

Agriculturally Speaking

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Leaching is the movement of nutrients below normal rooting depth due to excess water moving (percolating) through the root zone. Although leaching generally has not been a problem since the 1978 season, recent heavy rains in 1982 have caused concern among tobacco growers in some areas.

Leaching is most likely to occur on deep, coarse soils with good internal drainage. These soil conditions enhance both water penetration into the soil as well as its movement through the fertilized zone. On these soils, most nutrients, except phosphorus, may be leached to some extent. Nitrogen, however, is the nutrient most likely to be leached in amounts great enough to reduce yield and quality of cured leaf if adequate amounts are not replaced. Leaching adjustments for nitrogen may include some replacement of potassium, magnesium, and/or sulfur if soil reserves and previous fertilizer applications of these nutrients are known to be low.

Determining the correct amount of nitrogen to replace for leaching losses is one of the most difficult and risky tasks in tobacco production. If uncorrected, nitrogen deficiency will result in low yields of pale, thin-bodied tobacco which has poor demand on the warehouse floor. If over corrected, excess nitrogen will delay maturity and reduce curability, which usually results in more tobacco in the lower quality unripe (K, S) and immature (G, GK) grades, as well as more sucker growth.

Water usually can move more freely and in larger quantities through deeper topsoils. Too, a portion of the leached nitrogen will accumulate just above or in the upper portion of the clay layer. Since the mass of tobacco roots normally occurs in the upper 12-14 inches of soil, the deeper the clay is below the normal rooting depth, the smaller the amount of leached nitrogen that will be absorbed by the roots.

Crop age is included in the guide because tobacco plants absorb a greater proportion of their needed nutrients as they become older. Since only those nutrients remaining in the soil can be leached, excessive rainfall during the first several weeks after transplanting, i.e. before substantial nutrient absorption has occurred, usually causes more leaching than the same amount of rainfall later in the growing season. Too, as the plants get larger, their leaves form a canopy which sheds some of the water to the row middles, thus reducing the amount of water passing through the fertilized zone. In setting up the leaching guide, the assumption was made that the crop was making normal growth when leaching occurred. However, if the crop has grown unusually slow, the

replacement percentage may be increased slightly (about 5 percentage points).

An estimate of water that enters the soil and ultimately percolates through the root zone is necessary for the adjustment procedure to be reasonably reliable. The amount of rainfall alone is usually not a good indication of how much leaching has occurred. Factors such as soil texture, soil slope, crust formation, amount and duration of rainfall, and the amount of water already present in the soil must be considered. Generally, maximum water penetration occurs when slow rains fall on flat, dry, coarse and deep soils which have been recently cultivated. Minimum water penetration occurs when hard, fast rains fall on sloped, finer-textured and, shallow soils which are crusted.

Only water that enters a soil in excess of its water-holding capacity will cause leaching. Most medium-textured soils typically used to flue-cured tobacco production will hold about 1 inch of water in the upper 12 inches. Coarse sands may hold only 0.5 inches, while more clayed soils may hold 1.5-2.0 inches. Therefore, even if the same amount of water were to enter these soils under dry conditions, percolation and thus leaching would be greatest in the sand because it has the lowest water-holding capacity.

Without question, a reliable estimate of percolated water is the most difficult of the three leaching factors to determine. Unfortunately, a method which incorporates the many factors that influence percolation has not been developed. However, this can be done reasonably well by growers who have experienced similar rainfall conditions on their land in past years. An invaluable tool in making leaching adjustments is an up-to-date rainfall record which shows both the amounts of daily rain and estimates of how much of each rain entered the soil.

Leaching is usually not a serious problem on soils with tight clay or possibly a hardpan within 12 inches of the soil surface. This is because percolation through the root zone is restricted. If it becomes saturated, oxygen starvation and then root decay will occur unless the saturated condition is alleviated. Usually, yellowing of the plants is accompanied by partial or complete flopping. This is a good indication that leaching losses are minimal. Although some of the nitrogen may be moved down to the clay, causing a temporary deficiency, it will be absorbed later as root growth resumes. Adding extra nitrogen in these situations often results in an overfertilized crop.

The rainfall for this week in Warren County was 2.3 inches.

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