Could Rice be Vermont's Newest Grain Crop?
By Cheryl Bruce, Vermont Organic Farmers

For the past two years, Linda and Takeshi Akaogi have been experimenting with growing rice on their small farm in Putney. This past March, they were awarded a SARE Farmer Grant to evaluate the viability of rice production in the Northeast and to create a supply of seed for other interested farmers. The goal of their 'Northern Rice Project' is to introduce rice as a commercial crop to this region.

People are often surprised to hear that rice can be grown in Vermont. After all, this grass, of the genus Oryza, is known as a tropical plant. Cultivated rice, *Oryza sativa*, was first domesticated 6,000 years ago. Today, the species is divided into two subspecies, *O. sativa 'indica'*, which is the long grain type (such as jasmine or basmati), grown in tropical southern regions and *O. sativa 'japonica'* which is a shorter, more round grain that is also more cold tolerant. Japonica rice has been grown in temperate climates such as northern Japan and some other locations that may sound surprising, such as the Ukraine, Uzbekistan, and Romania.

The Akaogi's first attempt to grow rice was in 2006. The plants grew, but did not produce any viable seed. In 2007, they had better luck. In just a 25' x 25' paddy, they grew and evaluated 21 different varieties and by season's end identified six varieties that produced seed. This year they are evaluating 31 varieties for seed production.

When evaluating varieties, several criteria are used for selection, with date to maturity/harvest being the most important. Other factors include resistance to both disease and lodging. Takeshi says once varieties are found that meet these criteria, they will then select for yield as well as taste. In fact, they have connected with Susan McCouch and Gen Fumio Onishi of Cornell University who specialize in rice breeding.

To grow their rice, Linda and Takeshi have constructed an actual rice paddy. The paddy is 6-8 inches deep and allows for controlled flooding. Nearby is a reservoir constructed for water storage and heating. Cold water comes into the reservoir from a nearby brook and is naturally heated before entering the paddy.

Rice plants are transplanted into the paddy by mid-May about a month after seeding in the greenhouse. In April, seeds are soaked for 10 days at 50 degrees and then planted in plug flats. When transplanted, the plant only has 1 shoot, so it is important that the tender plant have warm water in the paddy. Linda and Takeshi routinely monitor the temperatures of the water and the soil in the paddy to ensure the growing conditions are optimal. The water level in the paddy should be half the height of the small rice plant. Although rice can be transplanted up to 4 weeks before the last frost, when low temperatures are predicted Linda and Takeshi say that the water level is increased to ¾ of the height of the plant for added protection.

By June, the number of stems per plant increases significantly and plants are much taller. In July, some varieties begin to head out and start producing grain. September is the month of harvest and last year rice was harvested from September 13th to 26th. Since their production was such a

small scale, all the rice was harvested by hand. Plants were bundled, dried, threshed and then later dehulled.



The constructed rice paddy resulted in a created habitat for various types of wildlife. Linda and Takeshi observed 5 species of frogs and 3 species of dragonflies that had come to reside in the paddy. The abundance of wildlife could potentially result in a separate study with biologists to document the benefit rice paddies have in the landscape.

So what are the requirements to grow rice? First the soil has to have the ability to hold water. Because of its need for water, rice must be grown in an area that has a good watershed with an abundance of water. Lastly, the crop needs heat. Rice needs a certain accumulation of heat throughout the growing season. To further evaluate this, Linda and Takeshi are collecting accurate weather information this year.

The Akaogi's farm is located in southeast Vermont at 900 feet above sea level. Their farm may be the coldest climate for the production of rice. In our climate, we are at the northern edge of the growing area, making production more challenging. Linda and Takeshi believe that rice grown in the lower lying Champlain Valley region may do well given that area's longer growing season. However, trials are needed at other locations to compare. This year, several individuals will grow rice plants in buckets at various locations around Vermont. The participants will monitor growth and collect data throughout the season. It is hoped that this information will help in determining the potential growing areas in the state.

There may be potential for rice to be grown on marginal land with poor drainage. However, please note that poor drainage does not mean wetland areas. Linda and Takeshi have stressed that wetlands need protection and the conditions of wetlands are not suitable for rice production because the amount of water flowing in and out cannot be controlled. There is plenty of agricultural land in Vermont considered marginal. These wet fields are already being cropped for hay, for example. Consider the marginal fields in the Lake Champlain region that are already in current agricultural use and there is the potential for up to 60,000 acres of rice production. If the yield estimates of 2 tons per acre are accurate, a lot of rice could be grown in our region.

Linda and Takeshi see a lot of potential for rice production in Vermont. Besides transforming poor, marginal land into productive paddies rich with wildlife, farmers could recycle wastewater from their operations to be used for irrigating the rice paddy. This could include wash water from vegetable production or may even hold promise for dairy farms where the rice paddy could purify water running off from the barnyard, and remove nutrients before they enter the waterway.

In addition, rice production would benefit the greater community as well by increasing the diversity of agricultural products grown here. Vermont grown rice would create a niche market for farmers and also increase our self-sufficiency, growing what we can right here. Other

Vermont farmers are growing soybeans, wheat and other grains with this same purpose and have established a Northern Grain Growers Association.

In contrast to organic California rice, Vermont rice would be local and organic. Because our rice would be grown on a smaller scale, it would not be a monoculture, but rather diverse stands that attract wildlife and utilize water resources efficiently while sustainably producing grain for local consumption.

If you are interested in hearing more, contact the Northeast SARE office for a copy of the Akaogi's grant proposal (802-656-0471). Linda and Takeshi will be presenting their findings at the NOFA Massachusetts Summer Conference in August. They will also hold a second on-farm workshop in September. In addition, a basic crop manual will be prepared at the end of the season to share with other farmers.

Additional Resources

International Rice Research Institute: www.irri.org.

Lundberg Family Farms: the leading American organic rice grower: www.lundberg.com/

McCouch Rice Lab, Department of Plant Breeding Genetics at Cornell University: http://ricelab.plbr.cornell.edu/new/

National Small Grain Collection: http://www.ars.usda.gov/main/docs.htm?docid=2884

Universtiy of California/Davis: www.plantsciences.ucdavis.edu/uccerice/main.htm

Takeshi Akaogi presents at a rice growing workshop hosted by Akaogi Farm.