

RESEARCH WITH IMPACT

THE CHALLENGE:

China is the largest global potato producer and Inner Mongolia (IMAR) is one of the country's major potato-growing regions. In IMAR, potatoes are important as both a staple food and a source of income, with potato sales accounting for more than half of rural household earnings. Potato farmers generally earn a higher profit from growing potatoes, compared with cereal crops or legumes.

Potatoes remove large amounts of potassium (K) from the soil during harvest (up to 720 kg K₂O/ha). Gradual depletion of native soil K reserves by crop harvest, accompanied by insufficient K replacement through fertilization, has led to a decline in the once-adequate soil K supply. Without proper K fertilization, a reduction in potato yield, quality, and farmer profitability has been observed.

THE RESEARCH SOLUTION:



The IPNI China Program established a research project with the Inner Mongolia Academy of Agricultural and Animal Husbandry Sciences, with additional support by various IPNI member companies.

The initial objective of this project was to determine the most beneficial K sources for potato production in Inner Mongolia. There are several forms of fertilizer that are excellent sources of K nutrition, but they vary in the nutrients delivered, their behavior in the soil, and their purchase price.

Researchers studied the effect of KCl on potato yield and quality, compared KCl with two other excellent K sources—potassium sulfate (K₂SO₄) and potassium nitrate (KNO₃)—and studied the economic benefit of KCl application with different phosphate fertilizers.



Potassium Fertilizer Research is Reviving Potato Production in China

THE RESULTS:

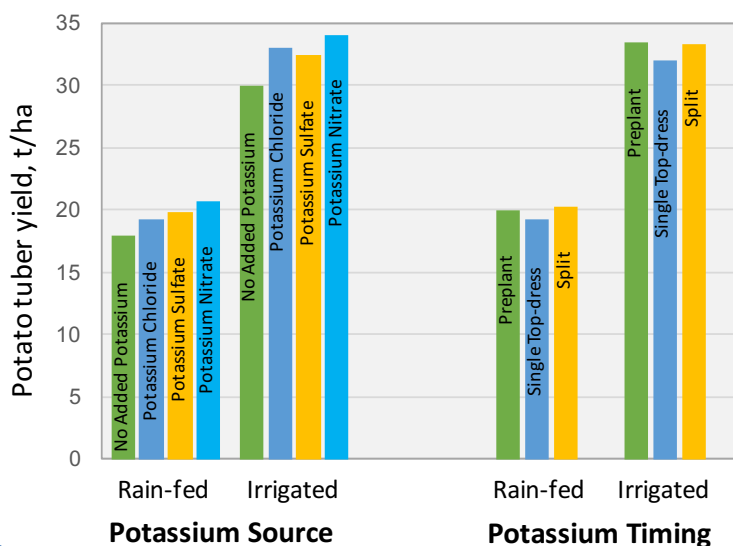
Compared with plots receiving no K, fertilization with KCl (79 kg K₂O/ha) increased rain-fed potato production by 1.6 t/ha (10%) and also boosted starch production. In irrigated fields, fertilization with KCl (129 kg K₂O/ha) improved potato production by 2 t/ha (7%).

An additional benefit of KCl fertilization was the lower sugar content of the tubers. A low sugar content results in a desirable light-colored potato chip after it is cooked.

In this research, tuber yield and quality equally benefited from K fertilization, regardless of whether the K was supplied from KCl, K₂SO₄, or KNO₃. Applying K before planting, or in two applications, was superior to a single application after the plants had begun growing.

Application of KCl or K₂SO₄ with P fertilizer [diammonium phosphate (DAP), or monoammonium phosphate (MAP) supplemented with sulfur (S) and zinc (Zn)] resulted in similar tuber yield, but the use of KCl was more profitable than K₂SO₄. Fertilization with both KCl with DAP was most profitable (US\$6,300/ha), followed by fertilization with KCl and S + Zn-supplemented DAP (\$6,100/ha). Potato profitability without the use of K fertilizer was only \$5,600/ha.

This multi-year research project has helped the region's potato farmers increase their productivity and profitability by identifying the most beneficial rates, sources, and times of K application.



Potato yields increased when K fertilizer was added, especially when the fertilizer was applied before planting or split into two applications. Irrigation consistently increased yields regardless of K management.



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