Interrelationships of Potassium with Cultural and Management Practices

B. C. DARST
Potash & Phosphate Institute
Stillwater, Oklahoma

G. W. WALLINGFORD
Potash & Phosphate Institute
Columbus, Ohio

Crop production is a dynamic system with no single input operating independently but each interacting with the others. Evaluating one input, then, requires an understanding of how it relates to other cultural practices. This fact complicates the approach to research but must be dealt with if the research is to support efficient, high-yield agriculture. Furthermore, on-farm management must be adjusted to include all production inputs to take advantage of what has been learned in research.

Potassium is used by most crops in greater quantities than any other nutrient except N. In fact, many crops require larger quantities of K than N. Table 24–1 shows the K+ uptake of several crops.

Since many soils cannot provide adequate K for sustained high yields, fertilizer K must be used. Needs for supplemental K are increasing over much of the world, and rising production and marketing costs dictate its efficient use. Understanding the relationships of K with cultural and management practices is an essential part of developing an effective K fertilization program.

I. POTASSIUM AND LIME USE

Unlimed acid soils limit production throughout much of the world even though the advantages of liming are well documented. Lime’s role in promoting more efficient crop use of K is one of its benefits.

Liming acid soils can reduce the leaching of exchangeable K+, as shown in Fig. 24–1. Liming improves K+ retention by increasing the effective cation exchange capacity of acid soils and by increasing the amount of Ca2+ on the exchange complex. Substitution of K+ for Ca2+ is easier than for H+ or Al3+, which dominate the exchange sites of acid soils (Munson & Nelson, 1963).

Reducing potential K+ loss through leaching is especially critical on coarse-textured, well-drained soils in areas of high rainfall or where irrigation is used. These soils usually have low amounts of available K+ and require large amounts of added K+ for maximum yields, making efficiency of use particularly important.