Peanut requires adequate calcium in order to develop and function properly. Calcium deficiency can cause underdeveloped kernels or “pops”, which significantly decrease profits. In addition to pops, application of calcium to low calcium soils has shown to increase yield, pod dry weight, grade, and germination rate. Other potential benefits of adequate calcium include improved disease resistance (e.g., pod rot) due to the important role of calcium in the cell wall structure.

SOIL SAMPLING
The sandy surface soils in the Coastal Plain region of southern Alabama are ideally suited for peanut production; however, they do not retain calcium very well. Thus, it is important to evaluate soil calcium routinely for peanut production. Soil testing typically requires samples taken from the top 6-8 inches of soil, but for peanuts soil samples from the pegging zone (top 3-4 inches) are needed. This is because the developing peanuts absorb calcium directly from the soil rather than from their root systems. Pegging zone soil samples should be collected one to six months prior to planting. If it is expected that lime will be needed to adjust pH, earlier is better.

CALCIUM RECOMMENDATIONS
In Alabama, pegging zone calcium values that are > 300 lb/A (> 150 mg/kg) are considered high or adequate in calcium, while Georgia and Florida consider soils high or adequate when pegging zone calcium is > 500 lb/A (> 250 mg/kg). Most of these critical values were determined more than 20 years ago with varieties that are not currently in production.

A recent evaluation of Georgia-06G and Georgia Green in 14 test found that irrigation practices made a large impact on peanut response to gypsum. This is because soil moisture plays a large role in calcium availability to the peanut affecting both dissolution and diffusion of calcium to the developing peanut. The study concluded that there should be different critical pegging zone calcium values for irrigated and non-irrigated peanut production. For irrigated peanuts, pegging zone calcium should be > 300 lb/A (> 150 mg/kg), and for dryland peanut production pegging zone calcium should be > 500 lb/A (> 250 mg/kg).

SEED SIZE
Seed size does affect the final concentration of calcium in the seed; however, differences are not large. Larger-seeded cultivars will be more susceptible to calcium deficiency than smaller-seeded cultivars. Thus, consideration of seed size when evaluating calcium needs should only be taken into consideration when the decision is borderline. In these cases, the larger seed size should tip the scales toward additional calcium application.
CALCIUM AMENDMENTS

Gypsum and lime are the most common calcium amendments, but there are also some liquid calcium fertilizers on the market. The major differences in these products have to do with the solubility of calcium.

Highly soluble forms of calcium are readily available to the plant; however, they also have a greater tendency to leach out of the pegging zone than less soluble forms. Based on solubility, lime (calcium carbonate) is the least soluble, gypsum (calcium sulfate) is moderately soluble, and liquid calcium fertilizers (various forms of calcium, but usually calcium sulfate or calcium chloride) are obviously the most soluble.

The overall goal of calcium supplementation is to maintain available calcium to the developing peanut throughout the entire peanut developing season from early bloom until harvest. Choice of calcium amendment, soil properties (e.g., clay and sand content), and irrigation/rainfall will affect availability and retention of calcium in the pegging zone. Because lime is not very soluble, it is typically applied before planting to ensure enough time for it to become available to the plant. Gypsum and liquid calcium products are typically applied at early bloom.

Soils with higher clay content in the pegging zone will retain more calcium making it less likely to leach away from the developing peanuts, while sandy soils will not hold calcium well. However, soils with higher clay content may require higher calcium concentrations before it is plant available due to their tighter hold on calcium.

Irrigation and high rainfall are likely to contribute to calcium leaching. Highly soluble forms of calcium are more likely to be lost due to leaching than less soluble forms.

While lime does provide calcium, it is strongly dependent on soil moisture. Without adequate soil moisture, lime will not provide calcium to developing peanuts. Therefore, lime may not be sufficient for dryland peanuts during a drought year. In contrast, liquid calcium products are limited by their low calcium content and by their high potential for leaching. In general, gypsum is the best source of calcium for peanuts.

HOW MUCH TO APPLY?

Determination of how much to apply will depend on the type of amendment, pegging zone calcium concentration, and type of production.

Lime is applied based on desired changes in pH. Generally, the optimum range for peanuts is between pH 6 and 6.5. Application of lime to adjust pH to this range is generally sufficient for general peanut production, especially under irrigation or when rainfall maintains adequate soil moisture.

Gypsum is applied based on pegging zone calcium levels. If a soil is below the critical value, gypsum is typically applied at 500 – 1000 lb/A. In a recent study, addition of gypsum increased dryland peanut yield by 500 – 1000 lb/A and grade by 3.5 – 5% SMK over the no gypsum treatment when 500 – 1500 lb/A of gypsum was applied. While increases in yield and grade were observed between 500 and 1500 lb/A gypsum treatments, the greatest response was due to the initial 500 lb/A of gypsum applied. Application rate of gypsum should be based on current prices of gypsum and peanuts.

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