11% higher total season fruit yield, linked to better root development of a salad tomato crop with application of Ultrasol®ine K Plus

Application of Ultrasol®ine K Plus resulted in a 11% higher total season fruit yield, and this was linked to better root development of a salad tomato winter crop in an unheated glasshouse

Iodine (I) should be considered as a plant nutrient. 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.

This was shown in a demonstration trial in salad type tomato ‘Simsek F1’ in calcareous soil (30% sand, 30% clay, 40% loam), in an unheated traditional type glasshouse in Antalya, Turkey. **Ultrasol®ine K Plus** (potassium nitrate containing a fixed amount of iodine) was applied as source of K and N - and iodine - in the nutrient solution for the whole crop season, starting from transplant in October till harvest in June. In winter, these greenhouses are heated only to protect the plants from frost at night, so the crop has a long vegetative period before starting to bear fruits. Prior to the trial, samples of the irrigation water were taken and the concentr

in these samples was measured. The concentration of iodine in the irrigation water was below 0.02 µmol/L. At this low supply of iodine in the nutrient solution, a detrimental effect of iodine-deficiency on plant growth can be expected.

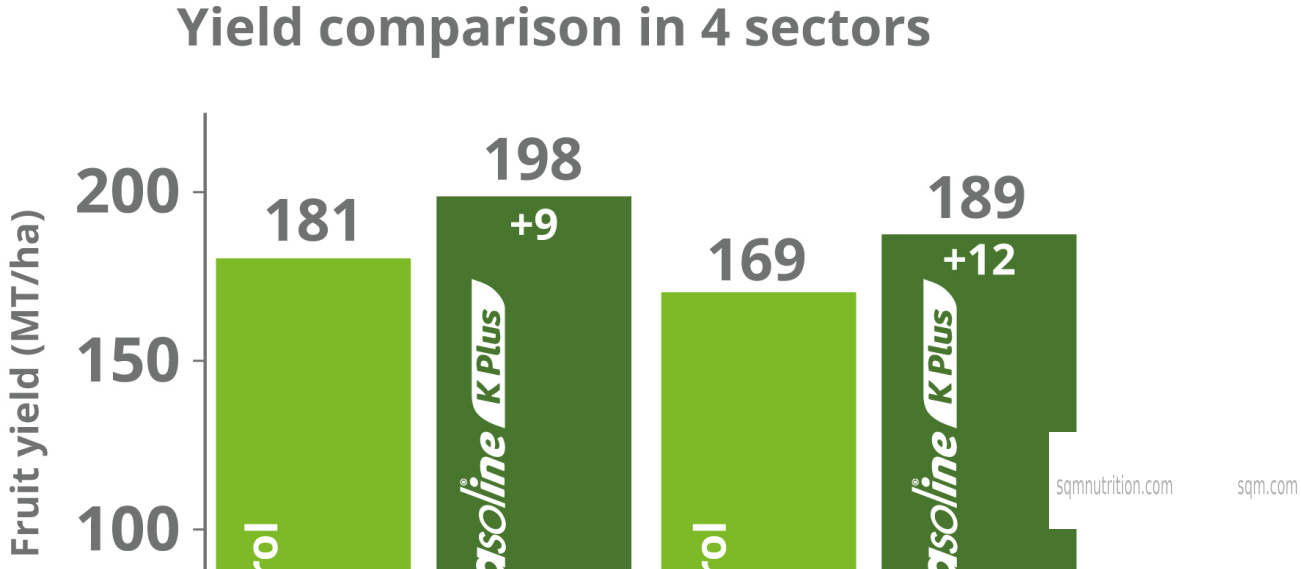
The whole greenhouse as planted with the same cultivar, on the same planting date, and fertigated with the same nutrient programme. The comparison between an iodine-deficient crop (with only the small amount of iodine in the irrigation water as supply) and a crop receiving the optimal amount of iodine by **Ultrasol®ine K Plus**, was carried out on 4 sectors (125 m^2 per sector) within the same greenhouse, serving as 2 replicas of the comparison between the two treatments.

The total season yield was consistently higher in each of the two sectors where **Ultrasol®ine K Plus** was included in the nutrient solution, compared to each of the two sectors where potassium nitrate without iodine was applied (Figure 2). The iodine concentrations in the leaves of the plants in the sectors with **Ultrasol®ine K Plus** were 1.6 times higher than the iodine concentration in the leaves of the control. This corresponded to the increase of iodine concentration in the nutrient solution applied with the drip irrigation. The fruit size was improved as well in the sectors where **Ultrasol®ine K Plus** was applied, as shown by measurements of the fruit diameter (Figure 3).

The results can be explained by two effects of improvement of the concentration of iodine in the root solution with **Ultrasol®ine K Plus**. First, it was seen that due to the iodine deficiency in the crop, the root development was not optimal. By application of iodine with **Ultrasol®ine K Plus** , the number an thickness of roots and the lateral root development was visibly improved (Figure 4). This of course benefits the crop by better access to water and nutrients. Second, iodine is present in many proteins that are important for photosynthesis. The improved fruit size observed with this grower, is a response to a better ability of the plant to produce carbohydrates (sugars) needed for fruit development. Moreover, iodine is present in proteins that ar

production of energy required by the potassium-dependent sugar transport from the leaves to the fruits.

Figure 1. The greenhouse was divided in four seperately fertigated sectors, and the treatment with **Ultrasol®ine K Plus** (dark green symbols) was alternated with the control (light green symbols), starting directly after transplant of the crop.



nutrient solution with **Ultrasol®ine K Plus**, compared to the iodine deficient control sector, in each of the two comparisons in the four seperately fertigated sectors in the greenhouse.

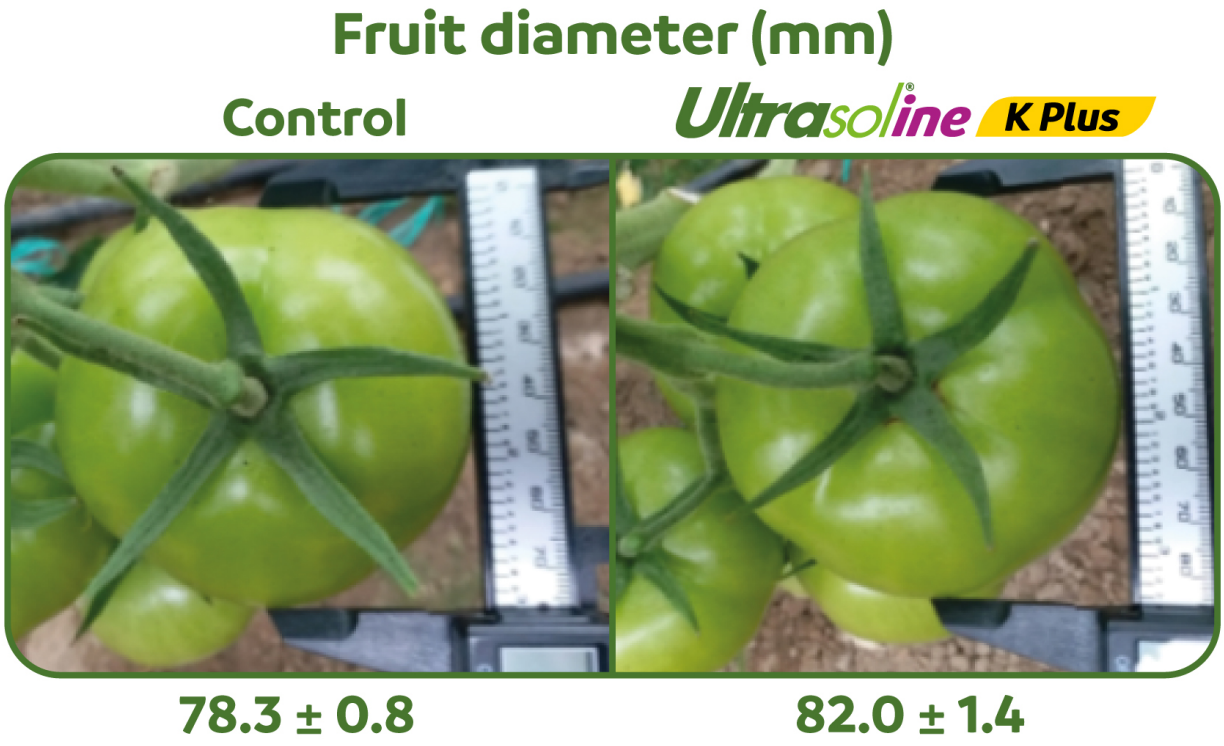


Figure 3. Fruit diameter was improved in the sector where **Ultrasol®ine K Plus** was applied (measured on the first fruit of the bunch during fruit growth, on an average of 10 fruits per sector with standard errors).