**Improving potato irrigation efficiency with mobile drip irrigation and changes in plant spacing and density**

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Water shortages and irrigation restrictions are becoming increasingly common, making the development of more efficient irrigation technologies and management practices essential for maintaining the global competitiveness and profitability of potato growers. Field trials near Othello, WA investigated potential solutions to these challenges including utilizing mobile drip irrigation (MDI) and adjusting plant population and spatial arrangement. Trial one compared MDI with conventional overhead irrigation using four season-long evapotranspiration (ET) replacement rates: 40%, 60%, 80%, and 100%. Trial two evaluated eight plant spacing treatments (81 and 86 cm row widths × four in-row seed piece spacings: 15, 23, 30, and 38 cm) under four season-long ET replacement overhead irrigation rates (40%, 60%, 80%, and 100%). The use of MDI allowed irrigation to be reduced by 20–40% while still achieving yields and economic returns comparable to those of the conventional irrigation treatment. In trial two, yield and economic return were positively correlated with irrigation rate and row width. The highest yields were achieved with 81 cm row spacing irrigated at 100% ET replacement. In contrast, the widest row spacing (86 cm) combined with the lowest irrigation rate (40% ET) produced the lowest yield and economic return for both varieties. Economic return improved when plants irrigated with 40% and 60% ET were spaced farther apart, increasing returns by approximately 35% in Clearwater Russet. However, plant spacing did not affect adjusted gross return in Ranger Russet in lower irrigation rates. Water productivity declined as irrigation rate and in-row spacing increased. Although adjustments to spatial arrangement may be needed when plants are irrigated with reduced overhead irrigation, potato production is still severely curtailed compared to full-rate irrigation; however, MDI significantly improves water productivity by allowing for water reductions of up to 40% without compromising yield or economic return relative to 100% ET overhead irrigation.