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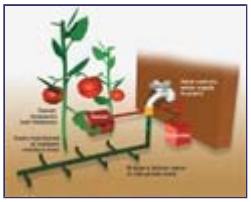
Fruitful drinking

A smart sensor that gives crops only as much water as they need dramatically increases yields

Exclusive from New Scientist magazine

A smart irrigation sensor that gives plants only as much to drink as they need can increase tomato yields by more than 40 per cent. The sensor has been developed by Yehoshua Sharon and Ben-ami Bravdo at the Hebrew University of Jerusalem's faculty of agriculture in Rehovot, Israel.



The researchers say that their system not only increases the yield of crops, but it also dramatically reduces water usage--by up to 60 per cent for some crops.

At the heart of the system is an electronic sensor that clips onto a plant leaf and measures its thickness to an accuracy of 1 micrometre.

"A leaf's thickness is dependent on the amount of water in a plant," says Sharon. "A healthy leaf is 60 per cent water." A thin leaf is a sure sign that the plant is suffering stress because it is thirsty, and stress is bad for yields.

Correct timing

The sensor consists of two plates, one fixed and the other spring-loaded, which together grip the leaf. The moving plate is connected to a small potentiometer that regulates the voltage in an electrical circuit. As the leaf's thickness changes, the plate moves, causing a change in the voltage. This signal is fed to a processor that adjusts the plant's water supply.

Unlike conventional irrigation systems, which water crops periodically, the Israeli system waters the plants continuously, but adjusts the flow to the plants' needs. "The idea is to give the plant the proper amount of water at the

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They're everywhere
More than one in 10 British children are carrying superbugs resistant to one or more antibiotics

correct time, according to what the plant requires," says Sharon.

Field studies show the system increases the yields of several crops while reducing consumption of water.

Yields of grapefruit increased by 15 per cent while needing 40 per cent less water. For peppers the yield rose 5 per cent while water usage fell by 60 per cent. Tomato plants yielded 40 per cent more fruit while consuming 35 per cent less water.

Surprising savings

"It is an interesting idea," says John Sadler, a soil scientist at the US government's Agricultural Research Service in Florence, South Carolina. "Other researchers have measured stress by measuring a plant's temperature or stem thickness. But I haven't heard of anyone doing irrigation at such a refined level," he says.

But Sadler is a little surprised by the figures for water savings. "They would depend on the technique you're comparing these results with," he says. Sharon says the savings are based on comparisons with the Israeli government's recommendations for irrigating crops.

He admits that the system has to be very reliable if it is to be effective. "Because the plants are watered continuously they are more susceptible to sudden changes in water supply," he says. "This means our system has to operate very reliably."

The researchers have founded a company called LeafSen to sell the new irrigation system, and they hope to start marketing it within the next few months.

1900 GMT, 9 May 2001

David Cohen

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