

IMPROVING AGRICULTURAL PRODUCTION

Improving agricultural production is a major priority for the University of Florida's Institute of Food and Agricultural Sciences and has been since its inception. To stay ahead of competitors in the U.S. and around the world, Florida's growers need science-based information to help them grow crops with the largest possible yield while reducing the need for economically and environmentally costly inputs such as water, fertilizers, herbicides and pesticides. UF/IFAS researchers time and again find ways to help agricultural producers grow more marketable products at lower cost. To that end, UF/IFAS scientists are investigating sod-based rotations in combination with cattle grazing to conserve water, a jet fuel made from an oilseed crop called Ethiopian mustard that can also feed cattle, and experiments with compact, plastic-covered raised beds that produce big water savings. Studies already proving highly beneficial to producers include work to help growers better manage a costly cotton disease, a study showing that a fertigation drip can help citrus trees grow faster and produce more fruit earlier, and long-term research that has made Southern pine forests among the world's most productive.

NATURAL
RESOURCES



HUMAN
SYSTEMS



AGRICULTURE



Ongoing Research



RAISED-BED AGRICULTURE

For decades, Florida's vegetable crops have been grown on wide, plastic-covered raised soil beds. Sanjay Shukla, an associate professor with the UF/IFAS Southwest Florida REC, wondered if the beds could be redesigned to better fit modern irrigation and chemigation technologies. Turns out, they can. Higher and narrower beds used to grow eggplant required as little as half the amount of irrigation compared to a traditional wide bed, with no reduction in yield. The compact beds reduced water and nutrient leaching, required less fumigant, and saved up to \$270 per acre. Shukla's team is now studying compact beds for tomato and pepper. If early results hold, the reconfigured beds could save Florida's vegetable industry millions every year while greatly shrinking its environmental footprint.



CROPS AND CATTLE

Farmers have known for centuries that rotating crops results in fertile ground and better yield. But UF/IFAS agronomist David Wright says the combination of peanuts and cotton, grazing cattle and bahiagrass creates an even better result: reduced fertilizer and pesticide use, crops that require less than half the irrigation, more soil carbon and a two- to seven-fold increase in farmer income. His team has taken a long-term look at the sod-based rotation system — it's currently in its 14th year of testing — and officials are looking into whether the method could reduce agricultural water use in Florida and Georgia as well as reduce water consumption in the Apalachicola River basin, which maintains the state's oyster industry.



ETHIOPIAN MUSTARD

Imagine jet fuel made from seed — it's renewable, it weighs less than petroleum-based fuel and it's not harmful to the environment. Now, imagine thousands of Florida acres devoted to growing this seed as a winter crop, bringing in income, reducing erosion and creating better summer crops. Finally, imagine that this oilseed can be used as cattle feed. UF/IFAS plant pathologist Jim Marois is helping make scientists' imaginings a reality by using U.S. Navy grant funds and other support to study how to best grow Ethiopian mustard (*Brassica carinata*) and determine which varieties work best in Florida. Florida, Canada and South Dakota are working to meet the Navy's 8-million-barrel goal by 2020.

Research with Impact



CITRUS NUTRIENT MANAGEMENT

Kelly Morgan, an associate professor with the UF/IFAS Southwest Florida REC, has long focused his research on growing crops such as citrus and sugarcane using the fewest inputs possible. His team's five-year study showed that using drip irrigation and a tiny amount of fertilizer in the mix helped young citrus trees grow more than 30 percent faster, with nearly double the output of fruit in the first few years. Those gains represent a huge benefit for Florida citrus growers who've had to replant trees far more frequently because of citrus greening and need them to produce fruit quickly. The study shows that growers can use less fertilizer than had been used in periodic applications, as well as less water overall.



COTTON HARDLOCK

Cotton hardlock is a fungal disease that prevents the cotton boll from fully opening. Mechanized pickers can't extract the bolls with hardlock, and often knock them to the ground — wasted product for growers. UF/IFAS plant pathologist Jim Marois and fellow North Florida REC scientists spent years unraveling the mystery behind the disease, eventually discovering that it enters through the bloom as the plant is flowering. Regimes in which producers keep close watch on cool nights and apply fungicide and pesticide as the plants are just starting to bloom can have as much as a 50 percent increase in yield. In 2013, the estimated impact of the research was an added \$12.5 million to Florida cotton farmers.



PRODUCTIVE PINES

Today, planted pine forests in the Southern U.S. cover nearly 39 million acres. These forests are among the world's most productive, producing about 16 percent of global industrial wood. Silvicultural and genetic research and new technologies developed by UF/IFAS scientists in the School of Forest Resources and Conservation with industry collaborators doubled the yield of pine forests. New management regimes based on these technologies include combinations of mechanical and chemical site preparation, understory control, genetically improved seedlings for growth and disease resistance, density management and fertilization. UF/IFAS forest scientist Eric Jokela, colleagues and the Forest Biology Research Cooperative found that a second-rotation loblolly stand has already resulted in what Jokela calls "remarkable" growth — 5-year-old trees that average 34 feet tall and 5.8 inches in diameter.

UNIT LEADERS

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