Breeding the Best
Thomas G. Ranney

Short Grasses
HRI’s SHIFT Program
Digging for Profit
American Nurseryman guides and reflects the greater green industry by providing authoritative, relevant, practical and inspirational information to help growers and landscape professionals succeed in strengthening their businesses and industry.

September 2015

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Tom Ranney is a professor in the Department of Horticultural Science at North Carolina State University, but his “classroom” is a bit different from most. Since 1989, he’s been in charge of the Mountain Crop Improvement Lab at the Mountain Horticultural Crops Research and Extension Center in Mills River, where he’s worked since earning his PhD in Horticulture/Plant Protection from Cornell University.

At the center’s Lab, Ranney does work closely with students (both graduate and undergraduate), but his position actually is 100 percent research, focusing on plant breeding and new crop development. So the teaching—and the learning—are hands-on. And the education extends far beyond the student body.

Tucked into the mountains of Western North Carolina, the Lab has an inspirational setting for the serious work of applied research that not only trains new plant breeders, but also contributes directly to the commercial hort industry. Ranging from sustainable production practices to glorious new plants, the results of the work here are shared with other researchers, and with growers and breeders across the country and around the world. Familiar with Invincibelle® Spirit hydrangea? It was developed here.

The Mountain Crop Improvement Lab

We asked Ranney to describe his work, the lab and the overall contributions of the Mountain Horticultural Crops Research and Extension Center:

“It’s basically a university research program, and we have broad challenges. We’re engaged in research, education, and new crop development. Most of what we do revolves around plant breeding, but that’s a fairly large tent. We sometimes get involved in more basic research and do work on fundamental genetics and reproductive biology, but it all typically has an ultimate goal of developing new and improved plants.”

Much of the work is intended to send plants into the market, but, as Ranney explains, “I would say there’s a whole continuum. A lot of the work is developing fundamental information that will enable other plant breeders. We do basic work on breeding and genetics, mode of inheritance, reproductive biology, and things that would allow other breeders to advance their programs. But we do like to take projects to fruition if we can, and ultimately use that new information in developing new and superior plants that are better commodities for the industry.”

Collaboration is key

“We work a lot with industry, growers and associations, and very much work in terms of partnerships,” Ranney says. “A lot of our plant breeding projects are grass-roots collaborations, from inception to commercialization. So we’re constantly getting input, sharing ideas, and walking nursery rows over periods of years and generations of plants.”

“It is a long-term undertaking, and it’s one that I think is well-suited to collaboration,” he continues. “Although we can often bring some technical expertise to the table, we lean heavily on industry for giving the business world perspective, looking at production considerations, plant evaluations, market analysis, and regional testing. And then ultimately we like to hand things off to a commercial partner to do the marketing and the commercialization.”

“Working with industry helps to keep me both inspired and grounded. If you ever want to be really humbled as a plant breeder, invite a bunch of nurserymen out to walk your rows of plants. They tend to be straight shooters and knowledgeable critics.”

Collaborators range from associations to private companies.

“We work a lot with the North Carolina Nursery and Landscape Association; they have a plant breeding advisory committee of quite a few people,” Ranney says. “They come out a couple of times a year and actually look at plants, discuss concepts and see how things look in the field at different locations. We’ll work with them to send plants to different trial sites with people

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The Mountain Crop Improvement Lab is responsible for several of the most popular plants on the market today. Working in cooperation with commercial breeders and growers, as well as the North Carolina Nursery & Landscape Association, Ranney and his crew have developed such favorites as the series of Invincibelle® Spirit hydrangeas, beginning with Invincibelle® Spirit and adding the new selections Invincibelle® Spirit II and Invincibelle® Ruby. Incrediball® Blush hydrangea also resulted from work at the Lab.

New selections also include a stunning shrub-form dogwood called Little Ruby (Cornus 'NCCH1') that features red new foliage, giving the impression that the plant is always in bloom. Developed by the Lab and introduced by the North Carolina Nursery & Landscape Association (NCNLA), it’s an advanced hybrid between hongkongensis and kousa (Cornus kousa ‘Miss Satomi’ × Cornus hongkongensis ‘Summer Passion’), and it’s said to be the first in a line of new dogwoods being developed through an NCNLA/Lab partnership.

Compact in size and form, Little Ruby boasts single to double, red bracts from late spring through early summer, with foliage that turns bright red to maroon in fall and winter in zones 6b to 10. “Extremely good disease resistance,” Ranney says, means it’s resistant to both anthracnose and mildew.

Working again with the NCNLA, “We just released a new redbud called Carolina Sweetheart, which has multicolored foliage in the spring,” Ranney says. “It’s actually got pink in the foliage; there are few trees that have pink leaves, and they can be a shocking pink. It looks like it’s in flower from a distance, but it’s really a foliage trait.”

Pink Cascade® weeping cherry (Prunus ‘NCPH1’), which was recently introduced by J. Frank Schmidt & Son Co., is a “strict weeper; it grows straight down,” Ranney says. “It’s similar to Snow Fountains® cherry, but with a dark pink flower color.”

Due out next year, an exciting new Miscanthus is the result of collaboration between the Lab and Star Roses & Plants. Coveted for its strong presence in the landscape, but often maligned for its invasive tendencies, Miscanthus has struggled in the market of late. My Fair Maiden™ (Miscanthus ‘NCMS1’) offers a strong, upright habit and is hardy in zones 6 to 9. Its best feature, however, is its sterility.

“We are just releasing a new miscanthus that has been bred for seedlessness called My Fair Maiden,” Ranney says. “We’re working on a whole series, and this is the first. It’s a triploid, so it’s the same concept as a seedless watermelon or a seedless banana. It has three sets of chromosomes, and though it looks like a typical miscanthus, it is extremely infertile and essentially seedless.”

Independent research as well as cooperative efforts have resulted in ‘Crystalina’ summersweet (Clethra alnifolia ‘Crystalina’), ‘Sweet Tea’ mountain gordinia (<Gordinia grandiflora ‘Sweet Tea’>) and ‘Blizzard’ pearlbush (Exochorda ‘Blizzard’), among others. (For a list of Lab introductions, visit www.ces.ncsu.edu/fletcher/mcilab/introductions/index.html.)
who work with these things every day and see how they propagate, how they look in a container, how they perform in different field conditions. It’s a long-term collaboration, and they provide feedback that helps reassess our goals and direction.

“But we also work with private companies, too, folks like Spring Meadow Nursery, Star Roses and J. Frank Schmidt & Son Co.,” Ranney continues. “And they might come to us with a specific project that they’re interested in, that they think has commercial merit, and then we work together with them on it.” One such project with Spring Meadow resulted in the series of Invincibelle® Spirit hydrangeas.

**Making connections**

These cooperative ventures make the most of the talents and skills both at academia and industry. But at the Lab, science is No. 1.

“We work a lot of different angles, but I feel like our niche is bridging the gap between academia and application,” Ranney explains. “There’s lots of information, techniques, and tools coming from the academic side that have application, and I think we’re in a good position to help facilitate that translational research and development.

“We are working on a bit more fundamental level than industry has the luxury to work on, so we might do basic research on understanding things like cytogenetics of hydrangeas,” he continues. “This is really valuable information for a breeder to know—things like base chromosome numbers and ploidy levels and how certain traits are inherited. That information is valuable and foundational to people who are doing more applied breeding. But we also like to develop a final end product as well, so I hope that some of our introductions are good nursery plants that have had utility in the market and ultimately for homeowners.”

**Generations at work**

All of this takes time, of course, and Ranney explains the process in terms of generations—generations of plants and generations of students and plant breeders. From the concept for a new, marketable plant to actual introduction, it may take the work of consecutive classes.

“It varies quite a bit on the plants; certainly if you’re working with herbaceous plants, their generation times are shorter,” Ranney says. “The biggest gains really are to be had once you can get in a few generations and start combining complex traits of interest.

“I think some of our hydrangeas are about six or seven generations in, and we start going through the process of setting goals and breeding new hybrids it becomes an exercise in winnowing down populations and identifying superior plants that might have commercial potential for different niches followed by lots of testing and evaluation. Once a decision is made and we give a green light to an introduction, we usually turn it over to a commercial partner. They take it from there, and deal with intellectual property issues, licensing growers, marketing, how you get it growing around the world in different markets, and things like that.”

**Awards and recognition**

Tom Ranney has many well-deserved awards to his name; in fact, the list is a bit too long to include here. But among the honors are the H. Marc Cathey Award from the American Horticultural Society (recognizing outstanding scientific research that has enriched the field of horticulture); Outstanding Graduate Educator from the American Society for Horticultural Science; the Porter Henegar Memorial Award for outstanding contributions to environmental horticulture research from the Southern Nursery Association; and recognition from the North Carolina Nursery & Landscape Association for Outstanding Contributions to the Horticulture Industry.

He also is a Fellow of the International Plant Propagator’s Society and this year was elected Fellow of the American Society for Horticultural Science.
years, so I would say that at the short end of the spectrum, even with a perennial that has a generation time of a year, you’d be lucky to do a project from start to finish is less than five years. And on the long end, it’s generational in terms of plant breeders, you know, a number of lifetimes. But that’s why we have graduate students. It’s sort of like a very long chess game.”

That long-term approach benefits the industry as well as the plants, because in a short-attention-span market, the temptation to rush plants to market sometimes is compelling. Testing, evaluation, more testing, trials... the better the science, the better the plant. And the better the chance that plant has to become a standard.

As exceptional as the plants are, the people who work on them are what Ranney appreciates the most.

“I’m really fortunate to work with some brilliant, capable people who are instrumental in everything we do, and they make it fun to come to work each day,” he says. “The other thing that we’re really proud of is our students. I think that plant breeders tend to think in terms of generations, not only when we’re talking about plants, but also fostering the next generation of plant breeders. We’ve had a lot of great students that come through our lab—including graduate and undergraduate students—who have gone on to develop successful careers in industry, academia, extension, public gardens, and government. It’s fun to see them be so successful and it’s reassuring to know that the future of plant breeding and horticulture is in good hands.

“The plants are fun, but the students and staff are what we’re most proud of.”

Carolina Sweetheart™ redbud (Cercis ‘NCCC1’) is one of the newer introductions from the Mountain Crop Improvement Lab. Its pink foliage gives the impression of blooms.

My Fair Maiden™ miscanthus (Miscanthus ‘NCMS1’) is a breakthrough, seedless variety.

A new weeping cherry (Prunus ‘NCPH1’, Pink Cascade®) produces flowers in rich, deep pink tones.