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Developing Vegetables for the Future

by John Zakour

Geneva, NY - What happens when you pick up a Halloween pumpkin and the handle falls off? You reject the pumpkin and the grower never sells it. And what happens to a field of broccoli when a mid-summer heat wave hits? The broccoli sets ugly, uneven heads that farmers can't sell.

These and other questions occupied vegetable breeders and seed companies at the annuual Vegetable Breeding Field Day held September 1 at the New York State Agricultural Experiment Station in Geneva, NY. The purpose of the field day was for Cornell breeders to communicate breeding techniques and results to industry. The event was attended by representatives of seed companies from New York, Georgia, Florida, California, Brazil, Japan, and Holland.

"The Cornell vegetable breeding program has a long history of partnering with private seed companies," said Hugh Price, chairman of Cornell University's Horticultural Sciences department in Geneva. "The companies look to our breeders for sources of genetic traits of horticultural importance and an understanding of how those traits are inherited. Seed companies then use that germplasm in the production of varieties or hybrids that are adapted to various parts of the world." In return, the seed companies contribute money to Cornell vegetable breeders to further research. The end result is better crops.

Cornell University vegetable breeder Dick Robinson talks about tomato breeding amidst a field of Romas at the New York State Agricultural Experiment Station during the recentVegetable Field Day.
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At the Station, four scientists gave demonstrations. Dick Robinson, field day organizer, talked about his programs in breeding tomato, lettuce, eggplant, pepper, escarole, squash and pumpkin, and cucumber for insect and disease resistance. 'Whitaker', the new summer squash developed by Robinson, is a prime example of applied research at Cornell. Released earlier this year, 'Whitaker' is now being used by several seed companies in the production of squash hybrids with multiple virus resistance.

Norm Weeden described his molecular genetics research as it pertains to pea breeding. He reported that a large number of genes in pea now have been "tagged" with DNA markers. His pea breeding program has used marker-assisted selection and direct selection to obtain at least 30 inbred lines, each of which possesses seven resistance genes, i.e., each line is resistant to seven distinct viral or fungal pathogens. Weeden believes this is the first time the seven resistance genes have been combined into a pea line. "To have 30 such lines developed within two years indicates the power DNA markers have to make breeding programs more efficient," he noted. Weeden also conducted a tour of his molecular genetics lab, where he showed interested onlookers the "Matrix Mill," a device he invented that dramatically reduces the time and effort required to extract DNA from tissue.

Thomas Björkman, who specializes in broccoli and buckwheat physiology, told attendees that his lab has discovered the developmental step in broccoli that is blocked by high temperatures in the field-a major obstacle to broccoli production in NYS. In collaboration with Weeden, Björkman is trying to find exactly which gene's expression is altered in the flower meristem, to map that gene, and to design molecular markers that distinguish between the tolerant and susceptible alleles. "Ideally these markers can be adapted to Norm's revolutionary Matrix Mill mass

isolation system and in-dish ASAP analysis," said Björkman.

Björkman's lab is also developing a new buckwheat for the Northeast in collaboration with a Manitoba breeder. Since buckwheat is an indeterminate plant in Manitoba, and a determinate one here, the physiological traits that result in high yield are quite different. Determinate is like a bush bean compared to a pole bean. Björkman's lab has succeeded in getting substantial improvement in the plant habit, and a significant increase in the yield. A new variety, 'Keukett', was released this year from this program and is the first new variety for the Northeast since the 1960s. The buckwheat breeding program is funded by Birkett Mills, in Penn Yan, NY.

Steve Reiners spoke on breeding sweet corn, kraut cabbage, and pumpkin variety trials. Reiners especially stressed the work on pumpkin with Robinson where they will be measuring the strength of attachment of pumpkin stems (handles) to the pumpkin fruit. "This has never been quantified before and should provide for some interesting data," said Reiners. The research is important because the average consumer picks up the pumpkin they want to buy using the stem as a handle. If the stem breaks off, the consumer puts the pumpkin back and finds another, making the strength of the handle attachment an extremely important issue from an economic standpoint. Reiners and Robinson will be evaluating about 20 varieties.

"This event is very well organized and very informative," said Frans Meddens from Nunhems Zaden BV in Holland. Baldwin Miranda from Rogers Seeds, agreed: "We make sure we send somebody every year," he said. "We always learn something we can use."

Robinson credited research technician Joe Shail for his efficient organization of many of the arrangements for the event. As for next year, Robinson says, "I am looking forward to having a crucifer breeder join our department and being included on future programs."

NOTE TO EDITORS: Click on above photos for 300 ppi versions. If you prefer an electronic file or a hard copy, contact Rob Way at 315-787-2357, rfw2@cornell.edu.

Suggested caption: Cornell University vegetable breeder Dick Robinson talks about tomato breeding amidst a field of Romas at the New York State Agricultural Experiment Station during the recent Vegetable Field Day.
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