

7 May 2019

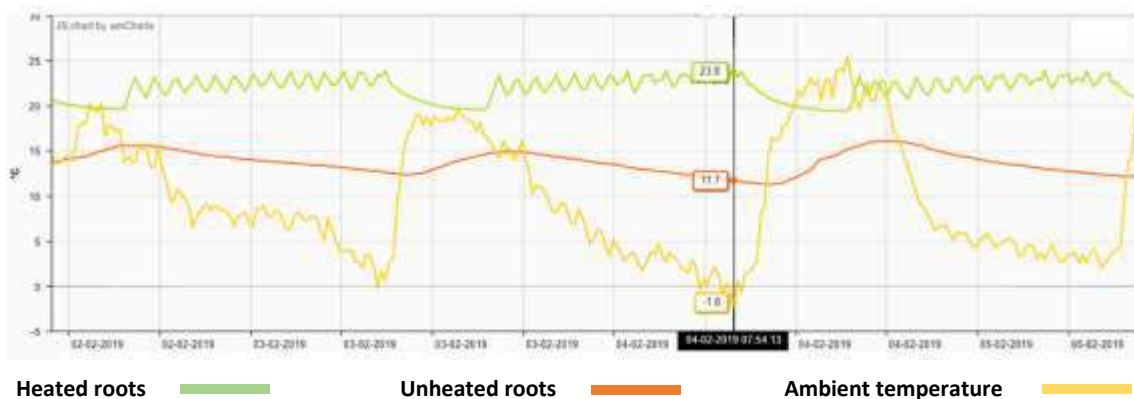
Roots's RZTO heating technology increases total plant yield of tomatoes in Spain by 19 percent

- Total heated tomato plant yields were 19% heavier compared to unheated control crop.
- RZTO heating system stabilised tomato crop root temperatures around 21 degrees, despite greenhouse ambient air temperatures frequently dropping to 10 degrees.
- Spain is one of the world's ten largest producers of tomatoes with an annual production of four million tonnes.
- Roots is the only company with commercial two-in-one root zone heating and cooling technology.

Roots Sustainable Agricultural Technologies Limited (ASX: ROO, Roots or Company) has increased total plant yield of tomatoes by 19 percent using its patented Root Zone Temperature Optimisation (RZTO) heating technology, compared to unheated control crops.

The commercial demonstration was conducted in greenhouses in Almeria, Spain during the Spanish winter from December 2018 to March 2019. A warm-climate crop, tomatoes are sensitive to frost and cold stress throughout the growing cycle. Roots' RZTO heating technology was used to maintain the crop root temperature at a relatively stable range around 21 degrees , despite ambient air temperatures in the greenhouse frequently dropping to 10 degrees. The roots zone temperatures of control plantings fluctuated between 10 and 22 degrees over the same period.

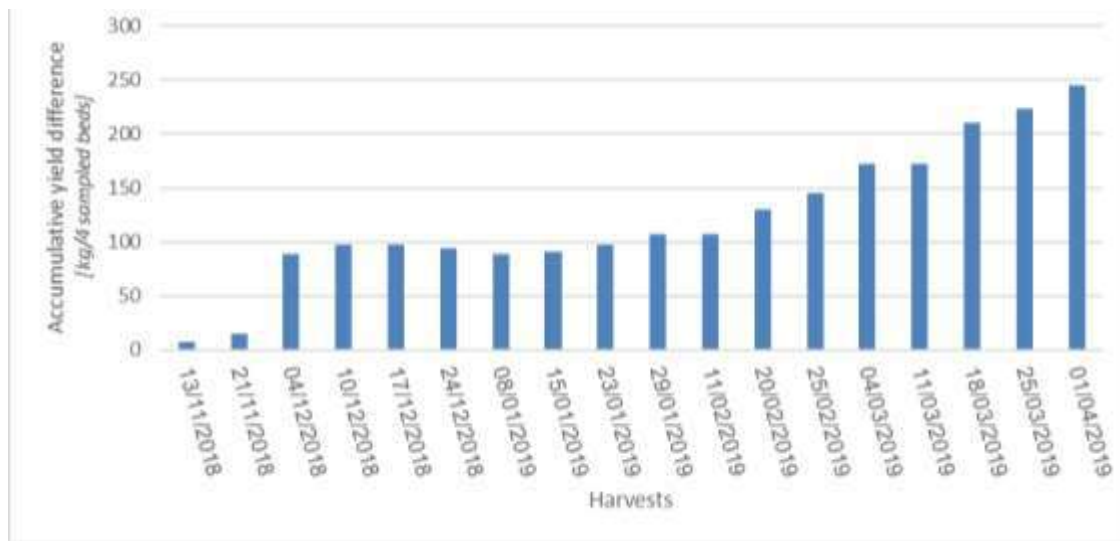
Root zone temperature comparison during winter



According to the literature, stabilising the root temperature of tomato plants throughout winter increases the absorption of water and fertilizers, which in turn improves the flowering and quality of the fruit.

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Accumulative yield differences Heated v Non-heated



Globally, 177 million tonnes of tomatoes were grown in 2016 – a rise of nearly 30 per cent in a decade¹. This production covers approximately 5 million hectares with an average yield of 3.7 kg of tomatoes harvested per square metre . However, in Spain the yield is 8.62 kg per square metre - more than double the global average.

In Spain, Almeria and Murcia are the main regions for fresh tomato production and export. Almeria in particular is characterised by small-scale family farms where cultivation is mostly in ‘enarenado’ – a 30cm layer of soil on top of the natural soil, followed by a 2-3cm layer of organic compost and a 10cm top layer of sand.

Roots CEO, Dr Sharon Devir said, “We are very excited by the fact that our RZTO technology caused a significant yield increase on Spanish tomato crops – already among the most efficiently farmed in the world. While Spain is a leading producer of fresh tomatoes within Europe, cold stress has a significant impact on the growth and development of tomatoes during cooler months. In addition to lost revenue from damaged plants, cold stress can injure both the above and below ground plant tissues, reducing crop quality and delaying the maturation of plants. Despite being grown in greenhouses with added soil protections, traditional growing and heating methods in Spain haven’t been able to mitigate significant overnight drops in temperature.

By using RZTO to heat the roots of tomato plants during autumn and winter, the farmer was able to mitigate the impact of cold stress and injury. Root zone heating ensures the roots' crop remains at optimal temperatures throughout the growing season, resulting in healthier crops and increased produce during the off-season.”

-ENDS-

¹ <https://www.freshplaza.com/article/2187792/overview-global-tomato-market/>

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About Roots Sustainable Agricultural Technologies Ltd:

Israeli-based, Roots Sustainable Agricultural Technologies Ltd. is developing and commercialising disruptive, modular, cutting-edge technologies to address critical problems being faced by agriculture today, including plant climate management and the shortage of water for irrigation.

Roots has developed proprietary know-how and patents to optimise performance, lower installation costs, and reduce energy consumption to bring maximum benefit to farmers through their two-in-one root zone heating and cooling technology and off the grid irrigation by condensation technology.

Roots is a graduate company of the Office of the Israeli Chief Scientist Technological Incubator program.

More information www.Rootssat.com

About Root Zone Temperature Optimization (RZTO):

Root Zone Temperature Optimisation (RZTO) optimises plant physiology for increased growth, productivity and quality by stabilising the plant's root zone temperature. Leveraging the principle of Ground Source Heat Exchange (GSHE), Roots installs a closed-loop system of pipes. The lower part is installed at a depth where soil temperature is stable and not affected by weather extremes, and the upper part in the target crop's root zone just below the soil surface. Water flowing through the lower pipes is charged by the soil's stable temperature. The heated (or cooled) water is pumped through the pipes installed in the root zone, where the heat (or cold) is discharged.

This significantly increases yields, increases growing cycle planting options, improves quality, mitigates extreme heat and cold stress while significantly reducing energy consumption by stabilising and optimising the roots zone temperature.

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