Farmer Rancher Grant Program

Final Report Form

Please fill out the final report form and return it to the North Central Region-Sustainable Agriculture Research and Education (NCR-SARE) Missouri office. The report may be prepared on a computer or handwritten (please write or print clearly) but electronic reports are preferred. The final payment of your grant will be awarded when the final report and final budget report are received and approved.

Use as much space as needed to answer questions. You are not limited to the space on this form. The more details the better.

I. PROJECT IDENTIFICATION

- Name: Carrie Read
- Bland, MO 65014

  New Address:
  Unit 6120
  DPO, AP 96562

- Phone: 630-936-4765
- Project Title: Potential of Heritage Wheat Varieties for Use on Organic Farms: A Variety Trial and Market Survey

- Project Number: FNC08-728
- Project Duration: 2009-2012
- Date of Report: February 28, 2013

PROJECT BACKGROUND

Our farm consists of 20 acres, half of which are open. We raise organic cut flowers and produce on approximately 3 acres and in a 26 foot x 96 foot high tunnel. We raise about a dozen goats on 4 acres and pasture our draft horses on the remaining land.

We are not certified organic but adhere to organic farming practices. We fertilize with animal manure, rotate our crops and use non-chemical forms of pest control.

GOALS

Goal 1: Conduct a preliminary variety trial to identify nearly extinct varieties of wheat that have potential to produce high quality flour when grown under organic conditions in the Ozark region of Missouri.

Goal 2: Begin to increase seed stock for varieties that show potential for growth and marketability for future production and research.

Goal 3: Conduct a survey of commercial bakers to find out what the marketing potential of this product may be.

PROCESS
Wheat plots were planted in 2009 and 2011. In 2009-2010 the plots were grown at Sweetleaf Farm in Bland, MO and in 2011-2012 the plots were grown at Terra Bella farm in Hatton, MO.

Obtaining Seeds
Varieties were selected based on variety trials conducted in 1888 by the University of Missouri. We selected the most promising varieties based on the research results and availability of seed.

The most difficult step in the process was obtaining seed for older varieties of wheat. These seeds are nearly impossible to obtain in the US. Many older varieties are being grown in Canada but due to customs regulations, they cannot be shipped into the US. After weeks of extensively searching the internet and phone calls with researchers I was able to obtain 5 gram samples of several seed types from the USDA Germplasm Repository. The USDA releases these seeds on a very limited basis and only for research purposes. Limited seed types are also available through the Heritage Wheat Conservancy.

Red May seems to be the most popular of the older varieties. We were able to obtain slightly larger quantities of Red May and Touzelle which is why the starting amounts in 2009 were greater than the amounts for other varieties.

Growing
It should be noted that these are not dwarf varieties of wheat and the recommended spacing is 12 -18 inches between plants within the row and at least 18-24 inches between rows. Composted goat manure was incorporated into the beds at planting time. Plantings were made the third week of September 2009 and 2011. All grain was harvested by hand on June 21, 2010 and approximately the same date in 2012. Plots were cultivated for weeds once in the fall and twice in the spring.

TAM 107 is an improved wheat variety that was released from Texas in 1984. TAM 107 was grown as a "control". It is a variety that was developed using traditional breeding techniques and has been popular for over two decades. It is known as a variety that performs well in non-irrigated and dry-land conditions.

There was an extremely heavy rain in the fall of 2009 which occurred before the plants were well established and consequently washed out the lower section of the beds. Several plots in that area were lost.

In the 2009 planting, the plots were surrounded with deer fencing which worked extremely well for deer control. However, the fence was not effective at excluding rabbits and approximately 40 percent of the crop received damage from rabbits. In the early spring of the year rabbits sought out the tender green growth and ate the plants off to the ground level. Bloodmeal sprinkled

around the base of the plants did an excellent job of deterring the rabbits. Additionally, the bloodmeal gave the plants an extra boost of nitrogen. The plants did recover from the rabbit damage and it is assumed that the nitrogen supplied through the bloodmeal was a big factor in their recovery.

Plots were not irrigated in either year of the project to replicate normal field conditions. A drought in 2012 caused stress to the plants and presumably lowered the yields during that season.

Harvest
Plants were harvested each year by hand. In 2010, the crop was also cleaned by hand using a very simple process. The seed heads were placed in a cloth sack and agitated to remove the chaff from the seed. Next, the seed was repeatedly poured from one sack to another in front of a fan blowing on medium speed. The fan blew the chaff away while the heavier seed fell to the other sack. After several times back and forth, the seed was clean.

In 2012 the crop was cleaned using a machine seed cleaner.

Bakers Survey
The survey consisted of informal interviews with bakers, and restaurant and grocery store owners. Participants were asked questions to illicit their interest in products made from heritage varieties of hard red wheat.

PEOPLE
University of Missouri Extension Specialists are very knowledgeable about growing practices in Missouri.

Eli Rogosa was also very knowledgeable and has some of the only Heritage Wheat varieties available in the U.S. (http://growseed.org).

Margo McMillen, owner of Terra Bella Farm has been growing, milling and selling soft wheat for a number of years. She is very knowledgeable about growing wheat and she networks extensively with growers across the state.

RESULTS

Table 1. 2010 Harvest

Variety	Harvest Date	Beginning Seed Amount(grams) 2009	Harvest Amount (grams) 2010	Average. Height (ft)
Fultz	6/21/2010	5	95	4.5
Harvest Queen	6/21/2010	5	125	4.5
Touzelle	6/21/2010	10	100	4.5
Velvet Chaff	6/21/2010	5	75	4.5
Red May	6/21/2010	20	620	4.5
Red Russian	6/21/2010	5	55	4.5
Moking	6/21/2010	5	145	4.5
Reliable	6/21/2010	5	110	4.5
Red Clawson	6/21/2010	5	90	4.5
TAM 107	6/21/2010	5	55	3

As seen in Table 1, the highest yielding varieties (based on planting 5 grams of seed) were Red May with a harvest amount of 154 g, Moking yielded 145 g of seed, Harvest Queen yielded 125 g, and Reliable yielded 110 g of seed. The low yields of Red Russian are partially due to their location in the field and the fact that a large portion of the bed was washed out during a particularly heavy rainstorm.

TAM 107 did not perform as well as other varieties in 2010. TAM 107 did not tiller (branch out as it grew) as heavily as the other varieties and did not grow as tall. All varieties received the same frequency of cultivation, and TAM 107 did not compete against weeds as well as the other varieties. This variety would have benefited from more frequent cultivation. Conversely, in 2012 TAM 107 was one of the highest performers with an approximately 10 times increase (Table 2.). TAM 107 is known to be tolerant of drought and it is likely that it suffered less during the hot and dry conditions of 2012.

Drought stress was noted while the crop was growing and it is likely that yields of the other varieties were negatively affected.

Table 2 shows that Touzelle performed relatively well in 2012 with an increase of approximately 8 times over the beginning seed quantity.

During harvest it was noted that the heads of Red Russian had already begun to shatter. It is likely that Red Russian is a shorter duration variety than the other types and should be harvested earlier.

Reliable showed signs of rust during harvest in 2012 (Table 2.). Typically hot dry weather such as that observed during the 2012 growing season would suppress foliar fungal pathogens. Observance of rust on Reliable could mean that this variety is extremely susceptible to rust.

During the harvest of 2012 it was also noted that seed heads of Velvet Chaff were largely unfilled. This was likely due to stress caused by the drought and hot weather.

Table 2. 2012 Harvest

Variety	Harvest Date	Beginning Seed Amount(grams) 2011	Harvest Amount(grams) 2012
Fultz	6/21/2010	83	350
Harvest Queen	6/21/2010	84	290
Touzelle	6/21/2010	69	540
Velvet Chaff	6/21/2010	62	240
Red May	6/21/2010	580	945
Red Russian	6/21/2010	38	65
Moking	6/21/2010	108	190
Reliable	6/21/2010	94	295
Red Clawson	6/21/2010	90	250
TAM 107	6/21/2010	36	350

Table 3. Combined Totals

VARIETY	Beginning Seed Amount (grams) 2009	Combined Harvest Amount (grams) 2010 plus 2012	Factor of increase from Original Amounts (Combined Harvest Amount/Beginning Seed Amount)
Fultz	5	445	89
Harvest Queen	5	415	83
Touzelle	10	640	64
Velvet Chaff	5	315	63
Red May	20	1,565	78
Red Russian	5	120	24
Moking	5	335	67
Reliable	5	405	81
Red Clawson	5	340	68
TAM 107	5	400	80

DISCUSSION

It is extremely difficult to obtain “Heritage” varieties of wheat in the U.S. Unless a source of seeds can be found, several years of on-farm seed replication will be needed before baking trials can begin and seed can be made available to bakers for experimentation.

Bakers expressed great interest in using these types of wheat in their products. They were particularly excited by the marketability of such a product. Bakers were also interested in the possibility of enhanced flavors by these varieties of wheat and are eager to experiment with them as they become available.

It is possible to grow these types of wheat in the Midwest. However, it should be expected for yields to be significantly lower than improved varieties that are commonly grown. According to University of Missouri researchers, yields may be as much as 50 percent lower when compared to improved varieties. Lower yields would necessitate higher prices for the products. The most likely markets for these products are boutique bakeries and grocery stores.

Heritage wheat varieties could be an important part of a rotation, especially for organic growers. Individual plants grow slowly in the fall but become extremely vigorous growers in the spring of the year. The plants grow to 4.5 feet tall and are quite bushy due to heavy tillering. This makes them very competitive against weeds in the spring. It is important to note that they are not very competitive against weeds in the Fall. Because they require a very wide spacing and do not put on much growth in the Fall, they are not very competitive against winter annuals. It is extremely important to do at least one cultivation during the Fall to kill winter annual weeds that will begin competing with the crop in the spring.

At this point it is too early to say which varieties have the most potential to be grown in Missouri. The varieties Fultz, Harvest Queen, Red May and Reliable all performed well during this project (Table 3). More work will be required to see which varieties perform well over several seasons and which varieties exhibit the best baking qualities.

PROJECT IMPACTS

Sweetleaf Farm (the original study site) was sold in 2010 due to the Read family moving overseas for employment with USAID.

OUTREACH

A field day was held in the winter of 2010 and the wheat project was toured and discussed with participants. Over 80 growers and potential growers attended the field day that was held to discuss alternative cropping options for Missouri. The project was discussed with 8 different Master Gardener groups reaching over 150 people. A newspaper article was written about the project that was published in 5 newspapers across the South Central Region of Missouri. Amish growers in the Southwestern and Central portions of the state were particularly interested in the idea of a hard red winter wheat suitable for bread making that could be grown in Missouri.

BUDGET SUMMARY

The project budget changed based on the shift of the project’s emphasis. The change was approved by SARE because the amount of seed that was able to be procured was less than originally anticipated. Because of the change, the amount of varieties in the variety trial was increased and the interaction with bakers was omitted. This increased the amount of labor costs associated with growing the plots but reduced the costs associated with conducting the baking trial and intensive market survey.