Ultrasol®ine K Plus application, potassium nitrate with iodine, improved fruit size and weight of cocktail tomatoes in Thailand

Iodine (I) should be considered a plant micronutrient. That is the main conclusion of Kiferle et al., 2021. In that paper, the presence and identity of naturally occurring iodinated proteins in higher plants, which had never been described before, was published. Eighty-two iodinated proteins have been identified that take part in important biological processes in higher plants. Similar to deficiency in any other plant nutrient, a deficiency in iodine is predicted to cause yield losses.

In fertigated and protected horticultural crops, grown in a commercial production setting, iodine deficiency can occur when the presence of iodine in the nutrient solution is below a sufficiency target value. In intensive, fertigated cropping systems under cover, the nutrient solution and irrigation water are the main sources of iodine. This deficiency will be visible as sub-optimal root or leaf development, later flowering, lower fruit growth and lower resilience to stress, resulting in lower yields compared to a crop which has been supplied with sufficient iodine in the nutrient solution.

A controlled trial was designed with cocktail tomatoes of the variety ‘T2021 F1’ in coco dust substrate in Thailand. In a glass greenhouse, plants in pots were supplied with a balanced nutrient solution using an automated system to inject the nutrients in the drip solution from concentrated stock in tank A (calcium nitrate and iron chelated with DTPA and EDDHA) and tank B (potassium nitrate, monopotassium phosphate, magnesium sulphate and an EDTA chelated trace element mix). The plants received these nutrient solutions from the start of the crop, EC 1-1.5 was maintained until flowering. Table 1 shows the resulting composition of the drip solution, at different ECs for each crop stage after flowering. Potassium nitrate was applied at a total dose corresponding to 1100 kg KNO_3/ha/crop season in a commercial cropping system.

In the control, the iodine concentration in the irrigation water and in the nutrient solution was 0.02 µmol/L; too low to provide the crop with sufficient iodine. A deficiency of iodine affects a variety of biological processes in the plant. It can negatively affect root development, flower formation and pollen quality of the flowers under high temperature. Additionally, iodine is present in enzymes which are needed for photosynthesis, and thus sugar production needed to fill the fruit.

To test the effect of addition of iodine in the nutrient solution, Ultrasol®ine K Plus was used in the test treatment, at the same rates and timing as potassium nitrate - without iodine - in the control. Thirty plants for each treatment were sown in August and transplanted to the pots 25 days later. The quality of the root system was evaluated on 5 of these seedlings 15 days after transplant. First harvest started in November, and the yield and fruit quality of 5 subsequent trusses was assessed on 20 plants per treatment.

Extra supply of iodine with Ultrasol®ine K Plus resulted in better root growth after transplant, more abundant flowering, and higher average fruit weight in these cocktail tomatoes. This can be ascribed to the prevention of iodine deficiency in the plants by ensuring an adequate amount of iodine in the nutrient solution with use of Ultrasol®ine K Plus.

Table 1. The composition of the nutrient solution that was applied daily at 2 L/plant/day, with drip in coconut dust substrate in 5 L pots. EC 1-1.5 mS/cm was maintained from sowing until flowering

Crop stage	Days after sowing	mS/cm		mmol/L N-total	mmol/L $N\text{-}NO_3$	mmol/L $N\text{-}NH_4$	mmol/L P	mmol/L K	mmol/L Mg	mmol/L S	mmol/L Ca
		EC	pH								
Flowering - Fruit setting	58-64 DAS	2.0	6 - 6.5	11	10.7	0.5	1	3	1	1	3
Fruit setting - 1° harvest	65 - 95 DAS	2.5	6 - 6.5	13	12.8	0.6	1	3	2	2	4
1° harvest onwards	95 days onwards	3.0	6 - 6.5	17	16.0	0.7	1	4	2	2	5

Figure 1. Average maximal root length (cm ± standard deviation), 15 days after transplant is improved with Ultrasol®ine K Plus

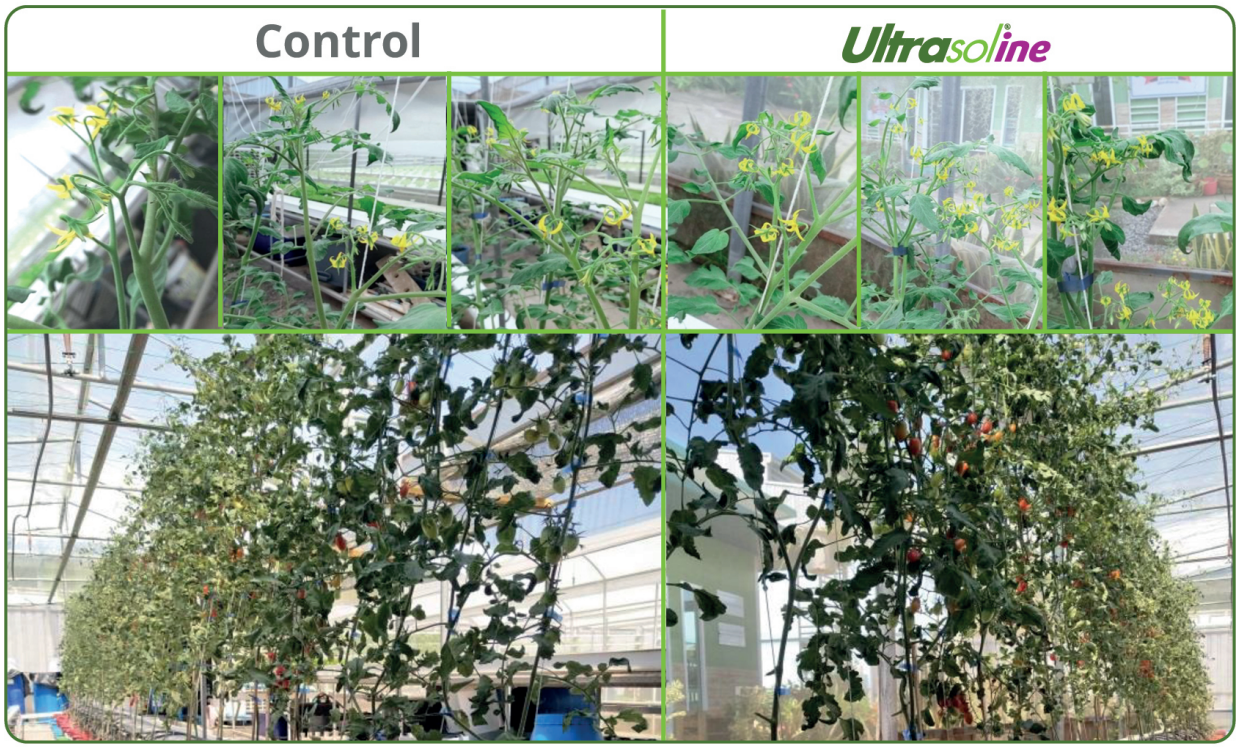

Figure 2. More abundant flowering and fruit set in the Ultrasol®ine K Plus treatment. These pictures were taken 63 DAS of the

flowers, 100 DAS for fruit set.

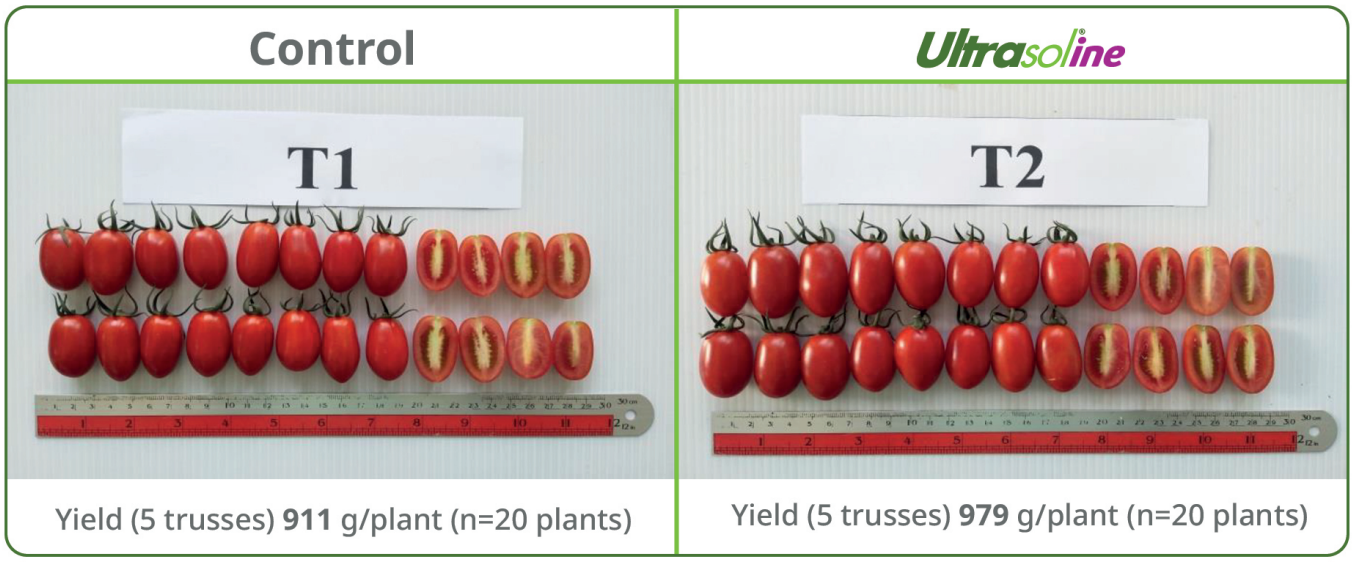

Figure 3. Average fruit size over 5 harvested trusses was greater, with 7% more total fruit yield as result.

Kiferle et al 2021

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