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More crop per drop - Increasing input efficiency in sprinkler irrigated potatoes.

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Water scarcity, climate change, and population growth are significant global challenges for producing sufficient food, fiber, and fuel in the 21st century. Feeding an increasingly hungry world necessitates innovative strategies and technologies to maximize crop production outputs while simultaneously increasing crop water productivity. In the 20th century, major advances in precision irrigation enabled producers to increase productivity while more efficiently applying water to crops. While pressurized irrigation systems can deliver water effectively to the soil surface, the efficiency of rootzone delivery may be compromised by intrinsic heterogeneities in soil wetting characteristics related to organic matter, biofilms, and hydrophobic coatings on soil particles and aggregates. Efficiently delivering applied irrigation water throughout the soil matrix is critical to increasing crop productivity.

We propose that management of soil water access by surfactants is a viable management option to maintain or increase yields under deficit irrigation.

Potato yield and tuber quality under sprinkler irrigation were evaluated under standard production practices or with the inclusion of an aqueous nonionic surfactant formulation (10 wt% alkoxylated polyols and 7% glucoethers) applied at 10L ha-1 between emergence and tuberization. Crop responses from multi-year evaluations conducted on irrigated potatoes in Idaho (USA) were compared to multi-year on farm grower evaluations in Australia and China.
Surfactant treatment resulted in statistically significant increases in yield (+5%) and US No. 1 grades (+8%) while reducing culls (-10%) in trials conducted in Idaho, USA. Similar responses were observed in commercial grower evaluations conducted in Australia (+8% total yield, +18% mean tuber weight) and in China in 2011 (+8% total yield and +18% premium, -12% culls).
Under diverse production conditions, a single application of the surfactant formulation improved crop water productivity in water stressed environments. Results from these trials support our hypothesis that surfactants may be a viable management practice to improve crop water productivity in a water stressed environments.