

## Salinity - a possible tool for improving tomato quality?

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Research in arid Israeli suggests that raised electrical conductivity (EC) of soil solution can improve fruit quality of tomatoes in terms of total soluble solids (TSS) concentration. This was evaluated in field and hydroponically grown tomatoes at Gosford on the central coast of NSW. Compared with controls at low EC (2mS cm<sup>-1</sup>), high EC (8mS cm<sup>-1</sup>) in hydroponics increased TSS (4.1 to 5.0%) but titratable acids (TA) increased relatively more (7.3 to 10.1 m-equiv. per 100 ml). Yield was reduced by 23%. In the field, high soil solution EC was hard to maintain because of leaching, but even when high EC was obtained TSS was not increased substantially.

### Methods

In field experiments in 1988 and 1989 tomatoes were grown on raised beds with black plastic mulch, trickle irrigation and conventional trellising. The podzolic soil was light textured and freely draining. In 1989, tomatoes were also grown hydroponically outdoors with normal trellis. The cv. Flora dade was common to all experiments, 6 other cvv. were also grown in the field in 1989, and cv. Sunny was also grown in hydroponics. KCl was used after fruit set to raise EC. In the field, irrigation water was used with an EC of 0.1, 1.8, 3.6 or 7.2 mS cm<sup>-1</sup> in 1988 and 0.1, 4 or 9 mS cm<sup>-1</sup> in 1989. In hydroponics, EC after fruit set was maintained at 2, 4 or 8 mS cm<sup>-1</sup>. Yield was measured in both experiments in 1989 and TSS and TA were measured in all 3 experiments. Soil solution at field capacity was monitored for EC about twice weekly.

### Results and discussion

Soil solution EC varied widely over time, particularly in 1988 when high rainfall evidently caused leaching despite the plastic mulch. Nevertheless, EC was maintained in the highest EC treatment at an average of 3.9 mS cm<sup>-1</sup> at 15 cm depth for five weeks in 1988, and at 3.5 and 9.0 mS cm<sup>-1</sup> in the medium and high EC treatment (at 30 cm depth) for about 8 weeks in 1989. These conductivities cover the range used in Israel<sup>1</sup>. However, in neither of the field experiments did increased EC substantially increase TSS although TA was increased significantly ( $P < 0.05$ ) in both experiments. In hydroponics, EC is controlled more precisely and the root system is bathed uniformly in solution. When EC was raised from 2 to 8 mS cm<sup>-1</sup>, TSS rose from 4.10 to 5.01%, TA increased from 7.3 to 10.1 m-equiv. per 100 ml, and yield was reduced by 23% (c. 9 v 7 kg/plant), all effects being significant ( $P < 0.05$ ).

High TSS is desirable for improved flavour in fresh tomatoes and increased out-turn in processed tomatoes. However, gains in TSS in these experiments were either small or, where large, they were offset by reduced yield and a relatively greater increase in TA which appeared to reduce flavour appeal (taste-test data, not presented). Moreover, in the high rainfall environment of the east coast it is difficult to maintain high soil EC, even with plastic mulch. There appears to be no value in raising soil EC for coastal salad tomatoes, but processing tomatoes inland may be able to make profitable use of saline irrigation water, subject to environmental considerations.

1. Pasternak, D., De Malach, Y. and Borovic, I. (1986), *Agric. Water Management* 12, 149-158.