

EYES ON THE WORLD

RECENT ADVANCES IN POTATO RESEARCH AND INNOVATION

Polymer coated urea in 'Russet Burbank' potato: Yield and tuber quality

Taysom, T.W., LeMonte, J.J., Ransom, C.J., Stark, J.C., Hopkins, A.P.
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WHAT IS IT ABOUT?

It is often said that you need to spend money to make money, and potatoes are no exception. High productivity relies on high nutrient availability, particularly nitrogen (N). This is partly due to their relatively shallow, inefficient root system.

Getting fertiliser into the soil when and where it is needed is a constant challenge. Too little and growth is impaired. Too much and plants develop more canopy than tubers, with the excess N polluting groundwater and/or volatilising into the air.

To overcome this issue, growers may apply 25 to 40% of the total crop N requirements at or before plant emergence. The remainder is applied incrementally during the growing season, either as broadcast fertiliser or fertigation through irrigation. Both increase costs. Nitrogen for fertigation is typically more expensive than broadcast products. Conversely, mechanical spreading uses time and fuel and may damage a developed crop canopy.

Controlled or slow-release sources of N can potentially improve the synchronisation between plant development and availability of nutrients in the soil. Polymer coated

urea (PCU) consists of granulated urea with a thin polymer coating. The rate of release depends on soil temperature together with coating thickness.

There have been many studies comparing PCU with traditional N sources for potato production. In all cases yield was similar or increased. However, previous studies were done in relatively high rainfall areas with good soils. This study was conducted in the Pacific Northwest USA, a semi-arid climate with relatively sandy soils - this makes it more analogous to the conditions in some Australian growing areas.

WHAT WAS DONE?

Three commercial grower properties were used for the trials. Four main treatments were applied at each property: control (no added N); PCU applied pre-emergence; urea applied pre-emergence; urea split applied four times over the growing period (50:16.7:16.7:16.7%). Nitrogen was applied at 33, 67, 100 or 133% of the University of Idaho recommended rate for each site. Once plants reached commercial maturity, vines were killed and 6m plots harvested. Tuber size, grade, internal quality and total yield were recorded.



Idaho potatoes (Image by Henry Gartley from Pixabay)

WHAT WAS FOUND?

While yield was reduced in the control (no added N) treatment, differences between the rates of N were generally not significant, so the data was combined.

Yield from PCU was significantly higher than the split applied urea at two of the three locations and significantly higher than urea applied at emergence at one location. Overall,

both marketable yield and US No. 1 grade yield were increased by application of PCU compared to the urea based treatments. The proportion of potatoes that were small (114-170g), medium (170-284g), large (284-397g) or extra-large (>397g) was relatively unaffected by the N application method. However, there was a clear increase in small potatoes in the unfertilised controls. Specific gravity

and physiological disorders were unaffected by N fertilisation.

The study demonstrates that application of PCU at emergence provides an efficient source of N for Russet Burbank potatoes grown with low rainfall in sandy, calcareous alkaline soils. While PCU is more expensive than urea, this may be offset by lower application costs, particularly where split applications are difficult to achieve.

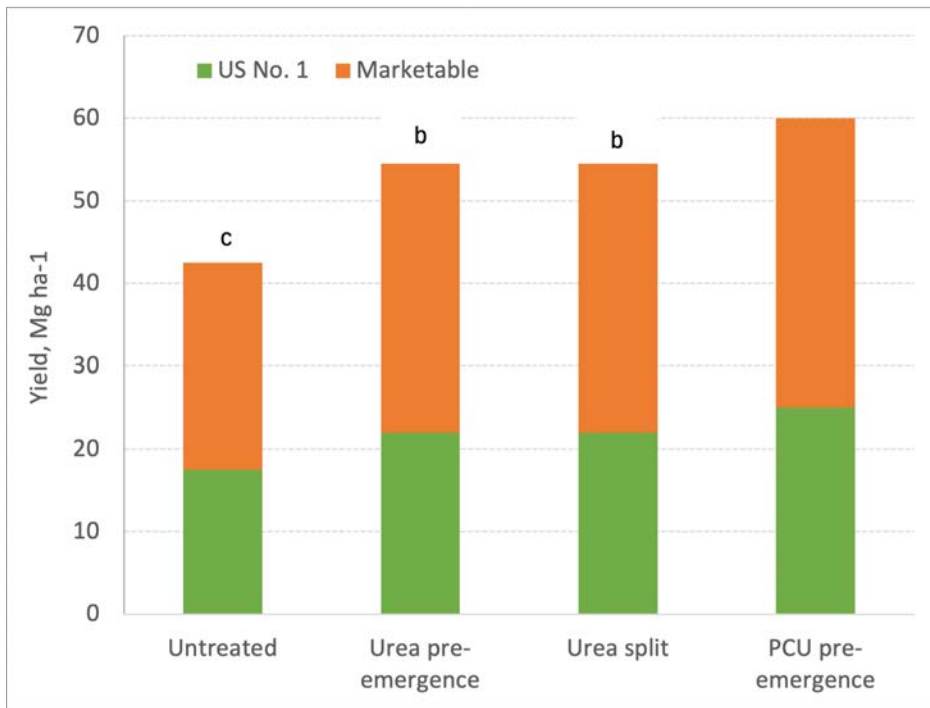


Figure 1. Yield of US No. 1 and marketable Russet Burbank potatoes, averaged across three locations and four N rates for different N sources (urea applied pre-emergence, urea split over 4 applications and polymer coated urea (PCU)) relative to an untreated control. Letters indicate values that are significantly different ($p < 0.05$). Derived from Taysom et al, 2023.

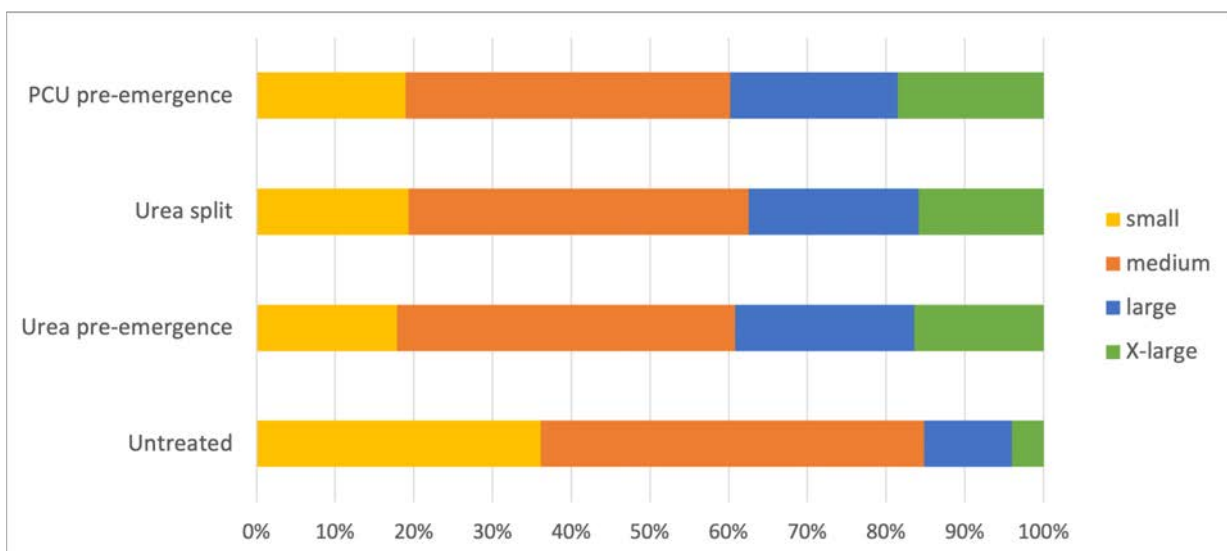


Figure 2. Proportion of yield of US No. 1 grade potatoes falling within each size grade being small (114-170g), medium (170-284g), large (284-397g) or extra-large (>397g). Data averaged across three locations and four N rates for different N sources (urea applied pre-emergence, urea split over 4 applications and polymer coated urea (PCU)) relative to an untreated control. Derived from Taysom et al, 2023.