

**PROGRESS REPORT**  
**North Central Region**  
**Sustainable Agriculture Research and Education (SARE) Program**

Progress Report Year: March 2010- March 2011

Project Number: FNC09-754

Project Title: Screening Open-Pollinated Vegetable Varieties Bred and Released In North Dakota For Suitability to Organic Production Systems and Local Markets

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#### WORK ACTIVITIES

Our team of farmers developed a survey that we conducted through Survey Monkey. The survey was directed at Farmers Market growers in ND focusing on two questions:

- > What vegetable crops are your problem crops during production or at market?
- > Do you need more variety options to deal with agronomic challenges or to meet consumer demands for food quality traits for those crops?

We surveyed producers' varietal choices for 39 crops providing them an opportunity to identify the crops for which:

- > I need varieties with better agronomic traits.
- > I need varieties with better food quality traits.
- > I need varieties with better agronomic and food quality traits.
- > I have varieties with suitable agronomic and food quality traits.

The second part of the survey was to help determine how important each crop is to their local food efforts. The drop-down list contained the following selections to complete the phrase "This crop is..."

- > of vital economic importance to my local food efforts.
- > of secondary economic importance to my local food efforts.
- > not part of my production plan but would be if suitable varieties could be found.
- > not of interest to my local food efforts.

The results were very informative. Over 50 percent of the farmers surveyed indicated that they need improved varieties for 23 of the 39 crops we surveyed. Over 75 percent of the farmers indicated that they needed improved varieties for 10 out of the 39 crops listed. 100 percent of the farmers indicated they needed improved varieties for 6 out of the 39 crops. More research is needed to identify the issues with the varieties farmers are currently using, where they are getting their information regarding suitable varieties, etc.

In 2010 the three farmers involved in the project were able to screen a total of 31 varieties.

**The goal** of this two-year project is to increase the number of varietal choices well suited to organic production systems and local markets in North Dakota.

**Objective 1:** Screen a minimum of 60 vegetable varieties for agronomic and quality traits of interest to North Dakota market growers (10 per farm per year). [See Attachments for detailed results from individual growers.]

- Marvin Baker—screened five varieties in 2010 [See Attachment A.]
- Theresa Podoll—screened ten varieties in 2010 [See Attachment B.]
- Steve Zwinger—screened sixteen varieties in 2010 [See Attachment C.]

**Objective 2:** Identify at least twelve North Dakota bred, open-pollinated varieties of vegetable crops with agronomic and quality traits of interest.

**Objective 3:** Facilitate seed increases of at least nine varieties based on variety trial results and farmer's market taste tests.

## RESULTS

We definitely have learned how to search the GRIN network! [Editor's Note: For more information on GRIN (Germplasm Resources Information Network) see: <http://www.ars-grin.gov/aboutgrin.html>.] There have been numerous varieties that we have been unable to find in GRIN and have not been able to find through Seed Savers Exchange, Seeds of Diversity Canada, or through online seed saving sources. This has been a disappointment only offset by the next variety that we WERE able to obtain seed.

**Objective 1:** Screen a minimum of 60 vegetable varieties for agronomic and quality traits of interest to North Dakota market growers (10 per farm per year). [See Attachments for detailed results from individual growers.]

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**Objective 2:** Identify at least twelve North Dakota bred, open-pollinated varieties of vegetable crops with agronomic and quality traits of interest.

Overall, each of us discovered varieties that had traits of interest in our first year of screenings. These varieties include: Potatoes—Crystal, Bison, Nordak and Viking;

Tomatoes—Cavalier and Sheyenne; Peas—Gradus and Alaska. Some of them will be repeated in year two (see work plan below). Tomato—Doublerich will be screened on a larger scale in the Podoll's disease nursery to select the most disease resistant plants to serve as a parent for some experimental crosses.

**Objective 3:** Facilitate seed increases of at least nine varieties based on variety trial results and farmer's market taste tests.

The potato screenings do not lend themselves to this objective due to state seed laws for potatoes but the NDSU has seed available of these varieties. Bryce Farnsworth expressed that he is very pleased that these varieties are being looked at and is happy to share seed tubers. So we will be encouraging farmers market growers to consider Crystal, Bison, Nordak and Viking potatoes for their markets, emphasizing Nordak and Viking for Fall and Winter CSA sales, as they are EXCELLENT keepers.

Steve and I are conferring on the tomato varieties to decide which ones should be taken to seed this year. We are considering putting Cavalier and Sheyenne in our disease nursery before proceeding with seed production. We may go ahead with seed production and run the disease nursery trials simultaneously.

Steve and Theresa will be taking the Alaska pea to seed this year. Theresa will be increasing the Homesteader variety, based on a Canadian farmer's recommendation and the need to establish a seed source here in the United States. [Our seed came from Canada.]

## WORK PLAN

*Marvin Baker* will screen eighteen varieties this year, including:

- Sweet Corn: *Zea mays* subsp. *Mays*-- Sunshine, Nueta, Stowels Evergreen, and Early June
- Tomatoes: *Solanum lycopersicum*-- Earliana Mandan, and Cavalier
- Squash: *cucurbita maxima*—Arikara and Banquet
- Carrot: *Daucus carota*-- Gold Pak
- Melon: *Cucumis melo* subsp. *Melo*-- Granite State
- Okra: *Abelmoschus esculentus*-- Clemson Spineless
- Peas: *Pisum sativum*—Alaska and Homesteader
- Celery: *Apium graveolens* var. *dulce*-- Golden Self Blanching
- Cabbage: *Brassica oleracea* var. *capitata*-- Copenhagen Market
- Cucumber: *Cucumis sativus* var. *sativus*-- Niagara
- Parsnips: *Pastinaca sativa*-- Guernsey
- Rutabaga: *Brassica napus* var. *napobrassica*—Laurentian

*Theresa Podoll* will screen thirteen varieties this year:

- Beans: *Phaseolus vulgaris*-- Hidatsa, Arikara Yellow, [Mandan Black, Mandan Speckled varieties were unavailable through GRIN]

- Edame Soybean: *Glycine max* - Hidatsa
- Carrot: *Daucus carota*-- Gold Pak and Emperor
- Tomatoes: *Solanum lycopersicum*—Millet's Dakota and Orange King
- Chinese Cabbage: *Brassica rapa* subsp. *pekinensis*-- Michihli
- Radish: *Raphanus sativus*-- Model Box and Cherry Bell
- Peas: *Pisum sativum*—Alaska and Homesteader

*Steve Zwinger* will screen thirteen varieties this year, including:

- Chinese Cabbage: *Brassica rapa* subsp. *pekinensis*-- Michihli
- Peas: *Pisum sativum*—Alaska and Worlds Record
- Lettuce: *Lactuca sativa* L. ASTERACEAE-- Salad Bowl and Ruby
- Watermelon: *Citrullus lanatus* var. *lanatus*-- Will's Sweet and Will's Sugar
- Tomatoes: *Solanum lycopersicum*-- Sheyenne, Cannonball, and Cavalier
- Potatoes: Crystal and Bison
- Popcorn: Pinky popcorn

Steve Zwinger is teaching us what to look for in a variety screening and how to properly report our results. His participation in the project has been a real asset to learning this skill and we will endeavor to use a more uniform trialing and reporting method this next year.

## OUTREACH

Outreach in 2010 included:

- Prairie Seed Farm markets at the Carrington Farmers Market and conducted consumer taste tests of the tomato, potato, and sweet corn varieties that it screened in 2010. (See Attachment C. for the results of the taste testings Steve conducted.)
- Prairie Road Organic Farm partnered with FARRMS to host a farm tour June 23, 2010. <http://www.farrms.org/cgi-bin/farrms.org/farrmsnews/fnews.pl?record=23> NPSAS and NDFMGA published a press release on the event.
- North Star Farms did not host a farm tour in 2010 due to the limited number of varieties they screened in the first year of this project.
- Theresa Podoll presented information on the project and preliminary results during a "Heirloom Seeds" workshop at the Local Foods Conference, February 18 and 19 at the Doublewood Inn, Bismarck, ND.  
<http://www.agdepartment.com/Forms/WebLocalFoodsRegistration.pdf>

Plans for 2011 include:

Each of the farms will host a field day in late July- early August in cooperation with:

- NDFMGA (The North Dakota Farmers Market and Growers Association, Inc.: <http://www.agdepartment.com/Programs/fm.htm>)
- FARRMs (Foundation for Agricultural and Rural Resources Management and Sustainability: <http://www.farrms.org/>)

- NPSAS (Northern Plains Sustainable Agriculture Society: <http://www.npsas.org/>)
- “Going Local North Dakota” program: <http://goinglocalnd.ning.com/>

The tours will each have a designated photographer. Press releases will be distributed through the NDFMGA, NPSAS, FARRMs, and the North Dakota Department of Agriculture’s “Going Local North Dakota” newsletters and websites. Project results will be presented at the 2012 NDFMGA Annual Meeting and the 2011-2012 NPSAS Annual Winter Conference. Variety trials results will be shared with the NOVIC project for posting on their website. [Editor’s Note: For details about NOVIC (Northern Organic Vegetable Improvement Cooperative), see: [http://www.ars.usda.gov/research/projects/projects.htm?ACCN\\_NO=418004](http://www.ars.usda.gov/research/projects/projects.htm?ACCN_NO=418004)] A final project report and press release will be sent to E-Organic with links to web postings, including pictures.

**Attachment A. North Star Farms, Marvin Baker, cooperator  
2010 SARE Farmer/Rancher Grant March 30, 2011**

**Screening open-pollinated vegetables bred and released in North Dakota for  
suitability to organic production systems and local markets.**

<b>Grower</b>	<b>Marvin Baker</b>		Rating Key: A=advance - R = retry - D = drop		
<b>Crop</b>	<b>Peas</b>	Location	Carpio, ND		
Planting date	31-May	Environment	cool, wet conditions prevailed		
Harvest date	11-Jul				
Description	SARE test plot				
Field #	Code/name	Positive Attributes	Negative attributes	Rating	Comments/recommendations
3	<b>Alaska</b>	41 days from planting to eating-- incredible; Short vines; easy to pick	soft pods hard to shell; bland taste; light color, almost translucent	R	I would certainly use these again simply because they are so fast maturing
<b>Crop</b>	<b>Peas</b>	Location	Carpio, ND		
Planting date	31-May	Environment	cool, wet conditions prevailed		
Harvest date	7/22-8/15				
Description	SARE test plot				
Field #	Code/name	Positive Attributes	Negative attributes	Rating	Comments/recommendations
3	<b>Gradus</b>	long pods mostly full, sweet, tasty	unusually long pods; light weed pressure	R	not the best producer but much better than tasting than our pioneer shell
<b>Crop</b>	<b>Watermelon</b>	Location	Carpio, ND		
Planting date	31-May	Environment	cool, wet conditions prevailed		
Harvest date	22-Sep				
Description					
Field #	Code/name	Positive Attributes	Negative attributes	Rating	Comments/recommendations
3	<b>Klondike</b>	bears fruit long before other varieties, as much as 3 weeks earlier,	Poor yields, small melons, lots of seed	R	we got only 6 watermelons; largest was 14 lbs. Delicious taste but too many seeds; faster maturing

		good for early markets			
<b>Crop</b>	<b>Parsnip</b>	Location	Carpio, ND		
Planting date	31-May	Environment	cool wet year		
Harvest date	NA				
Field #	Code/name	Positive Attributes	Negative attributes	Rating	Comments/recommendations
3	Improved Guernsey	none	didn't emerge		planted next to Klondike melons
Description	SARE test plot				
<b>Crop</b>	<b>Peas</b>	Location			
Planting date	<i>NOT PLANTED</i>		Environment		
Harvest date					
Field #	Code/name	Positive Attributes	Negative attributes	Rating	Comments/recommendations
	<b>Homesteader</b>			R	<i>Seed lost in wind storm</i>
Description					

**Attachment B. Prairie Road Organic Farm, Theresa Podoll, cooperator  
Screening open-pollinated vegetables bred and released in North Dakota for  
suitability to organic production systems and local markets.**

**Introduction**

Prairie Road Organic Farm is a certified organic small grain and vegetable seed farm located in South Central North Dakota. This area is known as the prairie pothole region and receives around 20 inches of precipitation annually, with approximately 135 frost-free days in the growing season. Annual precipitation on Prairie Road Organic Farm was about 150 percent above average for 2010. Temperature or heat unit accumulation was slightly above the long term normal for the area. The last frost in the spring was May 9 and the first frost in the fall was October 15. The Prairie Road Organic Farm represents the southern tier of the study area for this project.

Prairie Road Organic Farm focused on the crops potatoes and tomatoes in 2010. The source or developer of all crop varieties trialed is the North Dakota Agricultural Experiment Station (NDAES), more commonly known as North Dakota State University (NDSU). All tomato seed and potato tubers were obtained from NDSU research specialist, Bryce Farnsworth, providing for a reliable source of true-to-type varieties.

**Variety Information**

Prairie Road Organic Farm trailed four potato varieties in 2010. Of the varieties trialed, Norland is the only known variety that is commercially available, sold as Red Norland or Dark Red Norland.

**Table 1. Potato varieties trialed in 2010**

<u>Variety</u>	<u>Release Date</u>	<u>Skin/Flesh Color</u>
Red Norland	1957	red/white
Nordak	1957	golden/white
Viking	1963	purple/white
Crystal	1980	golden/white

All tomato varieties trialed in 2010 were developed from the NDAES. Table 2 lists the varieties trialed. Steve Zwinger discovered that Bakers Nursery in Fargo, ND recently reintroduced Cannonball, making it available as a transplant. No seed is known to be commercially available of any of the varieties trialed.

**Table 2. Tomato varieties trialed in 2010**

<u>Variety</u>	<u>year released</u>	<u>skin color</u>
Golden Bison	1932	yellow
Old Yeller	Unknown	yellow
Allred	1937	red
Doublerich	1954	red
Cannonball	1973	red
Radio	1973	red



## Methods and Results

### Potatoes

Potato tubers were hand planted on May 20 with a 16 inch spacing between plants. Potato rows were planted to a length of approximately 5 feet for each variety comparison. Previous crop was a rye green manure/cover crop. Potato rows were hilled numerous times to provide space and protection for the growing potato crop. Only one hill of the Red Norland variety failed to emerge. Colorado potato beetles (CPB) levels were low and no control was necessary. Leaf hoppers were present by mid-July. Beginning in early August the effects of the leaf hopper infestation was visible and by the end of August the plants had dried up; the Viking variety held out the longest. The trial was harvested on October 1.

**Table 3. Potato variety yields in 2010**

Variety	Seedling Emergence	Plant Vigor	Tuber Yield	Storage (3/30/11) Rating at 6 months
	Percent	(1-4)	lbs per ft	(1-4)
Red Norland	75	2	1.6	1
Viking	100	3	2.1	4
Nordak	100	3	1.8	4
Crystal	100	3	1.8	2

Trait notes: Seedling emergence: indicates percent of plants that emerged  
Plant vigor: indicates rate of growth where 1=worst and 4=best  
Tuber yield: total yield per foot of row, including b-size potatoes  
Storage rating: Rated for storability based on firmness and sprouting

### Tomatoes

Tomato plants were started on April 10; transplanted on May 25 into our tomato disease nursery to ascertain their resistance to Septoria Leaf Spot caused by the septoria lycopersici fungus. This fungus thrives in tomato debris and on solanaceous plants in abundant rainfall and temperatures ranging from 60 to 80 degrees F. The spores are transferred by wind and rain. The fungus overwinters well; it is not uncommon for transplants and seeds to be carriers of the disease. Our farm utilizes the disease nursery for selecting stock seed for the tomato varieties that our farm stewards, continuously selecting for disease resistance.

Transplants were spaced 1 foot apart in rows that were 3 feet wide. The tomato plants began to flower June 8; Allred was the most vigorous transplant and the first to flower. Septoria Leaf Spot began to show when the plant began to fruit. The spots began on the bottom leaves of the plant and migrated up the plant. The first ripe tomatoes were noted on August 13 but none were harvestable, except for Doublerich. Yield data was not gathered as most plants succumbed to the disease very quickly and the fruit bore spots as well. Doublerich was the only variety that exhibited good to excellent disease resistance; Old Yeller and Radio had moderate disease resistance; the rest of the varieties were rated low. Doublerich received low marks for taste but high marks for appearance. Old Yeller and Radio received average marks for taste and appearance.

### **Conclusions and future plans**

The tomato variety Doublerich is an obvious parent plant for breeding efforts focused on septoria resistance. The variety Radio would be a candidate for a larger planting and screening for individual plants that have higher resistance to Septoria; however, due to its moderate taste ranking this is not a priority for our farm. Given Steve Zwinger's consumer choice results, we will conduct a larger screening of Cavalier and Sheyenne for Septoria resistance.

The potato variety Crystal has proven to be an excellent potato that is a multiple use variety with very thin white skin. When compared to the two white varieties, Snowflake and Viking, Crystal is superior in taste and texture. Crystal has been said by some potato eaters to be the best tasting potato ever. Bison tends to be smaller in size has proven to be a very good tasting potato that that has a very uniform round shape. Both varieties store well and will be looked at again in 2011.

The next pages are pictures taken on Prairie Road Organic Farm during the 2010 growing season. (Note: Pictures taken of diseased plants in August were lost when inadvertently deleted from the family camera before being downloaded.)



East garden and tomato disease nursery.





First flowers! Variety: Allred, June 9, 2011.



Radio tomato before flowering

## **Attachment C. Prairie Seeds Farm/Steve Zwinger, cooperator**

2010 SARE Farmer/Rancher Grant

March 27, 2011

### **Screening open-pollinated vegetables bred and released in North Dakota for suitability to organic production systems and local markets.**

#### **Introduction**

Prairie Seeds Farm is a certified organic vegetable and seed farm located in Central North Dakota. This area is known as the drift prairie region and receives around 19 inches of precipitation annually, with approximately 120 frost-free days in the growing season. Precipitation from May-August on Prairie Seeds Farm was measured at 11.5 inches for the 2010 growing season. Temperature or heat unit accumulation was slightly below the long term normal for the area. The first frost received on the farm was September 18. The Prairie Seeds Farm represents the central tier of the study area for this project.

Crops chosen for this year's evaluation on the Prairie Seeds Farm were potatoes, tomatoes, sweet corn, and popcorn. The source or developer of all crop varieties trialed was the North Dakota Agricultural Experiment Station (NDAES), or more commonly known as North Dakota State University (NDSU). This breeding station no longer breeds or develops varieties of tomatoes, sweet corn or popcorn. All seed, transplant, and tuber sources for this year's trials were obtained from Bryce Farnsworth, research specialist with the NDSU potato-breeding project. Considering the source it is felt that the seed lots used are true to type.

#### **Variety Information**

Potato breeding and variety development continue at the NDAES with this plant breeding department having both national and international recognition. The first released potato variety from this program, a joint release with USDA-ARS and the Ag Exp. Station of ID, was Early Gem in 1952. Since then the program has released over 30 varieties of potatoes adapted to the region. Potato varieties trialed in 2010 along with the year of release and type are listed in table 1. Of the varieties trialed, Norland is the only known variety that is commercially available. Norland is sold as Red Norland or Dark Red Norland. These varieties are currently available and are planted by both home and market gardeners, along with field scale production for commercial table stock potatoes.

**Table 1. Potato varieties trialed in 2010**

<u>Variety</u>	<u>year released</u>	<u>type</u>
Norland	1957	red
Snowflake	1961	white
Viking	1963	red
Norgold Russet	1964	russet
Norchip	1968	white
Bison	1974	red
Crystal	1980	white

All tomato varieties trialed in 2010 were developed from the NDAES. Tomato varieties were bred and released at NDAES from 1922 to 1990. During that time 26 adapted tomato varieties were released to home and market gardeners for the northern region. Table 2 lists the varieties trialed. Of the varieties trialed Cannonball and Sheyenne are available as transplants from a local nursery in Fargo, ND. Bakers Nursery has recently reintroduced these varieties due to their proven performance and adaptability to our region. No seed is known to be commercially available of any of the varieties trialed.

**Table 2. Tomato varieties trialed in 2010**

<u>Variety</u>	<u>year released</u>	<u>skin color</u>
Bounty	1941	red
Cavalier	1953	red
Doublerich	1954	red
Sheyenne	1960	red
Cannonball	1973	red
Lark	1973	red

Sweetcorn and popcorn, as other vegetable crops such as broccoli, cabbage, and melons, were bred and developed in the 20's and 30's at the NDAES. These vegetable breeding programs are no longer in existence. Today NDSU still breeds corn, although it is focused on developing corn inbreds for the hybrid corn industry. Table 3 lists all releases from the experiment station with sweet and popcorn. All three corn varieties are open pollinated. These varieties to date are not available from any known commercial source.

**Table 3. Sweetcorn and popcorn varieties trialed in 2010**

<u>Variety</u>	<u>year released</u>	<u>type</u>
Sunshine	1926	sweet
Golden Gem	1930	sweet
Pinky	1936	pop

## **Methods and Results**

### **Potato:**

Potato tubers were hand planted on May 16 with a 12-inch spacing between plants and 3 feet between rows. Potatoes rows were planted to a length of approximately 20 feet for variety comparisons. Previous crop was a snow pea seed field. Potato rows were hilled numerous times to provide space and protection for the growing potato crop. The majority of the potatoes emerged by June 5 with differences reported in table 4. Fast emergence is felt to be an important trait for weed control as varieties that emerge faster will shade the ground sooner. Plant vigor ratings were visually taken on June 20 to rate the individual varieties amongst each other. The potato varieties began to flower from June 25 to July 5 (see table 4). Row closure (when plants from each row touch or cover the ground) started on June 30. This is also felt to be an important trait for weed control. Colorado potato beetles (CPB) were present from July 5 on. The beetles/larva were removed by shaking into a pail several times to avoid damage to plants. Overall the CPB



levels were low and no visual differences were detected in tolerance with the varieties. Beginning in early August disease symptoms were detected, and plants started to dry up early. The disease appeared to be brownspot and the literature suggests if seed is saved it can be transmitted in the saved seed. Therefore no seed was saved for planting from this year's production. Yields were determined at maturity to better access storage yields from a mature crop. An important trait to measure would be the varieties ability to produce an early harvest of the first 'baby potatoes'. This was not done due to amount of seed available. The trial was harvested on October 3 with the total yields recorded in table 4 for each variety. B potatoes were not separated although there were very few b's with the exception of Bison which had a higher percent of b potatoes.

Table 4. Potato variety data and yields in 2010

Variety	Flower Date	Flower Color	Seedling Emergence %	Plant Vigor	Row Closure 1-10	Tuber Yield lbs/ft
Norland	7/3	purple	70	4	7/5	1.9
Snowflake	6/27	white	55	4	7/6	1.7
Viking	7/4	white	15	2	7/9	2.0
Norgold						
Russet	6/28	light purple	70	10	6/29	2.3
Norchip	7/5	white	50	9	6/30	2.7
Bison	7/2	purple	80	1	7/5	1.7
Crystal	6/26	light purple	55	5	7/8	2.1

Trait notes: Flower date: date when 50 percent of plants have an open flower  
 Seedling emergence: indicates percent of plants emerged on 6/5  
 Plant vigor: taken 6/20 indicates rate of growth where 1=worst and 10=best  
 Row closure: date when vine growth covers space between rows  
 Tuber yield: total yield/foot of row, b potatoes are included in the total yield

**Tomato:**

Tomato plants were transplanted on May 26 on ground that was a snow pea seed production field the previous year. Transplants were spaced 3 feet apart in rows that were also 3 feet wide resulting in a 3 x 3 planting pattern. Twelve plants of each variety were used in this trial. Cutworms began to feed on the transplants during the night with losses of 5-6 percent of the stand each night. With no approved products available for organic farmers to control cutworms, a control method of creating a physical barrier to the tender stem of the tomato plant was tried for the first time on this farm. Nails were placed around the base of each plant (4-5 per plant) as a deterrent to the feeding of the cutworm. This concept worked well as the number of plants lost were minimized greatly. After the threat of cutworms passed the nails were gathered from the base of the larger plant. The tomato plants then had tomato cages placed over each plant to support the plants and to hold the tomatoes off the ground as they develop. The tomato plants began to flower in mid-June; initial flowering dates were taken (table 5) over an 8 day span to document

timing and intensity of flowering by variety. Early flowering and fruit set are important traits to achieve the first tomatoes especially for sales at the farmers market, or from a cool season where it seems to take forever to ripen tomatoes. The first tomatoes were harvested on August 9 and continued until frost. To determine yields along by date of each variety, harvest data was gathered from five separate dates ranging from August 13-28 (table 6). Lark and Doublerich data was not gathered from the last harvests due to a number of factors: Lark, tomatoes were poor quality with fruit that were on the ground as Lark did not grow up to have the tomato cage support the braches bearing tomatoes. Doublerich had a low yield and poor shape that did not sell at the farmers market.

Table 5. The number of plants flowering by date, total of 12 plants for each variety.

<u>Variety</u>	<u>6/20</u>	<u>6/23</u>	<u>6/27</u>
Bounty	2	5	9
Cavalier	0	1	9
Doublerich	8	11	12
Sheyenne	11	12	12
Cannonball	6	10	12
Lark	5	9	11

Table 6. Tomato yields by date in 2010, yields in lbs. from 12 plants for each variety.

<u>Variety</u>	<u>8/13</u>	<u>8/17</u>	<u>8/20</u>	<u>8/25</u>	<u>8/28</u>	<u>Total</u>
Bounty	7.0	14.0	6.75	10.25	19.0	57.0
Cavalier	1.0	10.5	6.0	11.25	13.0	41.75
Doublerich	2.5	7.5	2.75	4.75	--	17.5
Sheyenne	12.0	21.0	11.75	15.0	28.0	87.75
Cannonball	3.0	19.0	10.5	9.75	18.5	60.75
Lark	4.0	12.75	5.0	--	--	21.75

### **Corn:**

Pinky popcorn along with my main sweetcorn crop was planted on May 23 with a 2 row planter spaced 24 inches apart. Within 24 hours after planting severe thunderstorms moved through with very heavy pounding rains. These heavy rains compacted the soil causing a hard crust to form as the soil started to dry out. On May 26 all corn was harrowed with an adjustable spring tooth drag set on medium aggressiveness. A section of popcorn in the corner was missed by the harrow and was felt that those 2 short rows would not emerge without the help of the harrow. On June 1 Pinky popcorn had fully emerged, even the two rows missed by the harrow which were no different in stand as compared to the harrowed section. The popcorn stand was excellent and was thinned to a plant every 8 inches. None of the sweetcorn had emerged and had to be replanted on June 5. Golden Gem, Sunshine, and my main crop of Ashworth sweetcorn were again planted in 24 inch rows. With the good soil conditions stands were good for the entire crop. Sweetcorn was harvested from August 13 to August 20. The first sweet corn to pick was Golden Gem. The main crop of Ashworth was harvested on August 15 with the main harvest of Sunshine on August 18. All three sweetcorn varieties trialed are the traditional

yellow type. Popcorn was hand harvested from September 3-13. As the crop started to mature raccoons started to feed on the drying corn. Ears that were damaged or on the ground were harvested to secure as much seed as possible. The main portion of the crop reached physiological maturity (PM) on September 8 with the majority of the ears being harvested on that date. All harvest was done by hand therefore ears could be picked based on maturity. The last ears were harvested on September 13. Plant and ear height of each of the corn varieties is presented in table 7.

<u>Variety</u>	<u>ear height</u>	<u>plant height</u>
Sunshine	27 inches	86 inches
Golden Gem	19 inches	60 inches
Pinky	41 inches	96 inches

### **Conclusions and future plans:**

Information gathered on performance and customer preference indicated that Sheyenne, Cannonball, and Cavalier tomato are tomato varieties that need to be looked at again in the 2nd year of evaluation. Based off of choice by customers at the farmers market Cavalier followed by Sheyenne were the varieties of choice. Cannonball was the next variety that people would choose over the others. The potato variety Crystal has proven to be an excellent potato that is a multiple use variety with very thin white skin. When compared to the two white varieties, Snowflake and Viking, Crystal is superior in taste and texture. Crystal has been said by some potato eaters to be the best tasting potato ever. Bison tends to be smaller in size has proven to be a very good tasting potato that has a very uniform round shape. Both varieties store well and will be looked at again in 2011. Taste tests comparing the two heirloom corns with Ashworth, a currently available variety, showed that Golden Gem is still a good eating early sweetcorn. Golden Gem was preferred by most participants in the taste test. The taste of Sunshine was satisfactory although the taste was not as good as Golden Gem. Given the vigor, seed production and uniqueness of Pinky popcorn it is felt that this variety is very adapted and may be marketable as a seed crop for both popping and ornamental use.

The next pages are pictures taken on Prairie Seeds Farms throughout the 2010 growing season.





Potato (left 2 rows) and tomato (right 3 rows) variety trials on June 16, 2010



Potato and tomato varieties on July 1, 2010





Potato and tomato varieties on July 8, 2010, note corn in background



Potato and tomato varieties on July 29, 2010

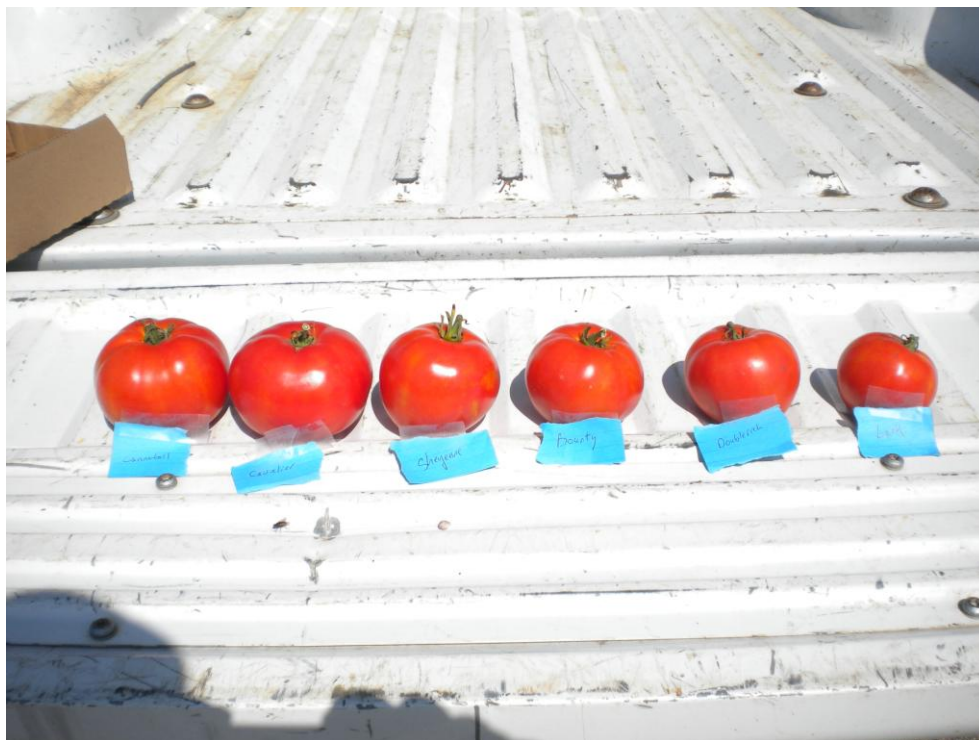




Pinky popcorn

Golden Gem  
August 18, 2010

Sunshine



Tomato harvest on August 24, 2010



Sunset on a flowering Blizzard snow pea seed field June 23, 2010