Grow Plasticulture Specialty Potatoes for Early-season Profit

Lewis W. Jett, Extension Horticulture Specialist, West Virginia University, Morgantown, and Larry Campbell, County Agent, Harrison County, West Virginia

Introduction

The potato (*Solanum tuberosum*) is a cool-season vegetable that was under cultivation in the Andes Mountains for more than 6,000 years before the Spanish came to South America in the 16th century. Today, the potato is the most important vegetable food crop throughout the world. In West Virginia, the Irish potato has been a staple garden vegetable crop for many generations. There is a wide diversity of potato cultivars that vary in size, shape, flavor, skin color, and flesh color. Potatoes with diverse colors and shapes are classified as "specialty potatoes" and have a strong market demand in some regions of West Virginia.

In 2012, 16 cultivars of specialty potatoes were evaluated in West Virginia. The site chosen was a commercial produce farm near Good Hope, West Virginia (39.1°N lat.). The soil was a clay loam with a pH of 5.5. The potatoes were grown using plasticulture technology. Plasticulture involves the use of plastic mulches, drip irrigation, fertigation, and row covers. The plastic mulch warms the soil, conserves soil moisture, and reduces weed emergence. The objective of this evaluation was to investigate the performance of several specialty potato cultivars planted in a single row versus a double (twin) row planting arrangement using plasticulture.

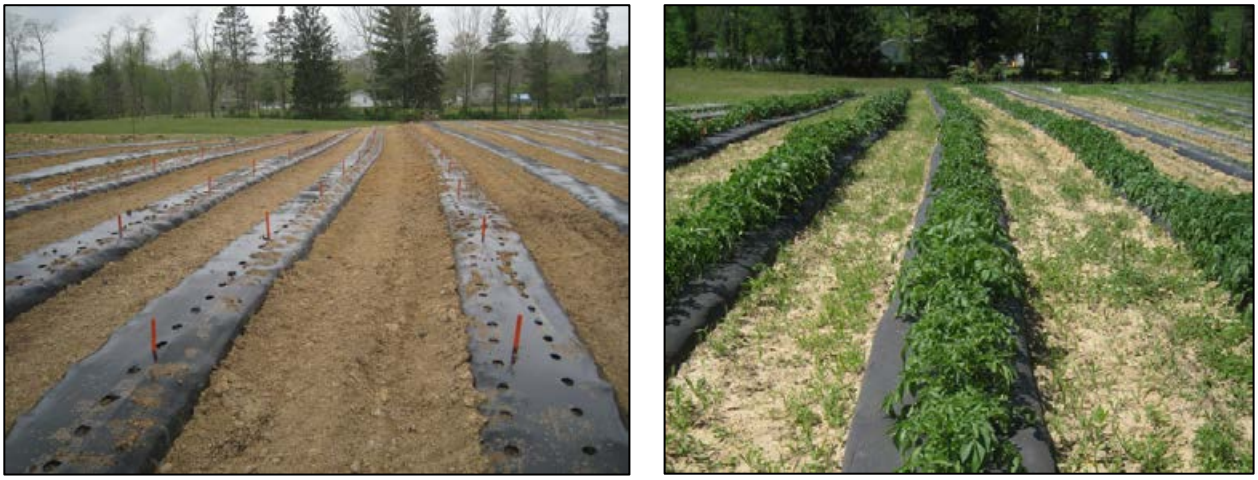
Materials and Methods

Certified seed potatoes were purchased (The Potato Garden, Austin, Colorado) and cut into individual seed pieces for planting in early April 2012 (Table 1). Plastic mulch (black embossed, 1 mil) and drip tape were laid over a 6-inch-high raised bed 60 inches on-center approximately 1 week before planting using a raised bed/mulch layer. Approximately 500 lbs/acre of 10-10-10 fertilizer was broadcast and disked into the soil prior to bedding.

Table 1. Potato varieties evaluated in 2012.

Variety/Cultivar	Season (days)	Description
Austrian Crescent	90-110	Fingerling potato; yellow skin and flesh
Belle De Fontenay	90-110	Small French salad potato
Bison	90-110	Red skin with white flesh
Blossom	90-110	Fingerling with red skin
Carola	90-110	Yellow skin and yellow flesh
Chieftain	90-110	Red skin; white flesh
Colorado Rose	90-110	Red skin; white flesh
Desiree	90-100	Red skin with yellow flesh
German Butterball	100-120	Yellow skin and yellow flesh
Kennebec	110-120	Standard variety with white skin and white flesh
Mountain Rose	110-120	Red skin and red flesh
Purple Majesty	100-110	Purple skin; purple flesh
Red Gold	90-100	Red skin with yellow flesh
Red Pontiac	85-95	Red skin; white flesh
Vicasso	90-100	Yellow skin with red tint
Yukon Gold	80-90	Yellow flesh and skin; early

The seed potatoes were hand-transplanted using a bulb planter on April 12. Each planting hole was approximately 6 inches deep, and the potatoes were spaced 12 inches between hills or plants (Figure 1). One seed piece ("eyes-up") was placed in each hole and covered with soil. Sixteen varieties were evaluated with the single-row arrangement, while three varieties were evaluated with a twin-row arrangement. The twin row was a staggered row with 12 inches between plants and rows on each bed (Figure 1).



Single- and twin-row planting arrangements (left) and single-row planting (right)

Twin-row planting

Figure 1. Planting arrangement of specialty potato cultivars.

Each variety was replicated three times in a randomized complete block design. Individual plots were 10 feet in length. Standard cultural practices were followed throughout the growing season. On July 11, the potatoes were harvested. The plastic mulch was cut in the center and removed along with the drip irrigation tape. A standard shovel-plow was used to unearth the potatoes. Individual potatoes were counted and weighed.

Results

The plasticulture system was very effective in eliminating the need for preemergence herbicides. The potato canopy filled the bed area and shaded the plastic mulch at flowering. 'Chieftain,' 'Yukon Gold,' 'Red Pontiac,' Mt. Rose,' 'Bison,' and 'Colorado Rose' produced the highest marketable yield of potatoes (Table 2). 'Chieftain' is a white-flesh potato with a smooth, red skin and scab resistance. 'Chieftain' would be an excellent replacement for 'Red Pontiac,' which has deeper eyes and is not as smooth. 'Yukon Gold' is a high-yielding, early-season yellow-flesh

potato but can also be replaced with 'Desiree' or 'Carola' if a less starchy texture is desired. 'Mountain Rose' is a distinct specialty potato with light, red flesh and red skin. 'Bison' and 'Colorado Rose' had excellent quality and yield as red skin, white flesh potatoes. 'Colorado Rose' had slightly larger tubers relative to 'Bison.' 'Austrian Crescent' is a high-yielding fingerling potato that should be included in any specialty potato production. Fingerling potatoes are heirloom potatoes and are eaten with the skins intact, which is important since most of the fiber and vitamins within potatoes is located in the skin. Fingerling potatoes have a less starchy texture compared with other tablestock varieties.

'German Butterball' is a superb quality potato with moist, yellow flesh; however, it did not produce a high marketable yield. 'Purple Majesty' is a very uniform purple skin and flesh cultivar that would add variety to any potato market. Four potato cultivars had a statistically higher marketable yield than 'Kennebec,' which is the dominant standard tablestock variety of potato grown in West Virginia.

Table 2. Marketable yield of specialty potatoes produced in a single-row plasticulture system, 2012.

Cultivar	**Avg. Wt/Tuber (oz.)**	**Marketable Yield**	
		lbs./plant (hill)	lbs./acre
Austrian Crescent	0.9	0.6	5,082
Belle de Fontenay	2.3	0.4	3,398
Bison	3.0	0.8	6,897
Blossom	2.9	0.3	2,874
Carola	3.0	0.5	4,505
Chieftain	3.0	1.0	8,871
Colorado Rose	3.2	0.7	6,388
Desiree	3.3	0.6	5,111
German Butterball	3.8	0.4	3,485
Kennebec	4.3	0.7	6,156
Mt. Rose	2.8	0.8	6,824
Purple Majesty	2.1	0.6	5,373
Red Gold	3.1	0.6	5,372
Red Pontiac	3.1	0.8	7,027
Vicasso	3.0	0.7	5,953
Yukon Gold	4.2	0.8	7,231
Standard error	*0.2*	*0.04*	*379*
CV	*0.8*	*0.7*	*0.7*

The three cultivars evaluated with a twin-row planting arrangement had significantly higher marketable yield relative to the single-row planting arrangement (Figure 2). The individual tuber weight did not significantly decrease when planted as a twin-row, but there was a significant increase in marketable tuber numbers per unit area. With a twin-row planting arrangement, the plant population is about 17,000 plants/acre, which is approximately equal to potatoes planted in

single rows with 3 feet between rows. The twin-row planting arrangement increased marketable weight per acre by approximately 35%.

A

B

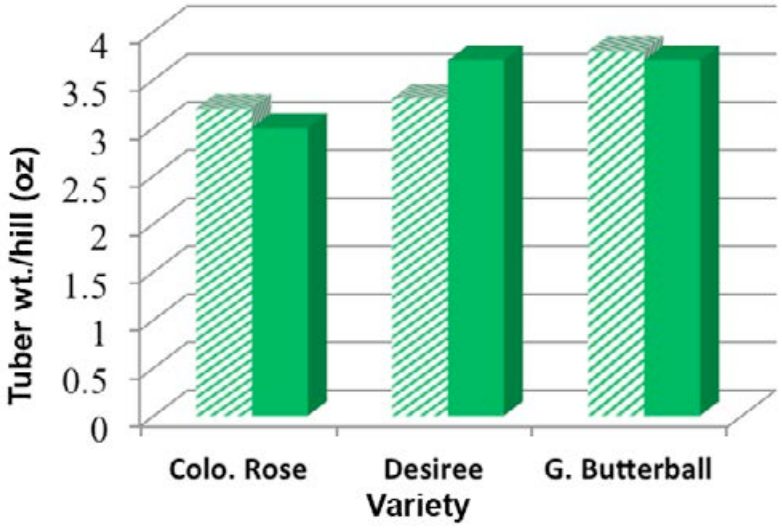


Figure 2. Marketable yield (**A**) and average tuber weight (**B**) as affected by planting arrangement and potato variety.

Conclusions

Enterprise budgets estimate variable costs of approximately $3,500/acre for specialty potatoes produced in a plasticulture system (Bogash and Lamont, 2009). Plasticulture inputs are approximately $1,300/acre. Observations at retail farmers markets indicate that specialty potatoes sell for $1-2/lb., which can result in a potential net return of $6,000-$15,000/acre for specialty potatoes (Figure 3).

Figure 3. Specialty potatoes are often sold as mixed variety combination packages at retail farmers markets.

Plasticulture permits earlier planting, and the black plastic mulch keeps the soil warm, which can accelerate growth of potatoes. In addition, reduced or no herbicide applications may be possible with plasticulure potatoes. Plasticulture does not permit hilling of the potatoes, which could explain the relatively low marketable yields observed in this study. In addition, in high temperature the black plastic could result in very high soil temperatures, which may reduce tuber set. Nevertheless, plasticulture and a twin-row planting arrangement seem to be a very effective method to produce early-season specialty potatoes.

Acknowledgements

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References

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