Potassium Nutrition of Potatoes

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Potatoes (Solanum tuberosum L.) are grown throughout the world as a major, staple food crop. Burton (1966) ranks potato production just behind world production of seven grain crops—barley (Hordeum vulgare L.), maize (Zea mays L.), millet (Panicum miliaceum L.), oats (Avena sativa L.), rice (Oryza sativa L.), rye (Secale cereale L.), and wheat (Triticum aestivum L.). Worldwide production of wheat, rice, and potatoes stands at 205, 117, and 25 million ha, respectively, but production represents 250 million tons each for wheat and rice compared with 276 million tons for potatoes (Pushkarnath, 1976).

Numerous wild potato species and a few cultivated types are produced in the high plains and mountains of South America (Venezuela, Columbia, Ecuador, Peru, and Bolivia), with > 0.5 million ha grown each year (Mendoza & Estrada, 1979; Smith, 1977). Potato production in this area is not of commercial significance because most of the crop is grown for direct consumption. In Peru, where 0.23 million ha are planted annually, potatoes are the most important food crop (Valverde et al., 1966). Average yields are < 6 tons ha⁻¹, which suggests that recent advances in technology are not being applied to this important crop. Unlike grain crops, the major areas of commercial potato production are in the temperate zones of the world, with 80% of the world production in Europe and the western USSR (Pushkarnath, 1976). The tropics and subtropics have been considered unsuitable for potato production; thus, production in these areas is insignificant (Valverde et al., 1966).

The tubers, which are the harvested portion of the potato plant, are modified, underground stems with internodes greatly extended (Harris, 1978). The tuber serves as a storage organ to perpetuate the crop the following season under natural conditions after the tops are killed during the winter months.

Potassium plays an important role in maintaining the tone, vigor, and efficiency of the potato plant (Pushkarnath, 1976). Potatoes are sometimes regarded as an indicator crop for K⁺ availability because of their high K requirement (Ulrich & Ohki, 1966). Potassium is essential for the synthesis of simple sugars and starch and in the translocation of carbohydrates (Smith, 1977). The classical symptoms of K⁻ deficient potato plants begin with yellowing of older leaves, followed by necrosis and browning (Ulrich & Ohki, 1966).

¹Ton throughout the chapter refers to metric ton, or tonne.