
Michigan Potato Industry Commission Grant Proposal (FY-2010)

Project Title: Screening of Novel Russet Varieties for Adaptation to a Michigan Production Environment.

Investigators: Dr. Dave Douches and Chris Long – Professor and Potato Specialist, Dept. of Crop and Soil Sciences, Michigan State University, East Lansing, MI 48824; douchesd@msu.edu; 517/355-0271 ext. 1198

Background:

There is a need to find a russet table potato that will be profitable and produce quality russets for the eastern US market. The potato growers in the state of Michigan are experiencing increasing market opportunities to meet this demand. Currently, the three most desirable potatoes for production and type in Michigan are GoldRush, Russet Norkotah and Silverton Russet. Two of these potatoes suffer as symptomless carriers of PVY. Norkotah also has a weak vine and susceptibility to potato early die. Silverton, although it has a nice type, has a short dormancy, and seed production of this variety is problematic. We need a PVY resistant or PVY expressing Silverton Russet type potato that has early die tolerance, common scab resistance, good storability and most importantly tastes good. GoldRush has proven not to perform well in the Southern tier of Michigan. We are proposing two short term approaches to reach this goal.

Phase 1: Large scale commercial russet testing

We need to use multiple strategies to achieve short, medium and long-term goals of replacing R. Norkotah. The first strategy is to fast track a set of advanced breeding lines and/or recently released cultivars. We need to identify 3-4 lines with the Norkotah/Silverton type/appearance and test these lines in multi-acre blocks on commercial farms and run them through a packing shed. Testing these lines in blocks will help us determine the commercial yield and storability potential of these lines. In 2009, Classic Russet (A95109-1RUS) was tested at four locations (minimum one acre blocks) and in 2010 A95109-1RUS will be tested in 5 potential locations.

Phase 2: Testing of advanced russet selections from out of state cooperators

In 2009 we evaluated approximately 20 lines over three sites. We need to continue to bring in 10-20 russet advanced breeding lines for testing in replicated trials over three locations (Northern, Central (MRF), and Southern) from the breeding programs in Colorado, North Dakota, Idaho and Texas. These breeding programs are also looking for Russet Norkotah replacements. After evaluation in 2010 we should begin to narrow down the number of promising lines (less than 10). Then we can consider whether to produce seed in Michigan of any of these promising lines for further testing. From these lines, a few can be considered for fast-tracking based upon data collected.

Objectives:

Phase 1) Identify 1 commercially available recently released variety from a group of 3-4 lines that can have a large scale commercial impact in 2-3 years time frame.

Phase 2) Identify approximately 10 new russet selections that could be adapted to the state of Michigan and then begin certified seed increase and large scale commercial testing in 3-5 years. These varieties would eventually become MSU intellectual property (partnered with other institutions like Beacon Chipper) and can be licensed by the Michigan Potato Management Board.

Materials and Methods:

The phase 1 material would be obtained in truck load lots and the seed (approximately 600 cwt/variety) would be divided between 4-5 commercial growers. Each grower would pay for freight and seed costs. The MSU Breeding Program in conjunction with Chris Long, Potato Specialist would conduct: one stand evaluation; one maturity evaluation; a three replication yield check prior to harvest; and a grade out evaluation upon packing out of the material. This would be performed for each variety tested. Stand would be based on the number of plants in a 23 foot section of row and the number of stems per plant. Maturity would be evaluated based on a 1-5 scale, 1 represents completely dead vines, and 5 represents vigorous flowering vines. Vine vigor is typically evaluated in early June. Yield would be established by obtaining individual weights per tuber for two classes, marketable and pick-outs. The marketable class then can be analyzed by tuber weight to fit desired market classes.

Phase 2 would require obtaining clones of year 4-5 russet breeding material from the above listed national breeding programs. This material would be planted on two cooperator locations in Michigan and at the MSU farm that would provide differing genetic by environment interactions. Stand and maturity ratings would be taken as above. Yield and tuber type would be established at harvest. Following fall harvest, the results from the three locations will be summarized for the decision-making process (what lines to keep or drop). The goal would be to select 5 lines for commercial fast tracking. The selected lines would be placed into tissue culture for cleanup (if needed) and subsequent Michigan certified seed increase.

Outcomes:

Results of this research would provide the Michigan russet table stock market with potentially new commercial varieties by year 3. Phase 2 would prime the pump for further phase 1 evaluations.

Budget (see attached):

PROJECT BUDGET

Budget Item	Phase 1	Phase 2
(A.) Personnel Wages		
(A1.) Research Associates		
(A2.) Graduate Students		
(A3.) Technical, Shop & Other		5,000
(A4.) Secretarial & Clerical		
(A5.) Undergraduate Students	2,000	1,000
(B.) Total Personal Costs	2,000	6,000
(C.) Equipment Cost (Attach Explanation)		1,000
(D.) Materials & Supplies		1,000
(E.) Travel	2,000	2,000
(F.) Publication		
H. Other Costs (Attach explanation, list of items and individual costs.)		
TOTAL:	4,000	10,000

ABSTRACT

There is a need to find a russet table potato that will be profitable and produce quality russets for the eastern US market. We need a PVY resistant or PVY expressing Silverton Russet type potato that has early die tolerance, common scab resistance, good storability and most importantly tastes good. We are proposing two short term approaches to reaching this goal. The first strategy is to fast track a set of advanced breeding lines and/or recently released cultivars. In 2009, Classic Russet (A95109-1RUS) was tested at four locations (minimum one acre blocks) and in 2010 A95109-1RUS will be tested in 5 potential locations. The second strategy is to continue to bring in 10-20 russet advanced breeding lines for testing in replicated trials over three locations (Northern, Central (MRF), and Southern) from the breeding programs in Colorado, North Dakota, Idaho and Texas. From these lines, a few can be considered for fast-tracking based upon data collected. Results of this research would provide the Michigan russet table stock market with potentially new commercial varieties by year 3. Phase 2 would prime the pump for further phase 1 evaluations.