

**25 September 2018**

**Roots RZTO cooling technology increases lettuce growth in greenhouse  
by 132 percent and nearly halves growing time**

- **Cooled romaine lettuce leaf weight increased on average by 132% in greenhouse compared to control plants.**
- **Lettuce growing cycle was reduced by almost half, with the crop ready for harvesting in 27 days.**
- **Follows successful RZTO (Root Zone Temperature Optimisation) cooling proof of concepts on lettuce using Nutrient Film Technique (NFT) technologies and interim results in medicinal cannabis.**
- **Roots is the only company with commercial root zone cooling technology.**

**Roots Sustainable Agricultural Technologies Limited (ASX: ROO, Roots or Company)** has released results from a successful pilot on Romaine lettuce showing a 132 percent increase in lettuce leaf fresh weight using its proprietary RZTO cooling technology. Cooled lettuce plants had an average fresh weight of 502g, compared to an average weight of 216g for non-cooled plants.

In addition, marketing weight was achieved in 27 days – compared to seed manufacturer data showing a normal growing cycle range of 30-50 days<sup>(1)</sup>.

The pilot was conducted during the Israeli summer over 27 days between July and August 2018, at Roots' research site in central Israel. Using the hybrid ground source heat exchange version of Roots' RZTO system, lettuce roots were cooled to remain relatively stable around 24 degrees centigrade despite air temperatures in the greenhouse frequently topping 34 degrees. In comparison, roots of control plantings fluctuated between 28 and 34 degrees.

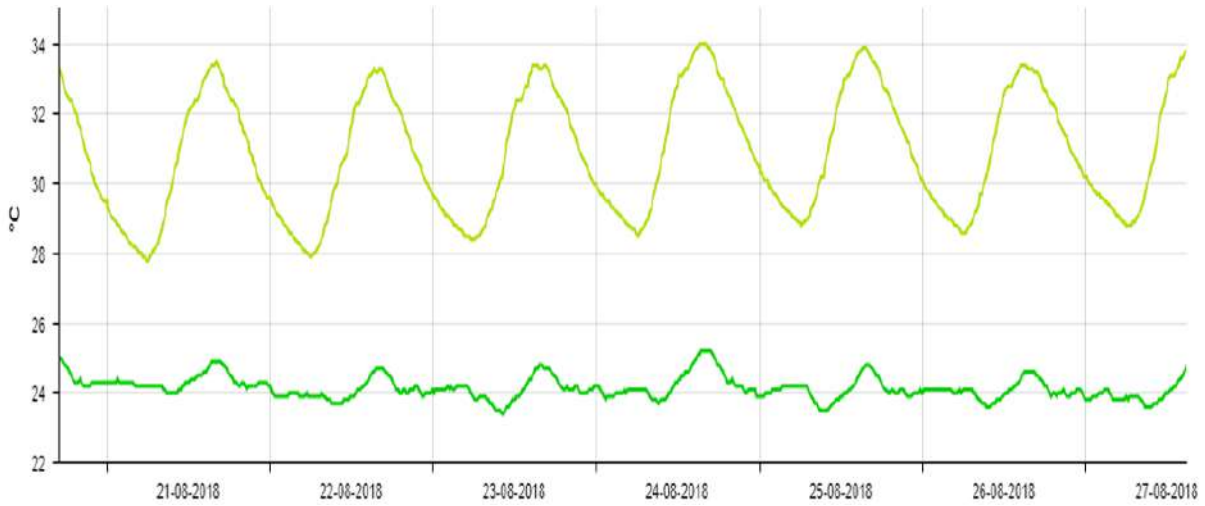
Roots CEO, Dr Sharon Devir said, "These results highlight the many benefits of root zone cooling in modern agriculture including enhanced plant growth, improved quality, shorter growing cycles, greater growth uniformity as well as energy savings compared with traditional greenhouse cooling systems."

"Cooling the roots of lettuce plants in summer not only significantly increases crop yield but also reduces the growing cycle duration and increase yield uniformity. These benefits together could help farmers plan for increased annual crop production and, therefore, increased income."

"This latest pilot complements the pilot reported in July where Root's RZTO technology was used in collaboration with NFT technologies created by Teshuva Agricultural Projects to cool the nutrient temperature of hydroponically grown lettuce. The results are consistent with previous open field lettuce cooling experiments."

"Our RZTO systems are versatile and can be used to cool the roots of crops in open fields, grow bags, hydroponic and in soil."

“Our RZTO cooling systems have so far been effective in stabilising the plant roots of basil, apricots and medicinal cannabis. We are the only company in the world with a commercial root cooling technology. We are therefore optimistic about our ability to generate increased sales, as the results of these pilots conducted in areas that experience weather extremes are analysed by farmers in various markets.”



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*RZTO technology increased lettuce yield weight by 132 percent and uniformity (left)  
compared to uncooled control plants (right)*

-ENDS-

<sup>1)</sup><https://www.hazera.co.il/product/%D7%90%D7%A1%D7%A3/>

**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](http://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 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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