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Technology

Roots Sustainable Agricultural Technologies helps plants keep their cool

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Helping plants keep their cool. Groundbreaking irrigation and agricultural technology emanating from Israel is not confined to inventions and achievements of the past.

Roots Sustainable Agricultural Technologies is an Australia-listed company based in Israel making rapid inroads into horticultural circles in China, Australia, Spain and some of the driest continents in the world, as it introduces technology designed to make plants grow faster and yield more edible food, while reducing water and energy use.

Roots, listed in December 2017 on the Australian Securities Exchange, is now a $30 million agtech company specialising in its patented Root Zone Temperature Optimisation technology.

Trials and pilot schemes are under way in Western Australia and a big technology deal has been signed with China.

Its RZTO system, which is suitable for growing large areas of irrigated vegetables or fruit trees in soil, sometimes under greenhouse cover, installs a closed set of water pipes at two soil depths to heat and cool plant roots.

One layer of pipes is laid more than a metre underground where soil temperature is relatively stable throughout the year; the other just level with the growing plant’s root zone, where temperatures can greatly fluctuate from hot during the day or in summer, to very cold at night or during winter.

Water flowing through the pipes — ideally pumped using solar energy — is “charged” by the deeper soil’s stable temperature, with that heat or cold differential, then discharged when the water pipes reach the root zone of the crops above.

The technology significantly increases plant and crop yields while also extending the length of the growing season and reducing heat and cold stress.

A trial last winter in Israel using RZTO pipes saw yields of basil — normally only able to be grown in summer months because of rising greenhouse energy and heating costs — increase by 66 per cent, while individual plant size also jumped by a third.

The trial, on a 20ha organic farm in the Carmia region of southern Israel between last December and February, demonstrated that the principle behind RZTO — ground source heat exchange — gave the basil roots an extra 5C of heat over the 39-day growing period compared to control plantings.

Roots chief executive Sharon Devir says not only were yields increased but the technology also enabled farmers who had abandoned growing basil in winter to now sell produce into higher value off-season markets.

“This pilot proves that heating the roots zone of basil seedlings on cold nights allows farmers to grow basil in winter with improved plant growth rates and crop yields, increasing profitability for the farmer with relatively low energy costs,” Devir says.

“Being a summer crop, basil needs high temperatures for normal development, making it prohibitive to grow in winter in many parts of the world.

“Our pilot farmer can now benefit from higher, premium prices for a crop that is normally out of season, which make his return on investment for installing the RZTO system only two years.”

Devir and his team are also testing the root heating system in a large avocado plantation in a cool area of northern Israel, for four months over late winter and early spring, to investigate the impact of heating mature tree roots on avocado yield, maturation, growth rates and quality, rather than on young annual basil seedlings.

A second year-long trial is underway on an apricot farm near Perth, where the roots of young apricot trees in a large commercial orchard will have been first cooled during the hot late summer months of February and March, and then warmed a little over the coming winter.

The first results are expected in mid-2019.

Roots' two founders say the company chose to float in Australia rather than in the US or elsewhere because here there is a relatively high and sophisticated level of understanding about agriculture and the agtech boom, the listing is on the main board rather than on a secondary NASDEQ system, and the time zone is similar to large potential markets in China and SoutheastAsia.

Australia's longstanding Jewish financial community, with many wealthy families and multi-generational investors, was also an attractive source of funds to the five-year-old Israel-based tech company, which grew out of the highly successful Israeli Office of the Chief Scientist Incubator program. A $19m sale and distribution deal has recently been signed with Dagan Agricultural Automation company in China to distribute Roots' root zone temperature systems for the next three years, aimed at increasing production in China's massive vegetable industry.

Chinese farmers already grow 53 per cent of all the world's vegetables, but production is declining because of polluted irrigation water, chemically tainted land, climate change and growing competition for scarce water.

"While China is a powerful agricultural producing country, it faces many challenges," Devir says.

"It must feed nearly three times the number of people per area unit of land as the rest of the world and demand for protein is growing, yet local land and water resource constraints make production increases a challenge."

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