OSU seed pioneer retires

By CANDACE POLLOCK

PLANT production starts with the seed, and Miller McDonald has spent his Ohio State University career furthering research, education, and technology in seed germination, vigor and viability.

The seed physiologist with the Department of Horticulture and Crop Science retired on Dec. 31, but his efforts over the past three decades have helped shape industry standards for seed testing and opened the doors to new ways of producing quality seed throughout the world.

“Agriculture begins with high-quality seed. No matter what the seed has been exposed to, in the end, the agricultural industry wants to know if that seed will germinate and how fast it will germinate,” says McDonald.

“And there are different ways of producing quality seeds. For example, in the United States, we use lots of machinery and few people and, in contrast, China uses lots of people and few machinery,” he explains. “The goal for me was to show students that, by using these differing technologies, you could solve seed production problems in various ways and still produce high-quality seeds.”

McDonald received his bachelor’s degree in biology from the University of Virginia, his master’s degree in biology from Wake Forest University and his doctorate in agronomy from Cornell. He began his career with the U.S. Department of Agriculture before coming to Ohio State University.

His love for seeds was sparked by an enthusiastic professor and an undergraduate experiment involving light reaction and tomato seed germination. Since then, he has carved a path of research accomplishments that have advanced the industry, and education in seed science and technology.

Seven-year rotation

“Every seven years, a faculty member is eligible to take a sabbatical. It’s a mechanism to rest and learn new experiences. I use that same approach in my research because eventually you become burned out focusing on the same thing year after year,” says McDonald.

Advances in technology and changes in the industry have also helped steer his research in new directions.

“When I first started at Ohio State, there were over 200 seed companies in Ohio. Today there are only about 50. They’ve consolidated, become larger in scope and have shifted to a more global research focus,” says McDonald. “As a result, we’ve shifted from training and educating seed people in the state to training and educating seed people with more comprehensive international exposure.”

He adds that there will always be a need for seed research no matter what direction the industry takes.

“We rely on seeds to produce plants. With new advances in production, such as genetically modified organisms, there will always be a need for research to ensure that seeds germinate,” says McDonald. “Take corn, focus on biodiesel, for example. We are taking the carbon from photosynthesis that is normally used for germination and putting it into oil. That’s going to modify how seeds germinate.”

Through all of the changes McDonald has been part of during his career, he’s most excited about interacting with students. “There’s nothing more satisfying than helping a student work out a research problem and seeing the look of excitement on his or her face,” says McDonald. “You go home with a smile.”

But he’ll never forget what brought him to Ohio State University in the first place. “When people ask me why I came to Ohio State, I tell them that not only is it an outstanding academic institution, but it’s also the only university in the world whose mascot is a seed.”

Crops

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Key Points

- Miller McDonald has helped to shape the seed industry in Ohio for 30-plus years.
- Demand for new seed technology is a constant in agriculture.
- McDonald drew satisfaction from helping students.

Career highlights of Miller McDonald

HERE are a few of Miller McDonald’s notable projects and products:

- The Association of Official Seed Analysts Seed Vigor Testing Handbook. Published in 1983, this handbook helped standardize vigor testing methods and enhance quality seeds throughout the world. “Before the book was published, industry didn’t have a standardized way of measuring seed vigor, or even how to define it,” says McDonald.


- The Tray Accelerated Aging Test. The system was developed by McDonald and his colleagues as a vigor test that simulates the seed aging process using high temperatures and water to increase relative humidity. Prior to the development of this new test, the standard accelerated aging system, which lacked trays, produced non-uniform results.

- The Saturated Salt Accelerated Aging Test. This test was designed specifically for vegetable and flower seeds, which are smaller than most agronomic crop seeds and therefore dehydrate more quickly. With the saturated salt accelerated aging system, salt is added to the water to reduce the relative humidity inside the aging box, extending the aging life of the seed.

- The Seed Vigor Imaging System. Now patented, this system measures several aspects of seed quality including vigor index, growth value and uniformity value. “This technology is important because it doesn’t measure one aspect of seed quality, like other tests,” says McDonald. “And when you look at seed vigor, there is a need to measure as many components of seed quality at one time. Can you germinate the seed? How fast and uniformly will the seeds germinate? This test measures these important aspects, and there are no other vigor tests with this capability.”

- Consortium for International Seed Technology Training. McDonald was the leader in the establishment of a five-member global consortium, including Ohio State University, that uses advances in distance education and other technologies to further international training in seed technology. Established for four years, CISTT provides leadership in educating students, industry personnel, and agriculturalists in seed science and technology through student internships, faculty interactions, educational materials, courses and workshops. To learn more, visit www.seedconsortium.org.

- Other accomplishments. Miller also helped establish the OSU Seed Biology Program (www.seedbiology.osu.edu) and the Ornamental Plant Germplasm Center (opgc.osu.edu). His personal philosophy of shifting research interests every seven years has contributed to the plethora of academic accomplishments.