

27 November 2018

RZTO cooling technology dramatically increases yield and extends growing cycles of chives

- **Average weight of the cooled chives plants increased by more than 250 percent compared to un-cooled control crop.**
- **RZTO cooling system stabilised root temperature of chives in greenhouse at around 25 degrees, despite ambient air temperatures frequently topping 36 degrees.**
- **Chives pilot follows successful RZTO cooling proof of concepts on other crops.**
- **Roots is the only company with commercial two-in-one root zone cooling and heating technology.**

Roots Sustainable Agricultural Technologies Limited (ASX: ROO, Roots or Company) has released results from a successful Root Zone Temperature Optimisation (RZTO) cooling pilot on greenhouse-grown chives, showing a 257 percent increase in yield.

Cooled chives plants had an average fresh weight of 268g, compared to an average weight of 75g for non-cooled plants replication. In addition, the cooled chives plants continued to grow for 55 days, while the control crop virtually stopped growing after four weeks.

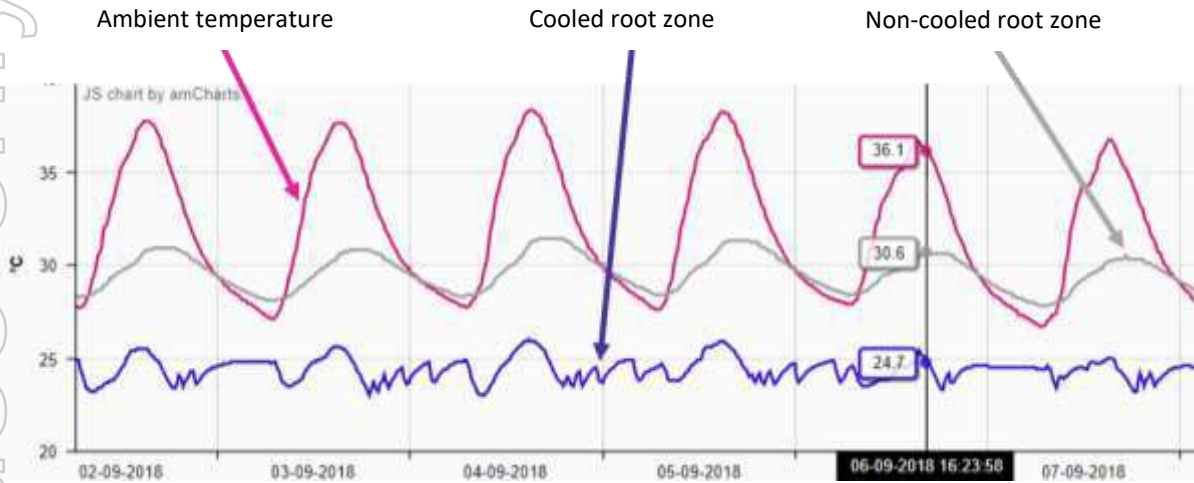
The pilot was conducted during the Israeli summer from August through to October at Roots' research site in central Israel. A traditional cool climate crop, high temperatures significantly impact chives harvest production and crop quality. Using the hybrid ground source heat exchange version of Roots' RZTO system, the roots of chives crops were cooled to remain relatively stable around 25 degrees centigrade despite air temperatures in the greenhouse frequently topping 36 degrees. In comparison, roots of control plantings fluctuated between 27 and 31 degrees.

Roots CEO, Dr Sharon Devir said, "These results further demonstrate the effectiveness of our proprietary RZTO cooling technology in significantly increasing crop yield while also extending growing cycles of plants that typically require cooler climates".

"Our RZTO cooling technology complements our root zone heating systems, providing farmers in areas affected by weather extremes with a two-in-one year-round solution."

"Pilots and proof of concepts are incredibly important in the agri-tech sector and are essential for generating sales in new segments. Results on a variety of crops, environments and growing conditions validate the versatility of our technology and allow us to begin discussions with a broader target market."

Results of RZTO cooling pilot on chives



RZTO technology achieved a 6-degree difference between cooled (purple) and uncooled roots (grey) of chives.



Cooled chives plants (blue) continued growing for 55 days while uncooled plants (orange) virtually stopped growing after 36 days.



RZTO cooling technology increased the average weight of chives by 257 percent compared to control crops.

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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 Optimization (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 are coils installed at a depth where soil temperature is stable and not affected by weather extremes, and the upper part in the target crop's

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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.

ROOTS technology is based on three main configurations: (a) GSHE only; (b) Hybrid GSHE coupled with a heat pump; and (c) heat pump only. POC is often demonstrated with configuration (c) only to simulate and calibrate agronomic thresholds. The technology is appropriate for Greenhouses, Nutrient Film Technique (NFT) hydroponic greenhouses, small open fields, young tree plantations and for grow bag set ups.

This significantly increases yields, increases off season 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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