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2010 NPB – Fertilization and Nutrient Management of Peanut

Executive Summary

With the recent shift from small-seeded to large-seeded peanut cultivars in the Southeast, there were numerous questions by farmers concerning calcium nutrition. Research conducted between 2008-2010, with funding from this grant, answered many of these important questions and more. The first important question was “Is 500 pounds per acre of soil test calcium in the pegging zone enough for these cultivars to avoid “pops” and significant yield loss?” The answer, believe it or not, is yes! Over 13 “site years” between 2008 and 2010, including dryland and irrigated and in both Georgia and Alabama confirmed that this requirement used for small-seeded runners (such as Georgia Green) is still adequate for large-seeded runners (such as Georgia 06G). It was suspected that large-seeded runnners would have a higher pegging zone calcium requirement but this was not the case. The second important question answered was “If I need supplemental calcium, is 1000 pounds per acre of gypsum enough?” And again, even though it was suspected that the new large-seeded runners would need more calcium, the answer to this question was Yes! Not only that, but where a higher than recommended gypsum rate was used (1500 instead of 1000 lbs/a), there was often peanut reduction in peanut yield. The reason for this reduction was never verified but it is suspected that the high rate of calcium applied in gypsum probably caused a slight potassium deficiency. Another important question answered by this research was “Are the current recommendations for calcium for small-seeded peanuts adequate for large-seeded when it comes to producing peanuts for seed”. The answer here again was yes, although it is obvious that with the same amount of gypsum applied (1000 lb/a), the calcium level in the seed was not as high in a large-seeded runner than a small-seeded. This has serious implications to the seed business and it looks like the critical level of calcium in the seed needs to be raised to close to 500 parts per million in order to assure 95 %+ germination. This is a change from the old recommendations. Other critical questions answered by this research that were not necessarily considered in the proposal were 1) It is obvious that using gypsum is much more critical under dryland conditions than irrigated. This makes sense since we know soil calcium is less soluble than the calcium in gypsum and that soil calcium is less available under water stress. 2) The “lime method” i.e using lime at planting instead of gypsum at bloomtime is basically ineffective under dryland condition. The original research for the lime method was conducted under irrigation and was never verified in dryland. 3) It appears that the developing peanut establishes its calcium level early and stays proportional as it matures. This means it may be possible for personnel in the seed industry to analyze calcium ion peanuts BEFORE they are harvested to get a gauge on how well they will be suited for seed production (i.e. calcium level and germination). And 4) The practice of using lime at planting and gypsum at bloomtime should be considered “overkill”. Even though half of the Georgia peanut farmers that were recently recognized as high-yield producers use this practice, there was no advantage according to results of this research.
1. **2010 Calcium Rate Studies (with John Beasley)** – The calcium rate studies using gypsum at bloomtime conducted in 2009 were repeated at similar sites in 2010. Yield results for 2010 at each site are shown below. Based on this yield data (and from 2009), the current recommendations for calcium on peanuts will not be changed. While it is true that calcium nutrition for large-seeded peanuts, especially GA 06G, is more critical compared to small-seeded runners like Georgia Green, the actual recommendations are the same.

Comments about each site, including the initial pegging zone calcium level can be found underneath each graph.

Pegging zone calcium for this site was 494 lb Ca/a so a yield response for both cultivars was expected. This was a dryland site. Notice, there was no yield increase going from 1000 to 1500 lb/a gypsum for either cultivar.
Pegging zone calcium for this site was 542 lb/a. This is an irrigated site that received plenty of irrigation water and thus notice the very high yields. This is the only site that included other large-seeded cultivars besides GA 06G. Florida 07 appeared to respond in the classic fashion to increasing gypsum rates (increasing to 1000 lb/a then dropping off at 1500 lb/a). Tifguard didn’t appear to respond to gypsum as far as yield and Ga 06G showed an anomaly at the 500 lb/a rate as did GA 07W at the 1000 lb/a rate.
The pegging zone calcium level at this site was 271 lb Ca/a. This was a dryland site. This was the lowest calcium site used in both years and was the only site that responded to yield in this matter where yields doubled when going from the 0 to 500 lb/a gypsum rate. Then yields of Georgia Green seem to level off and for GA 06G increased just slightly with increasing gypsum rates.
The pegging zone calcium for this site was 749 lb Ca/a indicating that the current recommendation of 500 lb/a in the pegging zone was adequate for both cultivars. This was an irrigated site.
The pegging zone calcium for this site was 706 lb Ca/a. This is the site that in 2009, GA 06G responded with increasing yields with increasing gypsum rates up to 1000 lb/a even with a 950 lb/a pegging zone calcium level. However, the 2010 yield data shown above shows a lack of yield response.

2. Lime, Gypsum or Both? - This study was also a repeat of a study conducted in 2009. Treatments were 1) no lime or gypsum, 2) lime at planting as recommended, 3) gypsum at bloomtime as recommended, and 4) lime at planting followed by gypsum at bloomtime. Yield for 5 different cultivars is shown on the first graph below. The next graph shows an average for the 5 cultivars and the third graph shows grade averaged across the 5 cultivars.

Like in 2009, since the soil pH and pegging zone calcium levels were considered adequate based on current recommendations (5.9 and 648 lb Ca/a), little yield response was expected. Although not statistically significant, there did seem to be a slight numeric yield increase with the lime method and a larger response to gypsum but no advantage to using both (above the response to gypsum. This was a dryland site and the yields were low.
Lime vs. Gypsum
ABAC – 2010
Pegging Zone Ca – 648 lb/a and pHw-5.9

Yields (lb/a)

- Georgia Green
- FL 07
- Tifguard
- GA 06G
- GA 07W

Legend:
- O
- L
- G
- L+G
Lime vs. Gypsum
ABAC – 2010
Pegging Zone Ca – 648 lb/a and pHw-5.9

Yields (lb/a)

Avg 5 var

0  L  G  L+G
3) **Gypsum Sources** - Three gypsum sources (USG 500, PCS Wetbulk, and Agrical/Smokestack) were applied at 1000 lb/a at bloomtime for comparison at 2 locations in 2010. In addition, **lime was applied at bloomtime (which is not recommended)** at both locations and an untreated check was included at the ABAC location. Based on the yield and grade data below, there does no appear to be any significant difference in effectiveness between the 3 gypsum sources used and lime applied at bloomtime appeared to be ineffective as expected.
Calcium Source
Turner Co.(Paulk) – 2010
Pegging Zone Ca - 271

![Graph showing calcium levels for Georgia Green and GA 06G. The graph compares different sources: USG500, PCSWet, AgriCal, and Lime.]

4) **Timing of Gypsum Applications** – The recommended time to apply gypsum on peanuts is at early bloom which would correspond to approximately 45 days after planting (depending on weather conditions). Preliminary studies to look at gypsum timing were conducted at 2 locations in 2010.

The first location was the RDC Pivot and is the same site that the rate study was conducted on with a pegging zone calcium of 749 lb/a. USG 500 gypsum was applied 45, 75 and 105 days after planting. The first graph below makes it appear that the later the gypsum was applied, the better the yield. However, the differences were not statistically different from each other.

The second location was at the ABAC site that had a pegging zone calcium of 494. The second graph below shows what was expected, i.e. the later the gypsum was applied the lower the yield, so that by 105 days after planting the yield response was the same as if no gypsum was applied. The third graph below shows the same trend for grade as yield for this site.
Calcium (Gypsum) Timing
ABAC – 2010
Pegging Zone Calcium – 648

Yields (lb/a)

0 52DAP 72DAP 102DAP
Calcium (Gypsum) Timing
ABAC - 2010 Pegging Zone Ca - 648

Grades

Ga 06G

0 52DAP 72DAP 102DAP