Retired scientist ignites 'Orange revolution' to fight citrus greening

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Inspecting a high density, micro-budded citrus orchard near Mission are (l to r) Dr. Juan Anciso, Dr. Mani Skaria and Barbara Storz. Credit: AgriLife Communications photo by Rod Santa Ana

Five years ago, Dr. Mani Skaria, then a plant pathologist at the Texas A&M University-Kingsville Citrus Center at Weslaco, encouraged the citrus growers he worked with to think outside the box. He urged them to ignite what he called the Orange Revolution.

Too many factors, including exotic diseases, high land prices and urbanization, were slowly squeezing veteran citrus growers out of the business, he said. The citrus industry wasn't doing well and it was time for growers to change their longtime cultural practices.

Skaria's revolution, named after Dr. Norman Borlaug's Green Revolution and his life-saving wheat improvement projects of the mid-20th century, called for growers to switch to high-density planting using micro-budded trees that produce fruit quickly.

Skaria reasoned that the only way to stay one step ahead of tree-killing diseases and prohibitive expenses was to produce more citrus fruit per acre quicker using cost-effective methods.

"Back then, I was talking the talk with the field experience I'd had with micro-budded citrus," Skaria said. "But now, I'm walking the talk, encouraged by extraordinary field successes with micro-budded trees planted between 2008-2013 in at least seven South Texas locations."

After a 25-year career with the Texas A&M University System, Skaria retired in March and began practicing what he had been preaching. In a partnership with others, Skaria founded MicroTech LLC, which purchased a large tract of land outside Hargill in the Lower Rio Grande Valley. The company has begun producing and planting citrus trees while workers build what Skaria says is a state-of-the art facility that eventually will be emulated globally.

Two experts, Barbara Storz and Dr. Juan Anciso, a Texas A&M AgriLife Extension Service horticulturist and a citrus specialist in Hidalgo County, respectively, are encouraged by Skaria's premise and believe his system may help growers manage the economic impact of greening disease until a long-term solution is found.

Citrus greening is an incurable bacterial disease that is not harmful to humans, but clogs a tree's vascular system, prevents fruit from maturing and eventually kills the tree. The disease is spread by a tiny insect known as the Asian citrus psyllid.

Opportunities arise when disaster strikes, Skaria insists, such as the Irish Potato Famine of the 1840s. Solutions throughout agricultural history are well documented.

While visiting a citrus orchard east of Mission that has two- and three-year old micro-budded citrus trees, Storz and Anciso agreed the new orchard system could offer growers a way to circumvent adversities and stay in business.

"If we have to start replacing trees because of citrus greening and/or a freeze, this method of high-density, micro-budded trees is a whole lot less expensive," Storz said. "The trees are less expensive, the labor to plant them is cheaper and trees produce fruit sooner. A grower can dramatically cut down the time, space and money needed to produce citrus."

In a process Skaria developed, hardy sour orange rootstocks are grown from seed in a tubular container and micro-budded when the rootstock is still small. Within two or three weeks, the newly budded rootstock begins to grow and is soon ready for transplanting to an orchard.

Unlike traditionally grafted trees, micro-budded trees do not spend

12-18 months or more in a nursery before they can be transplanted, which makes them less expensive, Skaria said. And for reasons not yet thoroughly studied, micro-budded trees mature and produce more fruit and quicker than traditionally grafted citrus trees.

"These micro-budded trees are not genetically modified," he said.

Although retired, Skaria continues to serve as an adjunct professor at Texas A&M University's horticulture department, where he mentors one student, Jose Perez, whose doctoral work involves discovering exactly why micro-budded trees are precocious and produce more abundant.

The idea of harvesting fruit on a commercial basis just three years after planting is unique and "pretty special," Storz said.

"Normally, trees take five years before you can harvest fruit, and certainly not in the amount that this micro-budded, high-density grove is producing," she said. "That means that the length of time before growers start seeing a return on their investment is shortened. A grower could start harvesting fruit after only two years and by the third year, you'd be in business."

Skaria said this system helps growers keep pace with losses.

"In a well-maintained orchard," he said, "assuming citrus greening pressure of a three percent yearly incidence, a high density, micro-budded orchard could definitely bring an economic advantage, unlike a traditional orchard."

Anciso said high-density planting offers advantages because they reduce the space, time and cost involved in producing fruit.

"In relation to citrus greening, I think this production system does offer

an alternative," he said. "Growers may be able to make it work economically by having larger production quicker. In a micro-budded orchard, trees are planted in high density, with more than 500 trees per acre, which is a completely different system from what we've been using here in the Lower Rio Grande Valley. In a conventional orchard there would normally be about 121 to 130 citrus trees per acre, so this is roughly three times the amount of trees per acre."

While still under construction, MicroTech is already growing citrus varieties that won't necessarily compete with fruit grown commercially in the area, Skaria said.

"Our fruit production will concentrate on those citrus varieties that are in short supply in Texas, including oranges, Persian limes, mandarin varieties, specialty grapefruit and other assorted varieties, but our main focus will be on producing high-quality Persian limes."

So far, 7,000 trees have been planted since June, and another 60,000 are ready to be planted, Skaria said. Once the irrigation system is in place later this month, more trees will be planted weekly.

"We plan to produce and plant 5,000 micro-budded citrus trees per week," he said. "Our goal is to eventually plant over 1,000 acres of micro-budded, high-density citrus, which will be roughly one-fourth of the current citrus tree population in the Rio Grande Valley's commercial citrus industry of 24,000 acres."

Other innovations of the new citrus facility are the use of windbreak trees, sod in the orchards and sniffer dogs to detect citrus greening.

"We will plant fast-growing trees along the perimeter of our orchards as well as between rows of trees," Skaria said. "Closely mowed grass will be maintained between trees and we're in the process of training two

African Boerboels to serve as watchdogs and to detect citrus greening, a practice that has shown to be a possibility, as per limited studies in Florida."

The grass on the orchard floor will serve two purposes: to reduce damage to fruit and tree leaves by windblown sand, and to serve as a reservoir for beneficial mites and insects that will help keep pests in check while reducing the amount of pesticides used in the orchards.

"This new citrus facility in Hargill, with effective management and production staff, will be totally integrated because we will produce trees, plant them, care for them in an environmentally safe way, harvest them and market the fruit. In the interest of food safety, we want total control of the fruit all the way to consumers' hands, and to be in compliance with the rules of federal organic produce standards."

Skaria said the facility will use what he calls an 'organic-plus' method of producing citrus.

"We won't use any herbicides," he said. "We'll stick as closely as we can to the spirit and the law of organic production, with minor adjustments as needed to keep our citrus free of fungal toxins and pesticides, focusing on quality assurances to consumers."

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