

18 December 2018

Roots conducts floriculture sector's first successful RZTO cooling pilot on Alstroemeria (Peruvian Lily)

- **First use of Root Zone Temperature Optimisation (RZTO) technology on flowers.**
- **Successful RZTO cooling pilot increased flower production in greenhouse by additional eight weeks, despite inhospitable air temperatures.**
- **Floriculture annual market is US\$55 billion globally.**
- **Follows successful RZTO cooling pilots on edible herbs and promising interim results on medicinal cannabis.**

Roots Sustainable Agricultural Technologies Limited (ASX: ROO, Roots or Company) has presented the floriculture production sector, globally worth US\$55 billion¹ each year, with a successful Root Zone Temperature Optimisation (RZTO) cooling pilot on Alstroemeria (Peruvian Lily).

Pilot results showed growth and cultivation of flowers with cooled roots started eight weeks earlier than control plants with non-cooled roots. The extended growing season also allowed the farmer to obtain a premium price of more than double the standard rate for out of season flowers.

According to the farmer Mr Yarden Mualem, "Due to high greenhouse temperatures during the warmer months, I previously had to limit flower harvesting to only 25 weeks a year. However, this early blooming accounted for a 20 percent increase in production – the equivalent of 150,000 flowers per hectare²."

In Israel, the ability to harvest flowers year-round will double the farmer's yield and deliver a return on investment in a year.

The pilot was conducted on the cool climate crop during the Israeli summer between September and October in a quarter of an acre greenhouse. The site in central Israel holds an average of 33,000 rhizomes per hectare with each rhizome annually producing about 40 flowers³.



Peruvian lilies are part of the high-value global floriculture growing industry estimated at US\$55 billion

¹ https://research.rabobank.com/far/en/sectors/regional-food-agri/world_floriculture_map_2016.html

² <https://www.alstroemeria.com/>

³ **Alstroemeria** has an underground **rhizome**, which develops vertical shoots. The main **rhizome** can generate new lateral **rhizomes** that can also produce flowering shoots.

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During the pilot, Roots used its RZTO cooling system to keep the flower roots relatively stable at an optimal range, despite high warmer ambient air temperatures in the greenhouse.

Roots CEO, Dr Sharon Devir said, “The floriculture sector is very diverse and includes the production of floral crops such as cut flowers and cut foliage, flower bulbs, potted flowering as well as foliage plants and bedding plants. Annual global floral production of these high-value crops is estimated at US\$ 55billion⁴ and is growing at a compound annual growth rate of 5 per cent due to increased use in social, political, sport, and entertainment events.

“We see many opportunities with floriculture crops as crop yield optimisation and growing cycle management is critical, as most cut flowers do not travel well and have limited lifespans.

“Drawing on the success of RZTO on various crops, edible herbs and medicinal cannabis, we wanted to demonstrate to the floriculture sector how the Roots RZTO technology optimises the root zone temperatures – in this instance by cooling Alstroemeria until the optimum temperature of the flower is reached and maintained.

“The RZTO system successfully cooled the root systems of the Alstroemeria seedlings, provided increased protection from the Israeli heatwave it experienced, and stabilised the temperature range between night and day. This allowed the farmer to dramatically increase growth and gain higher yield quantities. This would allow the possibility of additional productive growth periods, leading the farmer to benefit from higher, premium prices for longer periods for a crop that would normally be out of season.”

“This successful pilot allows us to undertake detailed discussions with stakeholders in this sector who were keen to see whether Roots’ proprietary technology could benefit representative crops common in the floriculture industry grown under extreme conditions.”



At 45 days growth the Roots RZTO-cooled Peruvian lilies (left) were full of buds and already flowering, compared to the non-cooled plants in the pilot control group which were still in a vegetative state (right).

⁴ https://research.rabobank.com/far/en/sectors/regional-food-agri/world_floriculture_map_2016.html

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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 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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