

(Table 9). However, assessment of the potential for P runoff loss from an agricultural field requires evaluation of a number of factors, of which soil test P is only one. The Phosphorus Index was developed as a tool to combine various soil and management factors into an index that can serve as a management tool as part of the nutrient management planning process. The revised P Index for Vermont uses several parameters, including erosion, soil hydrologic group, P soil test, rate and method of P application, and buffer characteristics, to estimate the potential for runoff of phosphorus from a given field. The results of the P Index calculation for each field are expressed as an index (0 to 100+) and are assigned a low, medium, high, or very high rating. Recommended management practices for each category can then be used as a guide to prioritize fields and to determine those on which P application should be limited or additional conservation practices implemented. The 2004 version of the Vermont P Index can be downloaded from the Web at: <http://pss.uvm.edu/vtcrops/?Page=nutrientmanure.html#Phosphorus>

Potassium

Plant-available soil K is primarily in the exchangeable form; that is, it is adsorbed to organic matter and clay surfaces but can be readily exchanged with ions in soil solution and taken up by plants. It is exchangeable K that is measured by the Modified Morgan's extractant (NH₄ acetate, pH 4.8). The rate of potash recommended is based on soil test K level and on crop need, as determined by crop type and yield level (Table 11). Recommended K rates for low-testing soils are quite high, especially for corn silage and perennial forages in which the whole plant is harvested. Even for soils in the optimum range, a substantial amount of potash is recommended because soils can be more quickly depleted of K than of P.

Potassium rates for corn silage and hay forages are adjusted based on yield level and on whether corn is harvested for silage or grain because these factors affect plant uptake and removal of K. Less potash is recommended for grass forage than for legumes because the fibrous rooting system of grasses is more efficient at scavenging for K than is the tap root system of legumes. In the case of a legume-grass mix, an adequate K supply is important to maintain the competitiveness of the legumes relative to the grasses. Less potash is recommended for establishment of a perennial forage than for topdressing to minimize any possible fertilizer

injury to seedlings. Lower establishment-year yields mean lower K uptake, as well.

A portion of the K recommended for corn (10 to 20 lb K₂O/acre) should be banded with the planter, especially on low- and medium-testing soils. (For more information, see UVM Extension Br 1392, *Starter Fertilizer for Corn in Vermont*.)

If manure will be applied, recommended K rates should be reduced based on manure rate and nutrient content (from manure analysis or typical values, Table 14).

Secondary and Micronutrients

Magnesium Recommendation - All Crops

Magnesium can be deficient on some Vermont soils. Because the available form of both Mg and K is a cation (positively charged ion), there is competition between the two for plant uptake. As a result, Mg deficiency is more likely to occur on high K-testing soils. Therefore, we have different recommendations for two situations—those with K test lower and higher than 200 ppm. For the higher K-testing soils, Mg critical level and recommended rate are adjusted for the K test level.

Situation 1: K soil test is 200 ppm or less.

Mg soil test of 50 ppm is considered adequate.
Mg recommendation, lb/acre = 100 - (2 x Mg soil test)

Situation 2: K soil test is greater than 200 ppm.

Mg recommendation, lb/acre = (0.6 x K test) - (2 x Mg soil test).

Zinc for Corn

Zinc (Zn) deficiency is not a consistent problem in Vermont, but it has caused serious production problems, primarily in corn, in some fields in some years. The Zn soil test provides a guide for Zn fertilizer need, but is best combined with field observations (Table 12). Zinc deficiency is more likely on fields with no recent manure application or on soils with very high soil test P (or excessive P application), low organic matter, or relatively high pH (approaching 7 or higher). Weather conditions are also a factor—with problems more likely under cool spring conditions. Zinc deficiency symptoms generally appear in young corn (6-12 inches tall) as interveinal chlorosis (light color between veins) or wide bands on either side of the midrib of younger