



James Truman

Citrus Agricultural Center, 2004, looking north towards Maricopa Water District offices in distance.

Desert Citrus Research

Studies assist commercial and backyard growers

By Joanne Littlefield

The miles of citrus orchards that used to stretch into the horizon are disappearing from the landscape in central Arizona to make way for houses. About 9,300 acres of citrus were harvested in 2003, down from 10,100 in 2001. According to the Arizona Agricultural Statistics Bulletin, Arizona's orange, lemon, grapefruit, and tangerine acreage in 2003 decreased by 1,200 acres from 2002. The total value of all citrus production, at \$40.3 million was 28 percent less than the previous year. Yet citrus production remains a viable agricultural venture in the state.

From variety trials of crops that look promising for central Arizona farmers, to investigation of improved irrigation and fertilization practices, researchers at the 40-acre University of Arizona Citrus Agricultural Center (CAC) attempt to investigate anything that might help citrus farmers enhance profitability. Larger, higher quality fruit with greater yields per

tree for the fresh-fruit market is critical for farmers who want to stay in business.

The CAC is one of two research farms operated by the UA College of Agriculture and Life Sciences that deal specifically with finding solutions to problems faced by citrus growers. Researchers at the Yuma Mesa Agricultural Center (YMAC) help farmers in the expanding citrus industry in the Yuma valley, where 18,000 acres of citrus were harvested in 2003.

Farm manager James Truman has been at the CAC since the first citrus trees were planted at the facility in 1989.

"Production of citrus is controlled in Arizona and in other parts of the world by climate," he says. "In Arizona you have to be a large-sized grower or a niche marketer to make ends meet." As with many agricultural crops, the net return per acre on citrus has been going down. "So you either expand, produce for a niche market or you get out of the business. In Yuma

County there's a lot of planting of citrus, so the acreage in Arizona overall has been stable for many years."

The CAC is insulated from surrounding development because it is situated on a small parcel of land owned by the Maricopa Water District, with headquarters just up the road.

"They are updating that facility and we think they're here to stay," Truman says. "Since we're on a small spit of land that'll be hard to develop, we think we're here for a long duration as well."

Consumer demand for loose-skinned mandarin oranges has increased recently in part because they're easy to peel and segment and have very few seeds. Those traits as well as a high fruit quality make them a good market commodity. Six mandarin cultivars were planted for evaluation at the center two years ago and have been able to withstand the summer heat.

"We're hoping that at least several of these will produce well and be a possibility for farmers to plant in the future," Truman says.

The traditional method of irrigating citrus has been flood-irrigating by accessing water through ditches or wells and putting it onto the orchards via furrows, ditches or by flooding the entire area. This has been replaced with a more efficient method of micro-sprinklers. Almost all of the irrigation on new citrus orchards uses these small sprinkler jets—one or two plastic sprinklers connected to plastic hose or pipe.

"You do need pumps and filters, so that's an added input expense," Truman says, "but we're finding that the savings of water and the convenience of the systems is offsetting their initial expense."

Fluid fertilizers can be also be added for more precise nutrient uptake. UA soils scientist Thomas Thompson is conducting a five-year research trial at the CAC, looking at fertilization strategies for young trees under micro-sprinkler irrigation.

Besides citrus, the researchers observe the performance of deciduous fruit trees such as peaches, plums, nectarines, figs, apples, pluots (a combination plum and apricot), and Asian pears. They plant a few trees of each variety that local nurseries recommend for the southwestern climate. In the past, evaluations have included strawberries, blueberries, blackberries, jujube and jojoba, with varying rates of success.

Results on some of the crops under scrutiny at the CAC are obtained in a relatively short period of time, depending on the life cycle of the plant. Row crops such as

strawberries produce in one season, while tree crops normally take years to produce.

"We had a bad experience with a particular type of citrus that became very popular," Truman says, "an early variety naval orange called Fukumoto that had a lot of strong interest in California. Thousands of acres were planted." After 8-10 years the trees started showing signs of unsuspected decline and many of those acres had to be taken out.

"When you're in the business of growing trees that will give you years of production and they die in their tenth year, you don't want to recommend them to farmers," Truman explains. "So we monitor production of varieties for many years before we recommend them."

While commercial farming is the main focus of research at the CAC, many of the growing practices can be adopted by the backyard citrus grower. Each year the citrus center hosts well-attended seminars where university experts relay the latest growing techniques and varieties.

"Some backyard growers can get a little more intensive with their production and do some things we wouldn't do in a commercial arena," Truman admits. "So they come to the university research people to find out how to control or monitor the situations that they have."

A common homeowner's question tends to be, "What's going on with my leaves?" Often the response is that the deformed leaf is caused by the citrus thrips that feed on young leaves and fruit, creating cosmetic external damage. Truman says he doesn't recommend that backyard citrus growers spray anything for these insects.

"We tell them not to be too concerned with aesthetics, be concerned with the internal quality of fruit that the tree produces."

For the commercial grower, however, the number one insect problem is the same citrus thrips—*Scirtothrips citri* (Moulton). The tiny 1/16-inch-long insect damages small fruit up to about 1" in diameter. Beyond that size the rind is too hard, the temperatures are generally too high and the insects will go away.

"We do apply some chemicals in commercial operations to keep insects off the fruit because consumers won't buy fruit with extensive rind damage," Truman notes. In Yuma County thrips are sprayed more often because the growing conditions are different.

UA entomologist David Kerns conducts ongoing research on chemicals that may be effective on citrus thrips in both central



Citrus Agricultural Center, Waddell, Arizona, 1992, facing north towards Maricopa Water District offices in distance.

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Arizona and the Yuma area. Most of the lemons grown in Yuma are grown for domestic and export fresh markets, which demand fruit free of cosmetic defects. Damage from citrus thrips annually results in millions of dollars in lost revenue due to scarred fruit and insecticide costs. Applications of insecticides for thrips control vary from three to five per season depending on temperatures and thrips populations. Insecticides can be extremely costly, and over many years may be one of the greatest production expenses.

The rapidly expanding organic fruit and vegetable market is the impetus for looking at organic methods of growing citrus. The CAC maintains an organic orchard area with one field of flood-irrigated Minneola tangelos comparing bare ground versus a cover crop, and another of Washington navels under micro-sprinklers.

"The cover crop is good because we're looking for beneficial insects to reside in this cover crop and help control the number of detrimental insects that affect the citrus," Truman says. The pesticide-free projects are mowed to keep the weeds under control. Fruit quality and long-term production of the two regimes are monitored.

CALS citrus specialist Glenn Wright has two projects at the CAC. One is evaluating different formulations of organic growth hormones on navel oranges to see which promotes retention of young small fruits on the tree, leading to a better crop. Although results are not compiled yet, preliminary findings indicate that organic growth hormones do tend to promote better sizing of the fruit as well as later ripening of the fruit. Wright's other project is evaluating 10 varieties of navel oranges to determine production levels and timing of harvest in the central Arizona climate. ☒



Micro sprinklers use a low pressure system (20 to 25 pounds per square inch of pressure) that puts out from 8 to 15 gallons of water per hour, spraying from 18 to 20 feet in diameter.

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