

Breeder profile: Jim Hancock

By Audrey M. Sebolt, Project Assistant

Dr. Jim Hancock, one of the Demonstration Breeders of RosBREED for strawberry, started his career in strawberry and blueberry breeding at Michigan State University in 1979. Realizing the limitations of the narrow germplasm base of the cultivated strawberry, from the onset of his strawberry breeding program, his primary focus was on improving the germplasm. Therefore, he spent the first twelve years of his strawberry breeding program on several germplasm collection trips throughout the United States and South America in collaboration with Chad Finn (USDA-ARS Pacific Northwest berry breeder; RosBREED strawberry Demonstration Breeder) and Jim Luby (University of Minnesota; RosBREED apple Demonstration Breeder), among others.



Jim Hancock, Michigan State University

Jim has also worked with a network of strawberry breeders in North America for evaluating and sharing the germplasm collected across the hemisphere. After characterizing the newly collected germplasm, Jim began to make crosses within the germplasm collection (wild x wild) and wild x cultivated.

Each spring, Jim makes approximately 100 crosses, of which 70% of the parents are ever-bearing or remontant. The ever-bearing trait is desirable for growers because once the strawberry plant flowers, it will continue to flower and produce fruit several times in a growing season as opposed to short day varieties that produce only once per season.

Each spring, Jim Hancock and his crew plant 6,000 to 7,000 first-generation strawberry plants. Jim is currently evaluating approximately 50 advanced selections which are short day and ever-bearing, high yielding, and have excellent fruit quality (see box to right). All of his seedlings are planted and evaluated in non-fumigated soil and therefore any that survive are considered at least moderately tolerant to black root rot, which is common in Michigan soils and most other production regions.

Jim, his Breeding Trainee Sonali Mookerjee (see next page), and Chad Finn have selected cultivars and seedlings that will be part of the RosBREED reference germplasm sets for strawberry. The RosBREED strawberry Crop Reference and Breeding Pedigree Sets (CRS and BPS respectively) will be replicated in Michigan, Oregon, California, Florida, and New Hampshire and therefore additional collaborations have been developed to expand Jim's network. Jim is excited about these new collabora-

Traits of interest for Jim's program:

Ever-bearing cultivars start to fruit and keep fruiting in a growing season. Other traits include

- High commercial yields
- Plant archetype with well exposed fruit and a thrifty canopy
- Fruit that are large and bright red
- Fruit with increased aromatics and are sweet yet have a hint of tart flavor

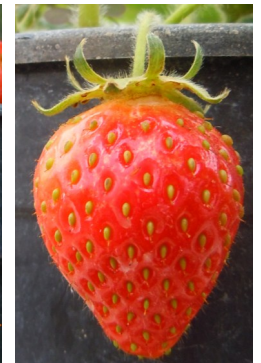
Below are images of a few key traits that Jim and Sonali are evaluating. Images on the left are of traits that are considered to be undesirable and to the right desirable.

Inflorescence type:



Right: short pedicel; Left: long pedicel. A long pedicel is desirable because of better fruit development and ease of harvest.

Fruit shape:



"Turtle-neck fruit" and "Monkey-face fruit" compared to a Perfect fruit shape. Turtle-neck and Monkey-face fruit are generally considered to be not aesthetically attractive to consumers.

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Jim Hancock in Ecuador (1996) using highly sophisticated scientific techniques for extracting seeds from fruit

tions and the opportunity to see how his selections will perform in the states of Florida and California, which are warmer climates. All five locations will evaluate the CRS and BPS for the traits indicated in the strawberry standardized phenotyping protocol (www.rosbreed.org/resources/fruit-evaluation).

Recently, Jim's program was visited by Jerry Hill, whose RosBREED Team is developing a breeding information management system. One of its many capabilities is that it manages breeders' trait data and assists with cross planning. Jim is excited about the new system because he believes it will be an excellent tool for designing crosses; he will be able to more easily visualize the pedigree of selections of interest along with their traits. Jim may consider making diverse crosses if the system reveals potentially new and exciting

cross combinations. In addition to providing an excellent management tool for parent and seedling selection, the data management system will also serve as a catalog for future breeders that may use his germplasm and trait data. Stay tuned for the next issue of our Newsletter where we will describe this data management system in more detail.

Meet Jim's Breeding Trainee: Sonali Mookerjee



Sonali Mookerjee in East Lansing (2011) using current highly sophisticated scientific techniques

Why did you choose Jim Hancock's program? When I joined the Plant Breeding, Genetics, and Biotechnology Program at MSU, I wanted to get training in plant breeding. I had been working with apples, so I had a preference for continuing to work with a crop in the same family. Dr. Jim Hancock had this project on strawberry breeding that I could work on and that would give me the opportunity to get experience in traditional, as well as molecular breeding. I could also participate in the RosBREED project and gain from all the valuable resources in RosBREED. I am extremely thankful to Dr. Hancock that he let me work with him because this was possibly the best breeding training I could hope for. Dr. Hancock's enthusiasm, optimism, and encouragement, makes research so much fun!

What is your thesis project if it has been determined? I am developing a linkage map for octoploid strawberry using SSR markers. I will be using this map to identify QTL linked to photoperiod and temperature regulation of flowering in strawberry and identify markers linked to these traits.

What benefits have you seen by being part of RosBREED? Being a RosBREED Project Assistant gives me the opportunity to be a part of this unique effort of implementing marker-assisted breeding into traditional breeding in Rosaceous crops. It gives me the opportunity to understand and follow streamlined research efforts involving many branches of science, many institutions, and many researchers with a common goal. I am able to interact with breeders, scientists, and graduate students from so many research institutions. I can contribute to a unique multi-state strawberry pedigree-based analysis project which will produce a lot of valuable information for all strawberry breeders/scientists. I get the opportunity to participate in the workshops on Pedigree-Based Analysis, an area that I was not familiar with.