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DETACHED TOMATO FRUITS GROWN ON VARIOUS SUCROSE SOLUTIONS AND COMPARISON WITH FRUIT GROWN ON PLANT

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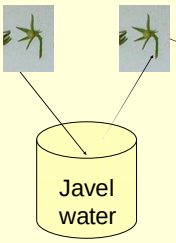
Introduction

In order to better understand the fruit growth mechanisms, effects of sucrose concentration and osmotic pressure of the solution entering the fruit, on parameters of several important fruit growth processes, were studied in vitro and some comparisons with the in planta fruit were made.

Materials and methods

Tomato plant grown under-glass

5 – 10 dap old fruits

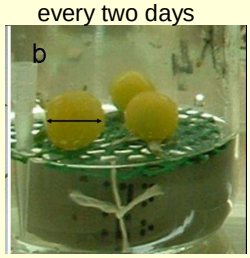


10 mn

10 combinations: **MS medium**
sucrose concentrations : 0 to 32%
PEG or mannitol concentrations

Phytotron 20 / 25°C night / day

Diameter is measured every two days



Results

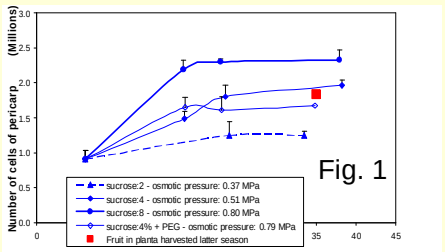
In vitro, a fraction of the fruits did not grow, likely due to contaminations. In healthy fruits:

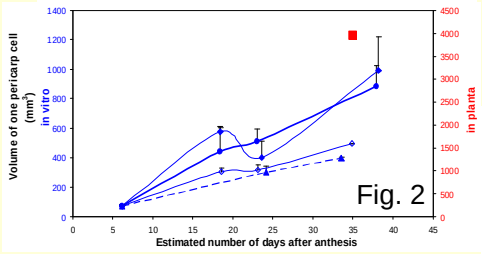
- cell number increased with sucrose concentration between 2 and 8%. In the in planta fruit, cell number was in the middle of this range (Fig. 1),

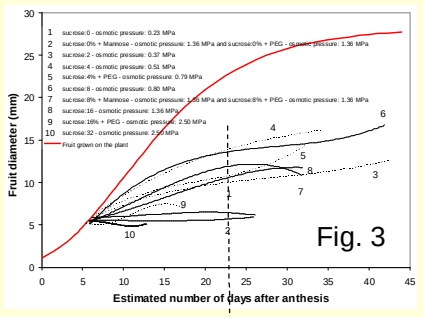
- the volume of one pericarp cell increased with sucrose concentration up to 4 - 8% and decreased when PEG was added. In the in planta fruit, this volume was much higher (Fig. 2). Also fruit diameter increased with sucrose concentration up to 4 - 8% and decreased at higher concentration or when mannitol or PEG was added (Figs. 3 and 4). Fruit expansion rate was null when osmotic potential of the solution was close to – 2.5 MPa (Fig. 5), which coincides with the value predicted by a model of water import in fruit[a]. The in planta fruit was much larger than the in vitro fruit (Fig. 3).

- dry matter content and Brix increased with sucrose concentration (Figs. 6 and 7). At 8% sucrose concentration they were close to those of in planta fruit and changed similarly over growth period,

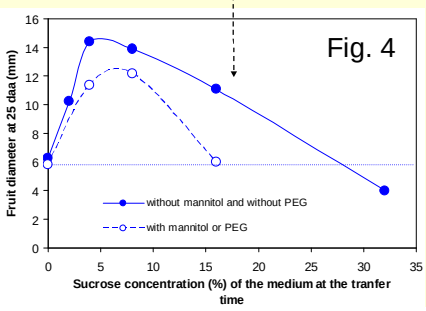
- fruits ripened at 35-40 daa, like in planta (Fig. 8).

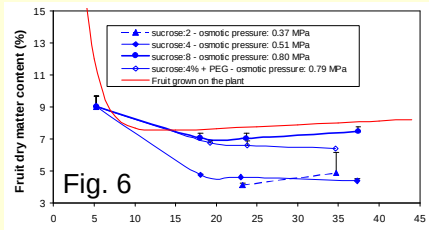


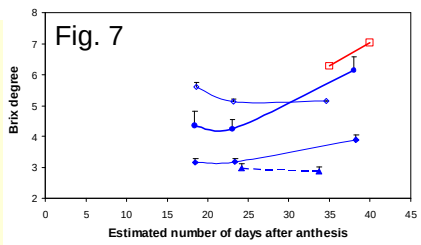


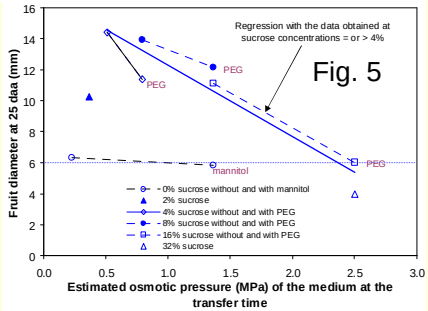


at 25 daa





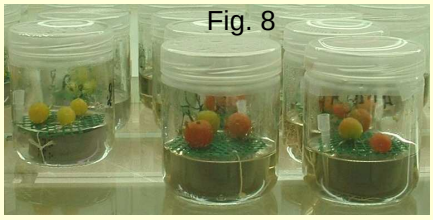




Discussion - conclusion

Despite fruit and cell expansions were strongly lowered in vitro, as generally observed in in vitro culture of organs[b], there were many similarities between fruit grown on the plant and in vitro.

Therefore, the experiences suggested that increased sucrose concentration may increase carbon supply, cell division and fruit and cell expansions, but that very high concentration may decrease these expansions through osmotic potential. Others negative effects of sucrose on tissues in vitro have been suspected[c]. These experiments indicate that in vitro experiences may be very useful to study and to better understand the fruit growth, especially cell division and expansion.



(a) Geelen et al. 1987. Journal of Plant Physiology130: 343-349; (b) Bussières P. 1994. Annals of Botany 73: 75-82; (c) Warren Wilson 1994. Annals of Botany 73: 65-73