

## Drip Irrigated Potatoes

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### Introduction:

The scarcity of water in the desert regions of the western U.S. has traditionally limited crop production. Finding ways to maximize crop yields and quality while under continual water limitations has led to intensive investigation into various water delivery processes. As the region's population and concerns about climate change continue to grow, potato growers have become more interested in adopting water and fertilizer delivery methods that produce the best results with the least amount of water.

### Challenge:

When growers have invested substantial infrastructure in an irrigation system, making a change is costly. If the new system is not effective enough to justify its cost, or it introduces foreign material into the production process, the investment will be a waste of resources.

Drip irrigation shows promise as a means to improve water efficiency without reducing crop quality, but has challenges. Before growers convert their potato farms from wheel lines or pivot sprinklers to drip irrigation, they need research-based knowledge about how best to implement a drip irrigation system without reducing crop quality or yield. Methods must also be found to ensure that fragments of drip tape do not enter the food production system.

### Research:

The University of Idaho teamed up with Simplot's agronomy staff to evaluate and improve drip irrigation for Russet Burbank, Ranger Russet, and Alturas potatoes. The University of Idaho's research field contains a Greenleaf silt loam soil with less than 1.0% organic matter. Simplot agronomists prepared seed, which was planted by university staff. The team also applied phosphorus, a portion of nitrogen, and other nutrients before planting to eliminate deficiencies during the season.

### Methodology:

Potato seed pieces were planted in two rows on 36" centers, centered from adjoining plots by a border row. Drip tape was placed at the level of the seed piece and 5" to the side.

Three drip-delivered nutrient treatments were assessed. Treatment 1 used growers' standard practice of urea ammonium nitrate (UAN). Treatment 2 used UAN plus NutriSphere-N (N-N). Treatment 3 used UAN plus N-N at half the rate of Treatment 2. The researchers evaluated tubers for specific gravity, sugar ends, size, bruises, and fry color.

### Results:

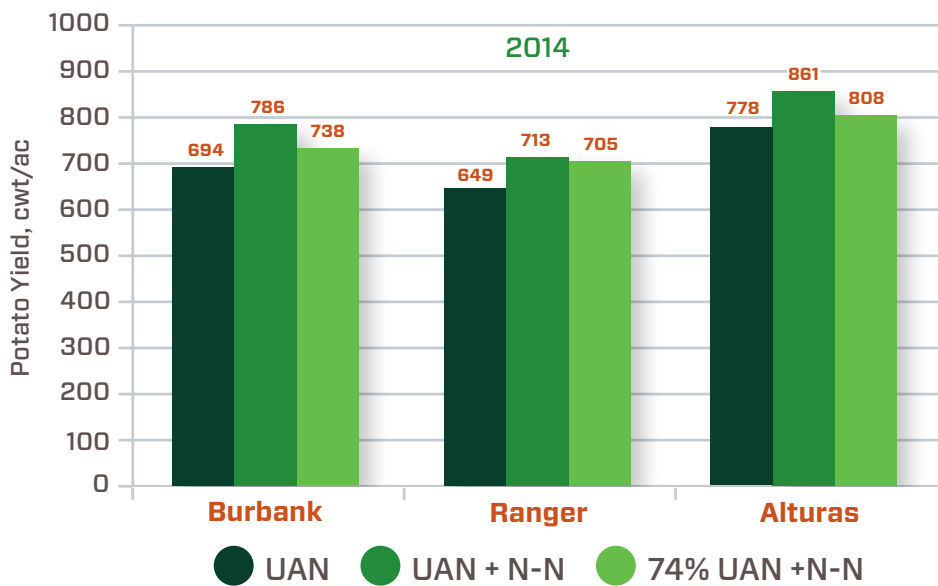
Differences in specific gravity were found to be related to the potato variety, not to differences in treatment. Sugar ends remained high in Russet Burbank for all treatment options, but applications of N-N significantly reduced sugar ends in Russet Ranger. Alturas had no problems with sugar ends regardless of treatment. All crops increased the percentage of tubers greater than 6 oz. when treated with N-N.

A Russet Burbank field on the same testing station was irrigated with sprinklers instead of drip tape, and had a total yield of 650 cwt/ac (32.5 tons/ac) with GSP nutrition. Yields within the drip study ranged from 694 for GSP to 786 with N-N and 738 for reduced N with N-N.

### Practical Applications:

Applying N-N through drip lines resulted in financially significant increases in yield and quality compared to growers' standard practice of applying UAN as the sole nitrogen source in sprinkler-irrigated fields—even when overall nitrogen application rates are reduced.

In order to use drip irrigation without a loss in plant quality due to lower access to water, the drip line must be more centrally located than the placement tested in this study. Future tests will measure results of placing drip tape 2" to the side and slightly above planting level. Harvest methods must also be found that ensure that debris from the drip system will not be found in the potatoes during processing.



Ranger < Burbank < Alturas p < 0.05, GSP < 80% GSP+ N-N, p < 0.05

Potato yields associated with drip study for Russet Burbank, Ranger, and Alturas compared to (1) GSP, (2) GSP with N-N, and (3) 25% reduction in N with N-N. Traditional sprinkler field yield comparison for potatoes being produced at the Parma R and E Center was 650 cwt—2014.