

**MANAGEMENT OF COLORADO POTATO FOR SUSTAINABLE TUBER
YIELD AND QUALITY**

SUMMARY OF RESEARCH PROGRESS REPORT FOR 2013

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SUMMARY OF 2013 RESEARCH STUDIES

Each potato cultivar has its own unique set of cultural management requirements to attain maximum tuber yield and quality. To attain sustainable yield and quality potential of any potato cultivar, optimum management guidelines for the cultivar need to be followed. The objective of the 2013 research studies was to establish cultivar specific management guidelines for the successful, sustainable, and economic production of new and existing potato cultivars, which optimize their genetic potential, while minimizing economic inputs and environmental degradation. In 2013, horticultural evaluations were conducted on 30 potato cultivars and advanced selections in 15 trials at 6 locations in the San Luis Valley of Colorado. Tests included 16 Russets, 7 yellow flesh specialty potatoes, 2 purple specialty potatoes, and 5 Reds. The trials assessed the influence of different cultural management practices on plant growth, development, tuber yield, tuber size distribution, and tuber quality of the cultivars studied, in an effort to establish optimum management guidelines for each cultivar. Studies conducted in 2013 included the response of potato cultivars to different nitrogen (N) application rates. Nitrogen rate treatments ranged from 0 (control) to 240 lb N/A. The effect of N rate treatments on mid-season petiole nitrate nitrogen concentration was evaluated. The response of early and medium maturity Russet potato to nitrogen application timing was investigated. The effect of extra late N application on the performance of Russet potato cultivars was also evaluated. Late N application treatments included 20 and 40 lb inorganic and organic N fertilizer per acre, and a control where no extra late N was applied. The response of Russet potato to in-row seed spacing was evaluated. The effect of soil amendments on potato root development, nutrient uptake, tuber yield and quality was evaluated. The response of russet potato to the form and rate of potassium (K) fertilizer application was studied in 2013. The influence of ten preceding green manure cover crops on red potato performance was evaluated. Twenty two advanced selections from the CSU potato breeding program were evaluated under grower management conditions in order to determine the yield stability as well as the optimum management practices suitable for each cultivar to attain its yield and quality potential. Observations from the 2013 field studies and some of the data collected were presented at the Southern Rocky Mountain Agricultural Conference in Monte Vista, CO; to potato growers in northern Colorado; and at various professional meetings in the United States. A field day was organized for potato growers at the San Luis Valley Research Center, Colorado, and for some potato consultants, to allow stake holders to see how different potato cultivars perform under different management treatments. Some of the results were published in the Spud Item (a monthly publication by CPAC to potato growers), potato magazines such as the Spudman magazine, and the Potato Grower magazine. Some of the results were also published in peer reviewed journal. Cultivar specific management guidelines were developed for some new cultivars.

Some Cultivar Specific Management Guidelines Updated at the end of the 2013 Research Studies

Field Management of Crestone Russet (CO99053-3RU)

Crestone Russet is a medium maturity Russet cultivar. Pre-cut seed to a size of 2.5 to 3.0 oz. and allow seed to suberize before planting. For maximum marketable tuber yield, plant seed at in-row spacing of 13 inches, and between row spacing of 34 inches.

Available nitrogen (N) (residual soil N + irrigation water N + applied N) rate required for optimum tuber yield and quality should be between 160-170 lb. N/A. This recommendation does not include nitrate nitrogen mineralization from previous crop stubble and from soil organic matter. Increasing the available N rate above 170 lb. N/A can significantly reduce tuber specific gravity and increase the production of more tuber misshapes. Apply 30-35% of the required seasonal N rate pre-plant or at planting. Apply the remaining N rate requirement in split applications during the growing season.

Begin in-season N application after tuber formation. Finishing N application early in the season is recommended. In the San Luis Valley, N application should be completed by the end of July or at least 30 days before vine kill. This will allow for tuber skin maturation (skin set). Late N application delays skin set. Petiole nitrate N concentration should range from 17,000 ppm at 50 days after planting (DAP) down to 5,000 ppm at 88 DAP.

Harvest tubers about 18-21 days after vine kill.

Field Management of Mercury Russet (CO99100-1RU)

Mercury Russet is an early Russet variety. Pre-cut seed to a size of 2.5 to 3.0 oz. and allow seed to suberize before planting. To obtain maximum marketable size tubers, seed tubers should be planted at in-row spacing of 12 to 13 inches, with between row spacing of 34 inches. Available nitrogen (N) (residual soil N + irrigation water N + applied N) rate required for optimum tuber yield and quality should be between 140 to 150 lb N/A. This recommendation does not include nitrate nitrogen mineralization from previous crop stubble and from soil organic matter. To gain early plant vigor, and to obtain maximum tuber yield, apply about 60-65% of the required seasonal N pre-plant or at planting. Apply the remaining N rate requirement in split applications during the growing season.

Begin in-season N application after tuber formation. Finishing N application early in the season is recommended. Optimum petiole nitrate N concentration should range from 22,000 ppm at 50 days after planting (DAP) down to 6,000 ppm at 70 DAP for maximum total tuber yield. To maximize marketable tuber yield, petiole nitrate N concentration should range from 16,000 ppm at 50 DAP down to 8,000 ppm at 70 DAP.

Do not plan on vine kill. The vines of Mercury Russet will die naturally when tubers are mature. A total of 15 inches of irrigation water throughout the growing season is sufficient, while maintaining soil moisture content above 65 to 70%.

Tubers can be harvested between 90 to 100 days after planting.