



Winter spelt planted at Henry Perkins on 9/15/06 (left) and 10/15 (right). The unwilling participant in the picture is about 5'8" tall.

A Farmer's Breeding Club in Vermont

*Dr. Heather Darby, UVM Extension and
Jack Lazor, Butterworks Farm*

In the spring of 2007, we received a USDA SARE grant to begin building farmer knowledge in the area of plant breeding. Currently there are few grain varieties being developed for organic farmers in the Northeast. Vermont is primarily a dairy state with a major focus on forage crops. Our cool climate and abundant rainfall offer us a unique growing opportunity along with many production challenges. Seed selections for forages and cereal grains are often very limited. Most available varieties are developed in regions with climates, soils, and management techniques that are very different than ours. In addition, those released are genetically homogenous and inbred for uniformity. This has often led to rapid breakdown of the genetic resistance to local diseases. These varieties are also the property of private seed companies and farmers are no longer freely able to save low cost seed as in the past. To address this situation farmers need to gain the technical skills needed to make their own crosses of small grain varieties and to learn how to make selections from their new populations under organic management. Plant breeding is a

(Continued on page 32)

We have been very excited about the opportunities for organic dairy farmers to grow winter grains to reduce the cost of purchased supplements. We will continue to trial both spring and winter grains to try and fine tune organic management practices. Tim Griffin is researching nitrogen management practices for winter grains and alternative methods that organic farmers might be able to use to apply manure to winter grains in the spring to provide some needed nitrogen.

Many of these trials have also been replicated in Vermont under the watchful eyes of Heather Darby. ♦

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lost art here in New England. There are very few public plant breeders in New England. In fact, the last well known breeder at UVM was Cyrus G. Pringle. Although he is most famous for his extensive botanical collections, Dr. Pringle also made major contributions in wheat breeding during the mid to late 1800s. Interestingly Dr. Pringle was considered a revolutionary in wheat breeding during his time.

As a step towards this revitalization, the goal of this project is to create a Farmer's Breeder Club in Vermont. The organic grain growers of Vermont believe that when farmers again become breeders we will find new satisfaction in our work. We will be able to breed good varieties that fit our farms and to make use of genetically diverse populations that are often more disease resistant than pure lines are. Seed saving with our new varieties will reduce seed costs and bring new seed production enterprises to small farms in the Northeast. Participatory and on-farm breeding efforts have worked all around the world, from the dry Middle East to Africa to Mexico. The Farm Breeder Club of the Northern Plains Sustainable Agriculture Society in North Dakota is about to release a new wheat variety that seems well suited to organic farms, and there is every reason to expect success like that in the Northeast too. Since there is so little farmer breeding in New England, we will need to learn our skills from plant breeders around the United States. To start we have developed a wheat breeding project. There is considerable interest in selecting improved varieties to develop wheat of high baking and animal feed quality and suitable for our climate. We are interested in growing and selecting from modern cultivars and other heritage varieties such as Cyrus Pringle's 'Defiance' to develop our own wheat varieties. To acquire "hands-on" breeding skills we recently attended an intensive short course on wheat breeding methods under the supervision of Steve Jones – wheat and cereal breeder at Washington State University. Dr. Heather Darby, Jack Lazor, and Seth Johnson attended the training. Dr. Jones and his students taught us many new skills including how to choose good parent varieties, how to emasculate and pollinate the tiny flowers of small grain plants, and how to move those few seeds from a few potted plants to seed "increase fields" and then to farm



Heather Darby & Susan Monahan emasculating wheat.

fields. We also met farmers in Washington that are working on their own breeding projects.

Upon returning from the "hands-on" training we are already practicing our new techniques on Vermont ground. In May of 2007, we seeded 19 varieties of spring wheat. The varieties we planted include 3 of Cyrus Pringle's wheat varieties, 5 from the North Dakota State Wheat Breeding Program, 10 from the Washington State Wheat Breeding Program, and 1 modern variety. Ten seeds per variety were planted. Each row represents one variety. The seeds were planted eight inches apart in the row and the rows were one foot apart. This planting scheme was developed to enable us

to make our crosses easily. We have emasculated two plants per plot. Emasculating means to remove the male parts of the wheat flower. Once the plants are emasculated a paper bag is used to cover the female flowers. This keeps unwanted pollen away from our plants. These females will be crossed with males (non-emasculated plants) in the next few days. Currently, we are deciding what crosses we would like to make among our 19 varieties.

To determine our crosses we are evaluating the positive and negative characteristics of each wheat variety. This has helped us determine what varieties should be crossed with one another. To make the crosses we will cut the flowering head of the male plant and insert the head into the paper bag protecting the female flower. We will tap pollen from the male flower onto the female plant. If all goes well a seed will form into our first generation progeny. These progeny will be collected and grown out in the season of 2008 and evaluation, selection, and breeding will continue.

In the summer of 2008, we plan to host two field days at Butterworks Farm. The first workshop will teach farmers the wheat breeding skills learned from Washington. A second field day will be held near harvest to teach farmers strategies for selection. Keep your eyes open for more information to come about the Farmer's Breeding Club. If you are interested in learning more about this project contact Heather Darby at (802) 524-6501.

Heather Darby is the UVM Extension Agronomic Specialist. ♦