**Changbin Chen (right) stands in front of trials of the Desert Dew tomato conducted at Biosphere 2.**

# Double-Crop Tomatoes Now Possible

Desert Dew could change the way tomatoes are grown. The compact, 12-in. high plants require only 6 to 8 weeks to go from seed to fruit. They mature quickly enough that two crops might be grown even in northern states. The yet-to-be-released variety is the third short-season tomato developed by Dr. Changbin Chen, Arizona State University.

"I started work on Desert Dew while at the University of Minnesota, where we developed and released Ground Jewel and Ground Dew," says Chen. "We've evaluated all three lines for indoor farming potential. They're self-pollinating and a compact form that lends itself to greenhouse production. You can grow them in a very small space, like a patio or pot, and produce a pretty decent amount of tomatoes for salads or snacks."

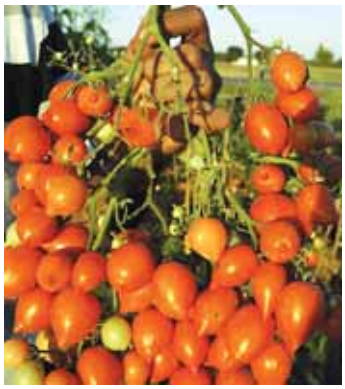
Of the three, Desert Dew yields heavier fruit and slightly more per plant, although it doesn't produce as much as Ground Jewel.

Desert Dew contains significantly higher levels of Vitamin C than conventional red tomatoes. Chen describes the flavor of the 2 to 4-in. fruit as citrusy.

"They're not slicing tomatoes, as they have a higher juice content," says Chen. "They yield as much as 3 lbs. of fruit per plant and only take up about 1 sq. ft. of space. They'd be a good variety for a small farm that wanted to diversify by producing for farmers markets."

The new variety was created through traditional, non-GMO plant breeding methods. Chen started by crossing two varieties and selecting for the traits he wanted. While at the University of Minnesota, these traits included fast growth and quick maturity to avoid season-ending frost. In Arizona, he found that high temperatures were bookended by two short growing seasons. Desert Dew and its older sisters performed well in both regions.

Unlike hybrid tomatoes, Desert Dew breeds true. While it doesn't produce many seeds, they'll reproduce faithfully. Ironically, while this is good for home gardeners, it reduces its value to seed companies since anyone can save seeds for personal use. As a result, this complicates the release of the new tomato to growers.



**Cluster of Desert Dew fruit from a single plant.**

"We're looking for a seed company to license Desert Dew and market it," says Chen. "The University would like a return on the research conducted to produce Desert Dew."

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**Graduate students Ava Forystek (left) and Jacob Belding (right) examine leaf color to identify N-deficient soil.**

# Plants Issue Red Alert When N Deficient

Two Cornell University doctoral students engineered tomato plants to turn red when soil nitrogen (N) levels are low. The RedAlert Living Sensors technology could be applied to countless other crops grown in gardens, greenhouses and open fields. Engineered sentinel plants, positioned periodically, could visually alert gardeners, farmers or hydronic growers to apply N.

Ava Forystek and Jacob Belding used a native plant pathway where roots detect nitrogen and signal other parts of the plant. The tomato plants were genetically engineered to produce a red pigment when the root zone N was low. The shade of red indicated the level of available N.

Plants often yellow and wilt when N is deficient. By that point, the damage has already occurred. RedAlert gives the plant a voice before harmful effects happen, explains Forystek.

"We like to use the analogy of a dog that whines when it's hungry," she says. "It would be kind of ridiculous to wait until you feel its ribs to feed it."

Forystek and Belding recently received the Graduate Runner-Up Award at the Collegiate Inventors Competition for the RedAlert Living Sensors. The National Inventors Hall of Fame runs the event. They received a $5,000 cash award and a U.S. Patent Office Patent Acceleration Certificate.

The two graduate students are exploring the development of a smartphone app that would correlate plant leaf color with root-zone N levels.

**Tomato leaves on right turned red due to low nitrogen in the soil.**

Belding notes that most "smart" ag tools tend to be sophisticated and expensive systems.

"This could be a smart ag device that's affordable and can be easily used by even a home gardener," he says.

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**Tom Burgess inherited his dad's 1960s model Allis-Chalmers B-112 garden tractor in poor condition and had it fully restored by Lee J. Sackett.**

# Vintage A-C Mower Restored To Like New

In 1981, when his father passed away, Tom Burgess inherited an Allis-Chalmers B-112 garden tractor that his father bought in the late 1960s. Although the tractor was in rough shape, Burgess says owning it was meaningful because he remembers his dad teaching him how to drive it and mowing grass when he was a kid.

Burgess stored the tractor for several years without trying to drive or restore it, always thinking of it as a "someday" project. Eventually, he found Lee J. Sackett, a restoration expert in Minnesota. He sent parts from an old Ingersoll tractor there to be reconditioned. Then, Burgess says, one conversation led to another, so he decided to send the B-112 to Minnesota for a complete makeover.

By then, the A-C had a frozen engine, rusted parts everywhere, and a mower deck full of holes. Burgess says Sackett's crew disassembled the tractor, repaired or rebuilt rusted parts, and overhauled the engine. Holes in the deck were cut out and replaced with new metal, then ground, sanded and buffed to reveal a seamless, almost brand-new condition topside and underneath.


**B-112 was in tough shape prior to restoration.**

Sackett has over 20 years of experience restoring vintage equipment, from small gasoline engines to garden tractors, pickup trucks, and full-sized tractors. They use a combination of modern and traditional techniques to remove dents and dings in sheet metal, repair rusted frame and wheel parts, and then sandblast and apply new paint. Restored equipment is always in "factory new" condition.

Burgess says he was amazed by the fit, finish and mechanical condition of his dad's nearly 60-year-old garden tractor. Sackett even restored all the chrome parts, added a new seat, installed new belts and tires, and rebuilt the dashboard. The B-112 has a Briggs & Stratton 30.1-cu. in. engine that produces 12 hp, more than enough power to run the 3-blade mower. The vari-shift transmission has 21 forward and seven reverse gears. Burgess says that since the mower is now in pristine condition, he intends to take it to shows rather than use it as a working mower.

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