A geneticist eyes the future of cotton

SIXTH-GENERATION MISSISSIPPIAN, Dr. Jack C. McCarty, grew up on a farm in Clarke County, Mississippi. He has seen unprecedented innovation in agriculture in his 40-plus years as a research agronomist with the **USDA** Agricultural Research Service's Crop Science Research Laboratory.

"As a child, I remember when my father purchased the family's first tractor. Up until then, we plowed the soil with mules. During my life and career, changes in agriculture have been more dramatic than several hundred years prior to that."

McCarty has spent his career focused on cotton genetics. In 2016, McCarty was honored as Cotton Researcher of the Year at the World Cotton Research Conference in Brazil. The selection was made by the International Cotton Advisory, a committee of cotton experts representing major cotton producing countries. That international recognition is a testament to the years of McCarty's quiet dedication.

McCarty earned three degrees in agronomy from Mississippi State: his bachelor's in 1968, his master's in 1971, and his doctoral degree in 1974.

When McCarty began working as a researcher in the 1970s, the biggest pest to cotton was the boll weevil.

"I worked to develop host plant resistance from a breeding standpoint, trying to find cotton plants that were resistant to the boll weevil. We had some success in that," McCarty said. "After the boll weevil was nearly eradicated in the U.S., our research shifted to bollworms, plant bugs, and other pests as well as the management of nematodes."

Most of McCarty's breeding work in cotton focuses on developing genetic material called germplasm with useful traits that can then be passed on to cotton breeding companies. The breeding companies pick up those traits and incorporate them into cultivars or varieties, and then they make those available to the farmers. In his nematode research, McCarty's work led to the development of genetic resistance to the important reniform nematode. Additionally, he developed more than 500 germplasm lines, which represented new sources of plant genetic resistance to insects, nematodes, and diseases.

McCarty has also been a leader in fiber research. He co-developed plant mapping technology that determined the economic worth of each boll on a cotton plant. The technology is used as a gold standard in settling legal disputes centered on cotton fruiting and retention.

McCarty served 29 years in the Air National Guard, retiring as Lieutenant Colonel. His two brothers both went into agricultural education, each earning advanced degrees from **MSU**; one brother was with the **MSU** Extension Service and the Mississippi State Plant Board (Robert H. McCarty died in 2000 and has a building on campus named after him), the other brother (Will) was the state cotton specialist for many years and retired as associate director of the **MSU** Extension Service. McCarty's sister retired after teaching elementary education for 30 years.

"I'm the only one of my siblings still working."

And work he does. McCarty continues his research in nematode resistance, improved fiber quality, and genetic diversity. He's published 168 peer-reviewed manuscripts and 106 non-peer reviewed papers. He is a member of the graduate faculty at Mississippi State and has mentored 50 master or doctoral students as a member of their graduate advisory committee. During his career, McCarty has left an imprint as a leader in agriculture. His research has improved the genetics of Mississippi's original cash crop, contributing to better, stronger plants, with greater resistance to pests and improved yield and fiber quality.

As a dedicated researcher and mentor training the agricultural leaders of tomorrow, McCarty has his eyes focused on the future of cotton. To sustain that future, McCarty recently established an endowed scholarship in the College of Agriculture and Life Sciences for students studying agronomy.