Efficient Fertilizer Use

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Efficient agriculture is important to feed the expanding world population with food produced cheaply enough that people at all economic levels can afford to purchase it. Since fertilizer is a vital component of food production, it is important that fertilizer be used efficiently both to minimize food production costs and conserve natural resources. My discussion of efficient fertilizer use will relate recent concepts on uptake of nutrients from the soil by plant roots to efficient use of nutrients added as fertilizers.

On many of our soils, food production would be greatly reduced if fertilizer were not used. In developing countries crop yields are frequently low because of the lack of fertilizer or inefficient use of the fertilizer that is available. Fertilizer use on a large scale is a relatively recent happening. The large increase in fertilizer use in highly developed agricultural countries has occurred over the last 25 years. Fortunately the fertilizer industry has met the demand by expanding production facilities while keeping fertilizer costs low in relation to the benefit in increased crop yield that results from fertilizer application. As a result, an ample quantity of fertilizer has been the usual recommended method of correcting soil nutrient deficiencies and for supplying the nutrients required to maximize yields. Some producers have fertilized at rates that would ensure that plant nutrients would not limit yields. Increases in all production costs have also stimulated fertilizer use because high yields became necessary to get profitable returns from crop production; high yields are not possible where lack of nutrients limits yields. These high rates of application have not always resulted in efficient use of fertilizer. While use of adequate fertilizer is a relatively recent practice in the highly developed agricultural countries, it has yet to occur in the developing countries.

In the U. S., fertilizer use in 1950, 25 years ago, was only 20% of present use (Hargett, 1975). The average plant nutrient use in the U. S. in 1974 was 102 kg of N plus P plus K for each hectare of harvested crop. This average represents the variation in use from an average 675 kg/harvested ha in Florida to an average 21 kg/harvested ha in South Dakota. Where weather