Fertilizing, Liming, and Soil Sampling

Fertilizer Recommendations

The phosphorus (P_2O_5) and potassium (K_2O) fertilization recommendations in this publication are based on soil test levels. Recommendations based on a soil test may be obtained from your state soil testing lab or the Cooperative Extension Service.

Nitrogen (N) recommendations given in this publication should be adjusted to account for soil type, cropping history, additions of organic matter, and crop culture system used. For example, for soils with more than 3 percent organic matter and following soybeans, alfalfa, or a grass-legume hay crop, no sidedressed N may be needed. For soils with less than 3 percent organic matter and the above rotation, half of the total N can be applied preplant and the other half sidedressed early in the crop growth cycle. Where the vegetable crop is following corn, rye, oats, wheat, or a previous vegetable crop, there may be no residual soil N available and the crop may benefit from additional sidedressed N.

Transplanted crops, such as cabbage, broccoli, tomatoes, peppers, and melons, often respond to a small amount of water soluble fertilizer in the transplanting water. Special fertilizer grades are used at a rate of 3 pounds per 50 gallons of water. Examples are 14-28-14, 10-52-10, and 23-21-17. The high phosphorus liquid 10-34-0 can also be used at the rate of 2 quarts per 50 gallons of water. Apply the starter solution at 0.5 pint (8 ounces) per plant. If dry weather is prevalent, irrigate after setting the plants.

pH and Lime

Maintaining mineral soil at a soil pH of 6.0 to 6.8, and organic soil at a soil pH of 5.5 to 5.8, is recommended for most vegetable crops. Soil pH should be adjusted only on the basis of a soil test, which should be conducted routinely. If your soil has little natural buffering capacity, low clay content, and low cation exchange capacity (CEC), then annual soil tests are recommended. Such sandy soils include those found along the Wabash, Illinois, Kankakee, Cedar, Iowa, Mississippi, and Missouri rivers.

Low pH (or acid) soils can be a significant problem in most vegetable-producing regions. Vegetables grown under acid soil conditions lack vigor and yield poorly. Under severe conditions, visible foliage injury can result from magnesium deficiency and/or manganese toxicity. The problem can be easily prevented and corrected for the next crop by a proper lime application based on soil analysis. Magnesium deficiency in low pH soils can best be corrected by applying dolomitic limestone. Be sure to inquire about the magnesium content in the limestone.

Sources of magnesium, other than dolomitic lime, are the soluble salts, potassium-magnesium sulfate (11 percent magnesium) and Epsom salts (10 percent magnesium). Apply one of these products according to the soil test level in Table 1.

Table 1. Magnesium Application Rates Based on Soil Test Levels

Magnesium		Relative Level	Magnesium to Apply	
Magnesium Soil Test (ppm)	Minnesota Only		Broadcast	Row
			lbs./A	
0-39	0-50	low	100	20
40-69	51-100	medium	50	10
70+	100+	high	0	0

Soil Sampling and Analysis

Over any given field, there can be large variations in soil pH, so soil samples for testing should be representative of the entire field. Instructions for taking soil samples are available at your county Extension office.

Soil samples should be taken at the same time each year, preferably in the fall or early spring. Soil pH varies seasonally, making comparisons between winter and summer samples difficult. Samples can be analyzed for pH, lime index, available Bray P1 phosphorus, exchangeable potassium, calcium, magnesium, sulfur, micronutrients, CEC, color, and texture.

The lime index determines the tons of lime per acre a field requires. The lime recommendation should be broadcast and worked into the entire plow layer. In addition to the routine water pH test, soils that are susceptible to large variations in soil pH should be tested for salt pH. The pH (salt) provides a more accurate estimate of the true acidity in these soil types by simulating the effects of fertilizer salts on soil pH.