

The Right Place

Nutrients can be applied in various ways to meet the requirements for potato production. Most nutrients, including N, can be applied pre-plant if tilled into the rooting zone before planting. Both Mn and Fe applied pre-plant may oxidize to unavailable forms before plant uptake, particularly on the high pH calcareous soils. Nutrient source also influences application method and rate. Fertilizer applications after planting are usually done before row closure. When topdressing fertilizer materials are broadcast on the soil surface and should be followed by tillage operation such as ridging. Side-dressed materials are usually physically injected into the soil a few centimeters away from the potato seed.

Fertigation can be an alternative practice for nutrient application, particularly if the nutrient is mobile in the soil, such as nitrate. Fertigation application of nitrate can be more efficient than a pre-plant application when the nutrient is not leached out of the plant's root zone during the process (Westermann et al. 1988). When nutrients are easily fixed by the soil (e.g. P in calcareous soil or acidic, red soil) they should not be applied by fertigation. In Northern China, where a single crop of potato is grown each year, consolidated farms with up to 100 ha of potato fields are becoming more common. Potato is irrigated by sprinkler irrigation systems, which can provide flexibility and efficient water application. Nitrogen and K fertilizer can both be applied through sprinkler irrigation.

Fertilizer banding can also improve efficiency of fertilizer N and P use. Banding fertilizer in ridges would also be expected to reduce the risk of nitrate leaching because of greater water infiltration in the furrow compared with the ridges (Zebarth and Rosen, 2007). Because potato has a low P use efficiency and limited ability to take up P at low soil P levels (Dechassa et al., 2003), P should be band applied to increase the P concentration in the root zone.

Summary

Results from this research indicate that there is consider-

able opportunity to modify fertilizer rates for potato production in China. While degraded soils can influence the nutrient rates applied, the negative impact from the overuse of nutrients must be addressed. Fertilizer rates not only depend on potato requirements, but on fertilizer source, water regime, and soil conditions. The best nutrient management practice for potato is to apply nutrients using right source, right rate, right time, and right place (4R) strategies for high tuber yields and nutrient use efficiency. The determination of these four “rights” is a location (or site-specific) process. **DC**

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