The Role of Potassium in Crop Quality

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Potassium (K) is often described as the “quality element” for crop production. Numerous research studies help explain why. With a shortage of K, photosynthesis, respiration, translocation, and a number of enzyme system functions may be disrupted. The result can be a reduction of plant growth and often of crop quality.

To evaluate the role of K on quality, standards for comparison are needed. For some crops the standard is a relative measure to the best treatment of the experiment. For other crops, such as cotton (Gossypium hirsutum L.), tobacco (Nicotiana tabacum L.), and vegetables, more precise standards are often established. These might reflect manufacturing specifications, sizing requirements, customer preference, or even component analysis, as in the case of forage protein or acid/sugar ratios for citrus (Citrus sp.).

There is no uniform measure of the influence of K on crop quality. It varies with the crop, the plant part to be marketed, and the intended use. For a given crop, genetics is believed to play a large role in establishing the potential for quality (Matches & Oumpaugh, 1979). Bruetsch and Estes (1976) found corn (Zea mays L.) genotypes to differ significantly with respect to dry matter yield and nutrient accumulation. Production management, motivated by economic incentives, teamed with favorable environmental factors all help to achieve the greatest amount of the potential.

Many studies and reviews have been conducted on K and crop quality. An in-depth report for vegetables and fruit crops emphasized the necessity to evaluate K on a crop by crop basis (Cummings & Wilcox, 1968). A more recent review reported on the influence of K on quality of grain, forage, turf, and horticultural crops (Pretty, 1980). Recent colloquium themes provide additional insight into the influence of K on the quality components of disease resistance and protein quality (Dam Kofoid, 1975; Taysi, 1976). Other reviews present research findings with a focus on crop management system improvement to help farmers achieve higher yields and crop quality (Martin, 1968).

Research reveals that many crop quality parameters are the measure of interactions involving inadequate K with one or more other production inputs. Such interactions can involve other nutrients, climatic influences, or even management decisions associated with time, rate, and method of practice performance. An evaluation of these relationships for both temperate and humid region crops provides a better understanding for the importance of K for crop quality in maximum economic crop yield systems.