Recent Research on Nutrient Balance

Shanks, James B. and Conrad B. Link, University of Maryland, College Park, Md. (Presented at the American Society for Horticultural Science Meetings at Purdue Univ., Lafayette, Ind. Aug. 27-30, 1961.) Fertilizer ratios for use with greenhouse cut-flower crops. Soil in the greenhouse received the same fertilizer ratio exclusively for a period of nine years. All soils received the same amount of nitrogen and the ratios of phosphorus and potassium in relation to nitrogen were varied. Amounts and times of application were based on the nitrogen requirements of the plant. Ground limestone was added between crops as required to attain a desirable soil acidity and peat moss was added to maintain soil tilth. There was good correlation between soil test results and the amounts of elements applied. Plant growth responses ranged from severe deficiencies to indications of excess. On the basis of these long term experiments, fertilizer ratios were proposed which should adequately meet the phosphorus and potassium requirements of a crop while supplying nitrogen at desirable level. A 3-1-1 ratio was adequate for roses and snapdragons while results indicated that a 3-1-3 ratio was more desirable for carnations, chrysanthemums and certain miscellaneous crops.

Ed. note--The fertilizer ratio refers to N-P-K in that order. To calculate the fertilizer ratio you are feeding, multiply the percentage of nitrogen, phosphorus, or potash in the fertilizer chemical used by the pounds of that fertilizer added to a given amount of water. If you are adding 3 lbs of ammonium nitrate per 1000 gallons of water, the amount of nitrogen added is 33% x 3 or .99 lbs of nitrogen.

The amount of muriate of potash required to balance 3 lbs of ammonium nitrate in a 3-1-3 ratio (the amount to yield 1 lb of potash) would be calculated as follows: Muriate of potash yields 60% potash (K_2O) or 0.6 lb of K_2O per pound of muriate. .99/.60 = 1.65 lbs of muriate of potash for every 3 lbs of ammonium nitrate used. To refine this a bit further, equal amounts of nitrogen and potash would be supplied by using .55 lbs muriate of potash for every 1 lb of ammonium nitrate.

Since phosphorus is normally applied to the soil as treble superphosphate, we are less concerned about its place in the ratio. Shanks and Link found 1/3 as much

most all crops. If this were applied in the liquid feed as 52% phosphoric acid, roughly 1/5 of a pound of phosphoric acid should be applied for every pound of ammonium nitrate.

If phosphate is added to the soil to keep the Spurway level in the 2 to 5 ppm range, a ratio of 3-1-1 for roses and snapdragons converted to the CSU feeding recommendations would be

> 3 lbs ammonium nitrate and 8.8 ounces of muriate of potash per 1000 gal. of irrigation water.

A ratio of 3-1-3 for carnations, chrysanthemums, and miscellaneous crops would be

> 3 lbs of ammonium nitrate and 1 lb 11 ounces muriate of potash per 1000 gallons.

Where higher rates of nitrogen are used, the ratio should be maintained, according to Shanks and Link.