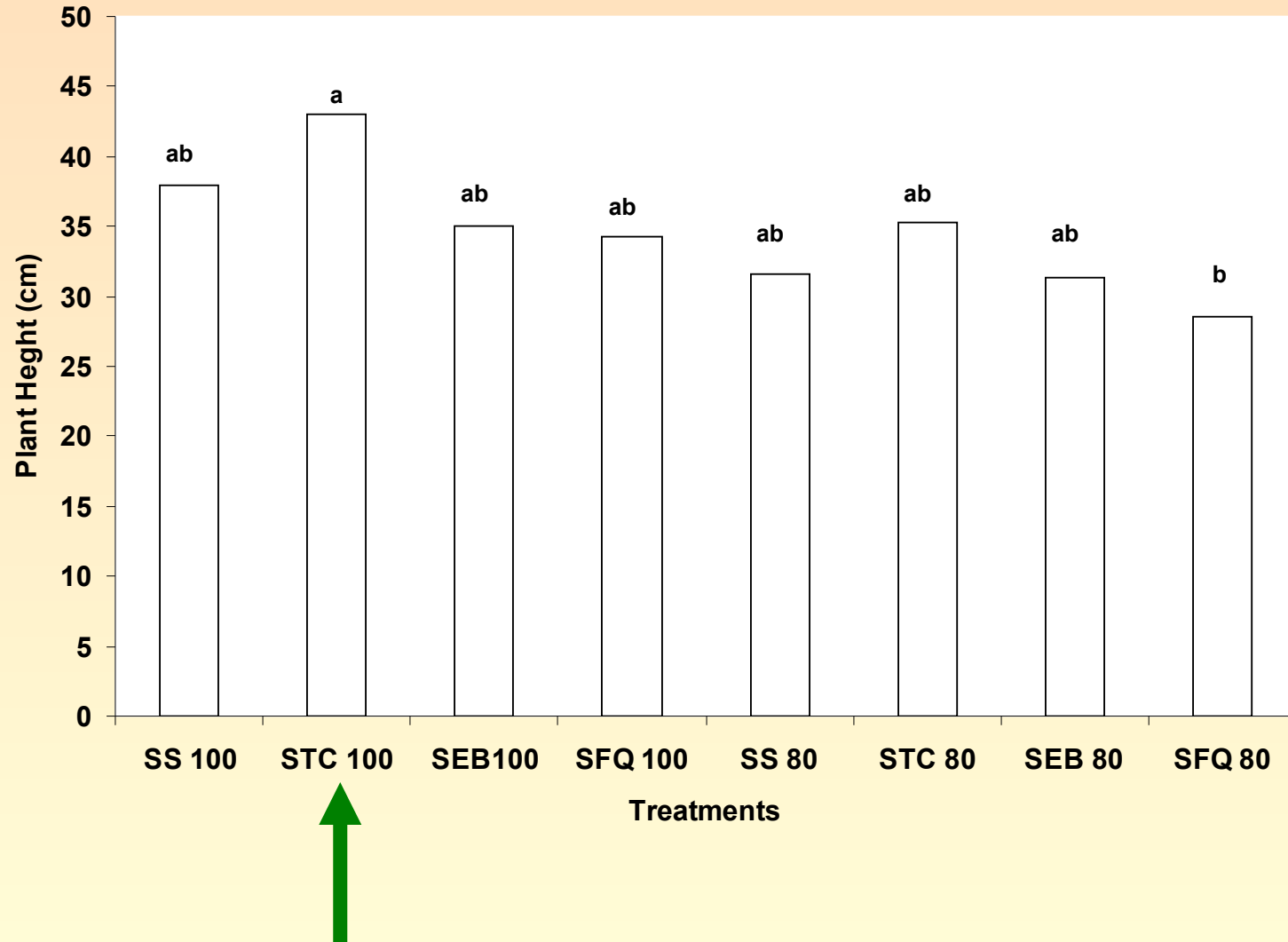
# Total volume of applied irrigation water at Zulia state soil



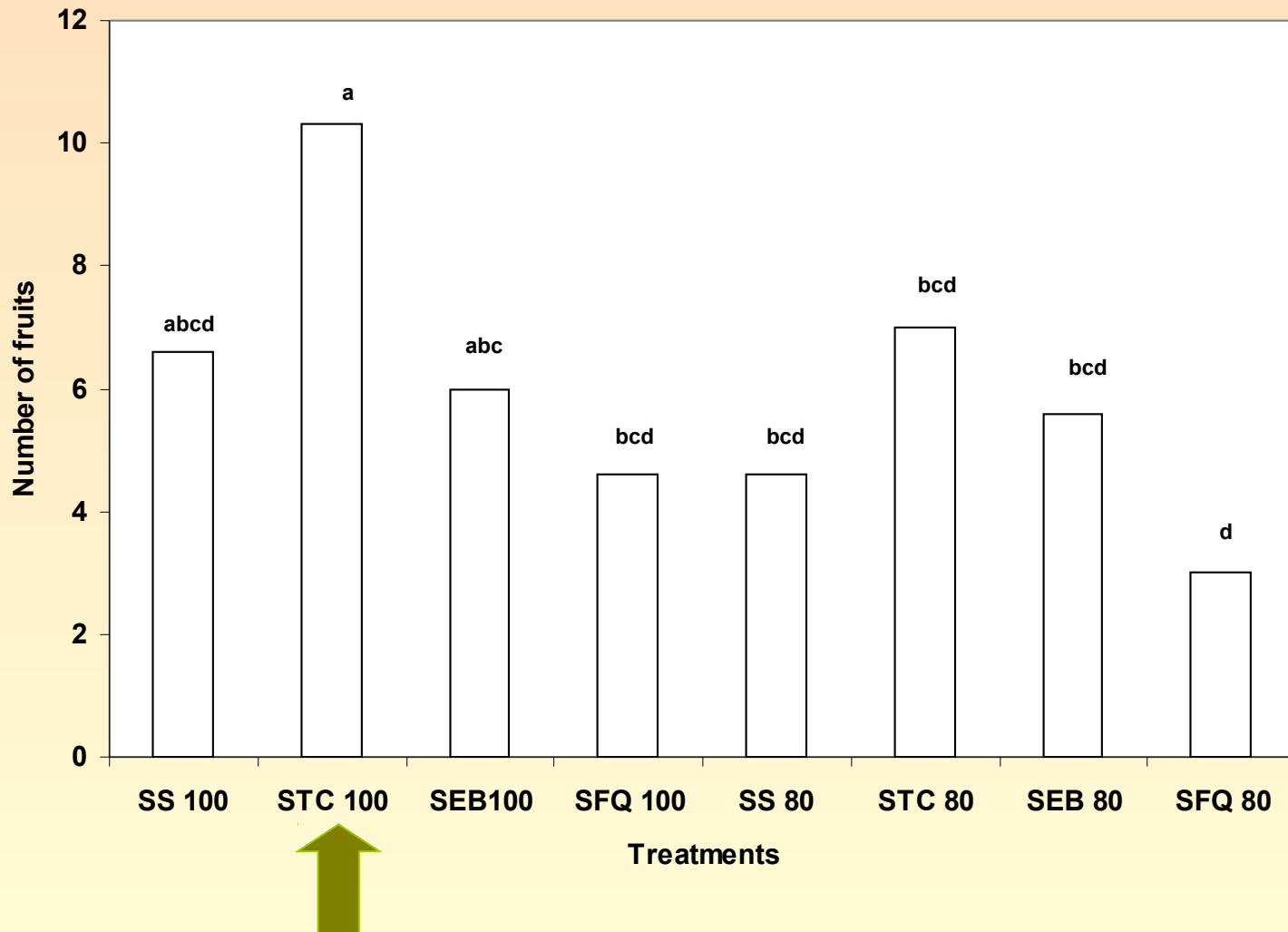
# Interval of irrigation at Zulia state soil



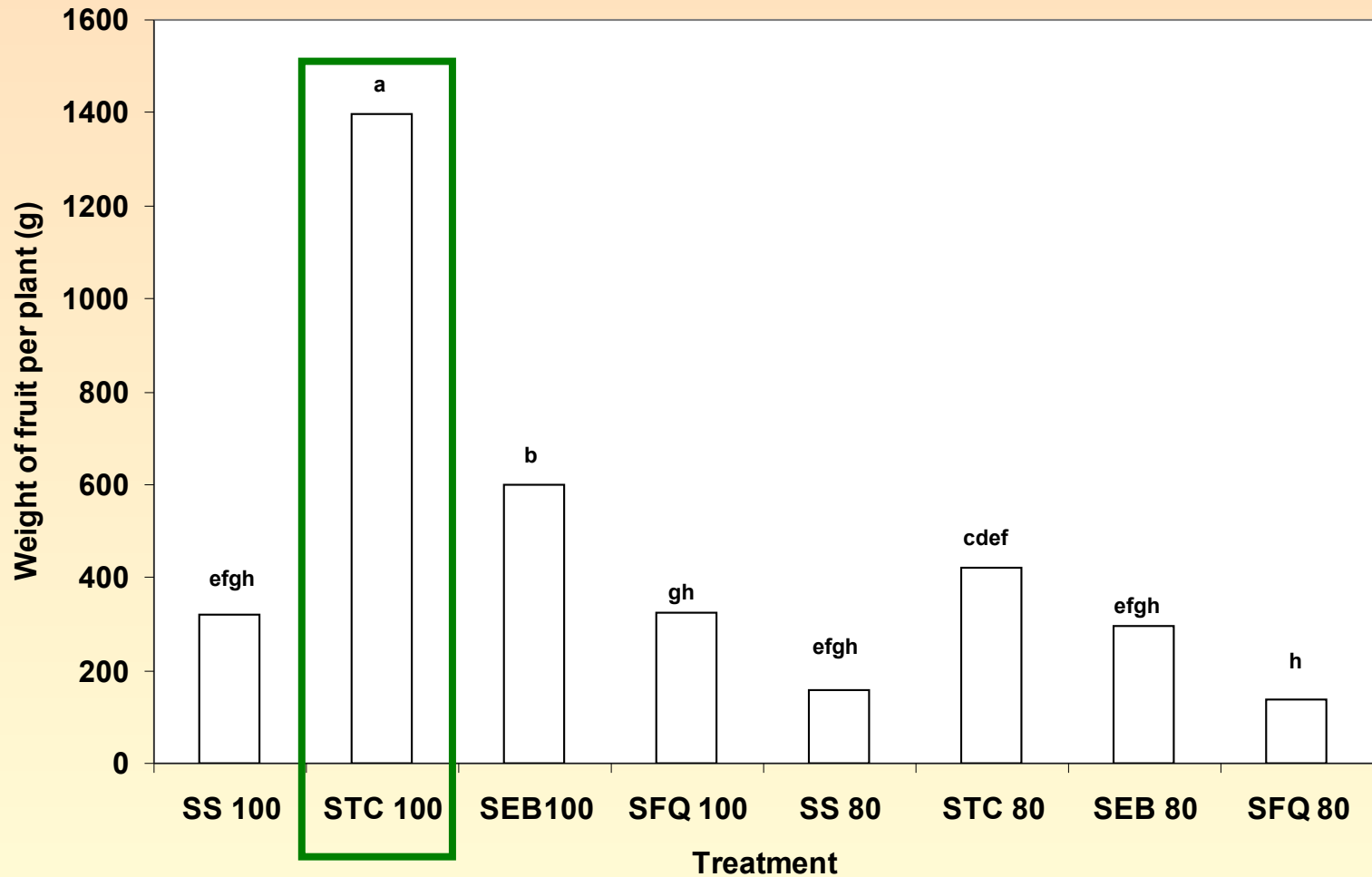
# Plant height at Zulia state soil



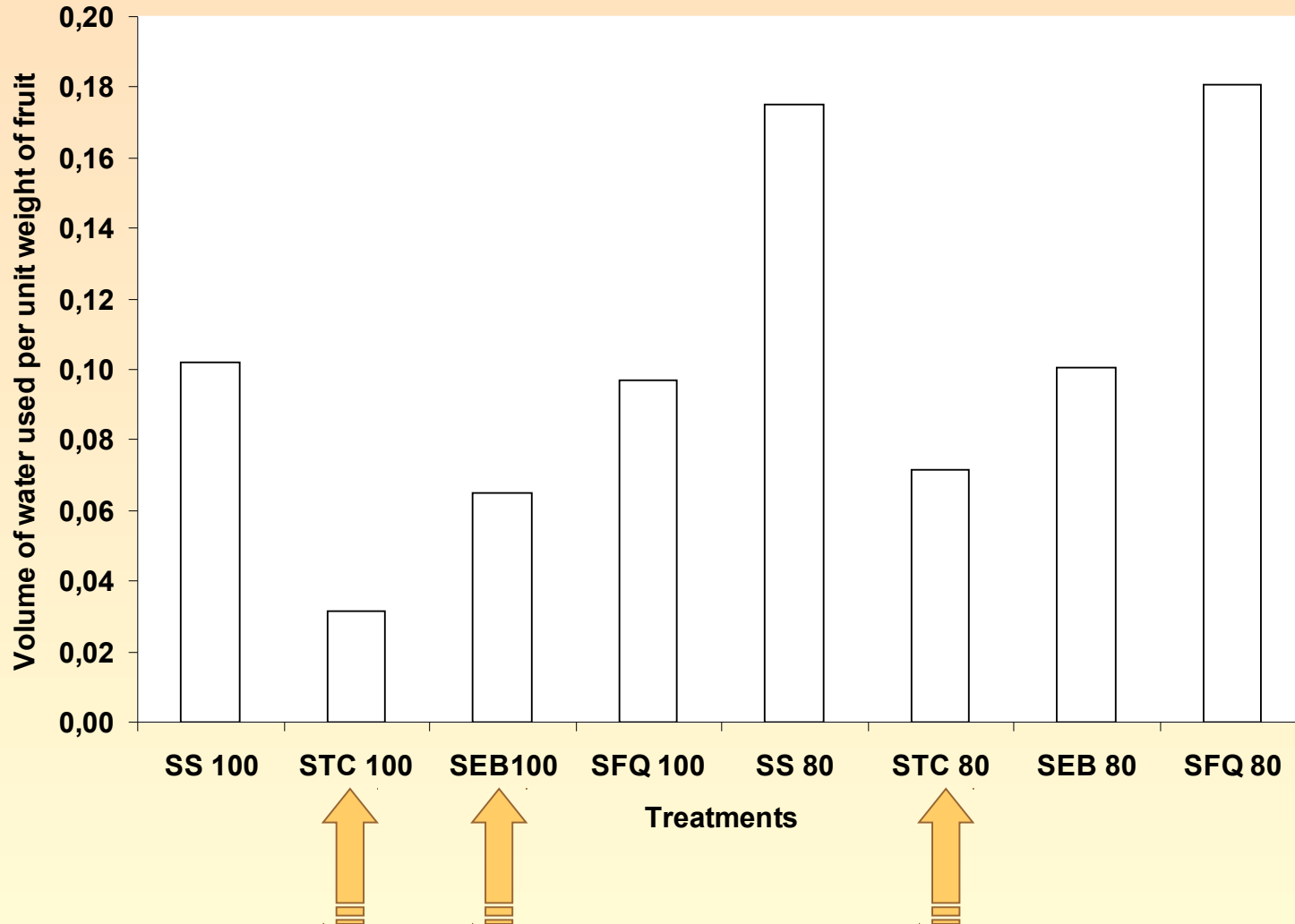
# Number of fruits at Zulia state soil



# Weight of fruit per plant at Zulia state soil



# Volume of water used per unit weight of fruit at Zulia state soil



## At Falcon state soil

- Above ground biomass production:

**Terracottem > Bocaschi > FQ = SS**

- Root biomass

**Terracottem > { Bocaschi  
Fertilizer**

- Volume of water used per unit weight of fruit: > WUE

**Terracottem < Bocaschi < Fertilizer**


**At Zulia State**

 **Water retention:**

**Terracottem > Cow manure**

 **Plant height and yield**

**Terracottem > Cow manure > Fertilizer**

 **Volume of water used per unit weight of fruit: > WUE**

**Terracottem < Cow manure < Fertilizer**

**Thank you for your attention**