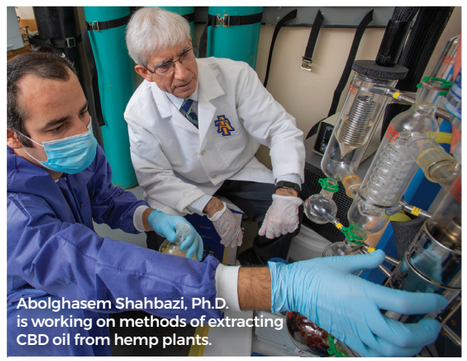
Professor Beatrice Dingha shows students how hemp benefits from intercropping.

HEMP RESEARCH

HELPING FARMERS NAVIGATE A NEW FIELD



Abolghasem Shahbazi, Ph.D. is working on methods of extracting CBD oil from hemp plants.

For some farmers, hemp sounds like the cash crop of their dreams. Since Congress made hemp farming legal in 2018, it has been the hot new topic in agriculture, bringing hope to North Carolina farmers still recovering financially from the decline of the tobacco industry. The fast-growing plant can yield seeds, flowers, fibers and oil, all of which can theoretically fetch high prices on the hemp market — enticing thousands to try growing it.

But there's one problem for current and future hemp farmers: it's a new field, with little long-term research to guide eager farmers on their journey.

Enter the College of Agriculture and Environmental Sciences, which is performing research that ultimately will educate farmers on commercial hemp production. Researchers are studying a variety of aspects of hemp farming — from pests and pollination to production and profits — to help growers maximize the crop's potential and minimize the risks associated with growing it.

As they reach conclusions, the researchers will share their findings with farmers and agricultural Extension agents through symposia, seminars, pamphlets, websites and other means — all with the goal of painting a full picture of the realities of hemp production.

"The plant has a lot of potential, but people are jumping into something without considering what they need to do first," said Obed Quaicoe, Ph.D., an assistant professor in the Department of Agribusiness, Applied Economics and Agriscience Education. His team is using a $500,000 grant from the USDA's Agriculture and Food Research Initiative to examine the financial risks of growing hemp.

Hemp is one of the oldest cultivated plants in the world, once grown in fields owned by George Washington and Thomas Jefferson. But there's not a wide body of research on the best conditions for growing hemp, the pests it attracts or the economic ramifications for farmers growing it.

With good reason. For most of the last 100 years, it was illegal to grow hemp, which made it impossible to study the plant's biology or its potential as a crop. Hemp comes from cannabis, the same plant that produces marijuana. And though it's legal once again to grow hemp in North Carolina, marijuana is a different story. State officials regularly test hemp farmers' plants for tetrahydrocannabinol, or THC. If a cannabis plant contains more than .3 percent THC, then it's marijuana and must be destroyed.

That's just one of the risks of hemp farming. Others include pests, mold and market saturation, which is where Quaicoe's interests lie. Too many farmers are investing time and money into growing a crop they know little about, he said. As of August 2021, there are 1,500 hemp growers licensed through the state's Industrial Hemp Commission; however, according to Quaicoe, many of those farmers have been so excited about the potential that they failed to line up buyers, which has been financially devastating for some.

"You have all these output from farmers and literally not enough people to buy the flowers or the fiber from them to process," he said. "When that happens, it chokes the market. And if you don't get a good price, you get your head underwater."

THE BENEFITS OF INTERCROPPING

Beatrice Dingha, Ph.D., often finds herself walking through rows of hemp at the N.C. A&T Farm, inspecting the plants, monitoring the soil, keeping an eye out for bees and bugs, her specialty.

Dingha, a research associate professor in the Department of Natural Resources and Environmental Design, is examining how hemp benefits from intercropping — growing two or more other crops so close together that they interact biologically. The research is being funded in part by a $230,000 grant from the Southern Sustainable Agriculture Research and Education, which promotes sustainable farming practices.

Dingha and her team are using three crops for this grant-funded research: hemp, cowpeas (black-eyed peas) and either okra, squash or watermelon, which are dependent on bees for pollination.

The bees are an important part of Dingha's research, and not just because she's an entomologist. Bees seek out cowpeas for nectar. The more pollinators there are in the fields, the greater the yield of cowpeas. And that means more nitrogen in the soil, something needed to produce a healthy hemp crop. Dingha is experimenting with four varieties of cannabis plants to see which one reacts best.

"If we can have cowpeas that produce nitrogen, then we might be able to cut down on the amount of fertilizer that we use," she said.

Her team's research has another important implication for hemp farmers: it demonstrates the importance of farmers having a second or third crop to sell income if something happens to the hemp.

"They should not rely only on hemp, because we all know that hemp is a delicate crop," she said.

PERFECTING PRODUCTION

A delicate crop, indeed. It needs the right temperature, the appropriate amount of fertilizer, the correct irrigation, the proper protection from pests and weeds. Any variations, and the crop could fail, costing farmers their livelihoods until next season.

Ghasem Shahbazi, Ph.D., a professor in the Department of Natural Resources and Environmental Design, has spent the last four years investigating the optimal growing conditions for hemp — specifically what varieties produce the best CBD oil. The agricultural and biological engineer, who specializes in bioenergy research and product development, is a member of the N.C. A&T Industrial Hemp Team, which is now in the second phase of research funded in part by a grant from the USDA Evans-Allen Research Program.

Like the other researchers in the college, Shahbazi's goal is helping farmers remove the guesswork from planting, cultivating and selling this often-misunderstood plant.

"Some people by nature only look at the positive side," he said. "They only look at the price and potential and income and say, 'Wow. I need to jump in there with both feet.' But a lot of people couldn't sell their hemp in years past because of the lower quality, or because of a lack of connection with a buyer."

The first phase of the team's work began with Arnab Bhowmik, Ph.D., the assistant professor of soil science and soil microbiology who is responsible for the part of the research that takes place on the farm. He planted two varieties known for their production of buds that produce high quality CBD oil to assess what grows best under what circumstances.

With grown plants in hand, Shahbazi extracted and purified the CBD oil, running it again and again through the university's small-scale biorefinery machine. The second phase, which began in 2020, is focusing on how the quality of the soil impacts the quality of the CBD oil.

Results from both phases will help farmers choose their varieties more wisely — and temper their expectations.

"We tell them that they need to be careful," Shahbazi said. "Usually in these situations, there are people who have a lot of money that they can throw at risky things. Farmers don't have unlimited money to throw at risky things."

To learn more about hemp research at N.C. A&T, visit us online at www.ncat.edu/caes

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