Traditionally the cultivation of dates has been very labor intensive. For example, workers have had to climb and pollinate each female tree by hand.

But drones are changing the way things have been done for thousands of years. Instead of climbing trees to hand-pollinate each individual tree, workers can now attach nylon stockings filled with pollen and fly it over the trees. The flying motion releases the pollen powder.

Drones are making this and other jobs much easier. And it’s one of the jobs of the Yuma Center of Excellence for Desert Agriculture to find out how drones can make agriculture tasks easier and more efficient.
“I’m excited about that,” said Rosa Bevington, a media specialist for the center.

Bevington has been a drone operator for the ag center for three years. She’s certified by the Federal Aviation Administration.

The center first used drones in pollinating date trees in 2016 by using nylon stockings. This year the center worked with the University of Arizona Systems Engineering Program, which developed a more sophisticated release mechanism as a senior design project.

The center first began using drones under the leadership of Kurt Nolte, then executive director of the Yuma County Cooperative, who originally focused on using drones to make high-quality educational outreach videos with footage shot from the skies.

Then they saw more potential for research and started using drones for plant counting and health analysis.

Paul Brierley, executive director of the Yuma Center of Excellence for Desert Agriculture, supports the use of drones for a variety of applications in agriculture. The center is researching ways drones can scout fields to spot bug infestations, diseases, irrigation problems and soil health problems.

“It’s good for detecting health issues that might not be seen by walking along the edge of a field. With drones, you can see the middle sections from above,” Brierley said. “If a plant is stressed, you can see it visually.”

Bevington stitches images shot by drones to create a composite of a field shot from above. “It’s a collage of sorts, but pretty seamless,” she explained.

The lower to the ground it is, the higher the resolution and sharper the image, which means that the image can be better enlarged, making it easier to spot problems.

Drone images can collect a lot of data, such as yield and stand counts (the number of plants growing), with software doing the counting.

“If someone is going to market dates, it’d be nice to see how many they will have to sell,” Brierley said.

If there’s a flood, drones can be used to assess damage to fields when someone can’t physically get in. This helps farmers know what kind and how much damage has been caused, which in turn helps them decide whether plants are still viable or if fields need to be replanted.

There’s also been talk of using drones to scare birds away from fields, but this comes with a hazard as some birds will attack drones. This happened to Bevington a couple of times. Once a hawk kept circling her drone until it decided it was neither a threat nor a treat.

Bevington had to learn the FAA rules for flying drones before becoming certified. For example, drones can fly only up to 400 feet.

“They don’t like drones crashing into aircraft,” Brierley quipped.

He doesn’t believe that this will be an issue in the future. “Technology will solve that,” he said, noting that the same avoidance technology that allows cars to drive by themselves without crashing will be applied to drones.

In the meantime, a drone pilot needs to have it in view at all times and there can only be one operator per drone while it is in flight.

If a field is located under unregulated airspace, a drone can be flown without permission, but it the field is near an airport, the drone operator needs to give a 90-day notice to fly. Most of these rules apply to commercial drones, not those flown by hobbyists.

The first phase in the use of drones is getting visual imagery that helps farmers manage their fields and make decisions.
But soon drones might help even more, thanks to the development of infrared cameras equipped with optical sensors that “see” things — such as disease on a plant — before they can be seen with the naked eye.

The sooner the farmer knows of disease or dry areas, the sooner the farmer can address it. This gives the farmer more options, for example, he can spot treat the disease with a mild chemical when it's just starting before it spreads to the entire field.

“There will be less chemicals used and less damage to the plant. Just better treatment options, it's better for the environment, and they’ll be savings money,” Brierley said.

The ag center will also be working with the U.S. Arid Lands Agricultural Research Center on a collaborative project with NASA early next year. The “ground truthing” project will help the agency verify the images taken by satellites. The center’s drone will take photos and compare them to those taken by NASA to check the accuracy of the satellite images.

Other developments in the near future include using drone 3D images that can determine things such as how tall plants are. There is a lot of work being on sensors that drones can carry that might ultimately automate lots of tasks.

But just collecting data is not enough, Brierley noted. They need to find out what to do with the data and how it can help farmers. The center is ready to do its part by helping to develop drone applications specific to the agriculture industry, addressing their needs and wants.

“Rosa is our step No. 1,” Brierley said, noting that Bevington is currently learning software programs that could help farmers.

The center is also ready to let drone companies test their abilities to detect disease and infections on its research farm.

“It can be valuable to the company and industry,” Brierley said. “They can say it’s been tested, that the ag center screened it. There are a lot of claims of ‘we can do this,’ but can they?”

The center is also seeking to partner with other researchers on projects, agriculture or otherwise. Brierley pointed out that drones nowadays are being used in many ways, for example, Yuma County uses drones in mosquito counts. Insurance companies use them to assess damage after natural disasters. Public agencies are using them to assess damage as well and to help with recovery efforts. Real estate and security companies are also using them.

“There’s so much potential,” Brierley said.