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Calcium Boosts Peanut Yields

New Mexico studies in irrigated fields document not only significant yield increases but monetary returns as well.

Summary: *Calcium (Ca) applied to the fruiting zone retains more number of pods per plant due to higher peg strength. Application of Ca 30 to 45 days after planting, which coincides with penetration of gynophores into the soil, increased the percentage of developed pods. Pod yields with the sub-surface drip irrigation (SDI) system averaged 2,381 lbs/A or an 18 percent increase over the center pivot (CP) irrigation system. Among the four calcium rates tested, an application rate of 1.5 lbs/A under SDI resulted in a 17 percent higher pod yield when compared to control while under CP an application rate of 6 lbs/A resulted in a 6 percent higher yield when compared to control. Application of dairy compost at 38 tons/A, along with 6 lbs/A of Ca, improved pod yield and farmers' stock grade under the SDI system.*

Deficiency of calcium (Ca) results in a phenomenon known as "Pops." Ca nutrition is often a yield-limiting factor for peanuts and is necessary for pod growth and increased peg strength. In our tests for Ca nutrition during the 1999 growing season, application of gypsum did not show any significant difference in yield, probably due to high soil pH (>7.5) while the subsurface drip irrigation system (SDI), which saved 3.03 inches of ground water, had higher pod yields, higher farmer stock (FS) grade, and 137 percent higher monetary returns. During 2000, we tested whether application of chelated Ca at four different rates (0, 1.5, 3.0, and 6 lbs/A) would influence pod yield and FS grade. Chelated Ca or ethylene diamine tetra-acetate (EDTA) was applied on either side of the peanuts using a Cady wheel fertilizer injector 45 days after planting. The experiment was conducted under two irrigation systems: SDI and center pivot (CP).

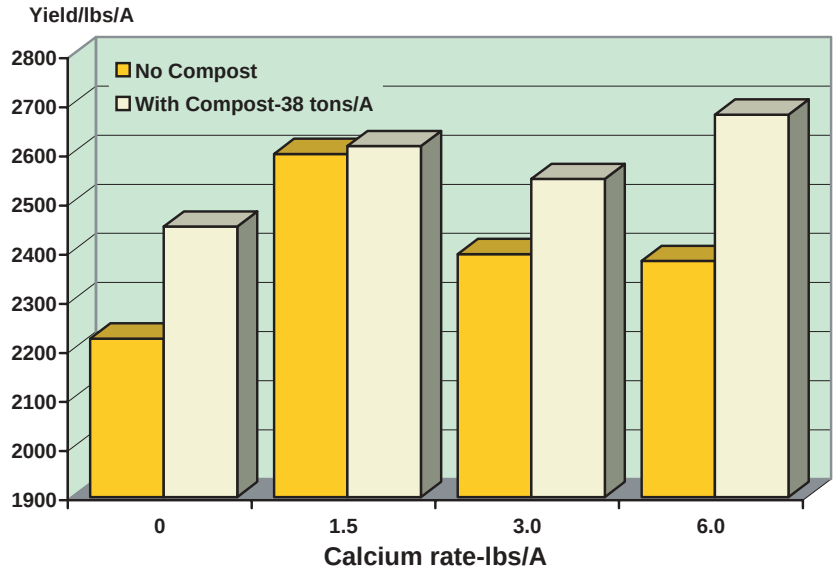

Figure 1. Peanut yield as influenced by compost levels and different calcium rates under SDI system.

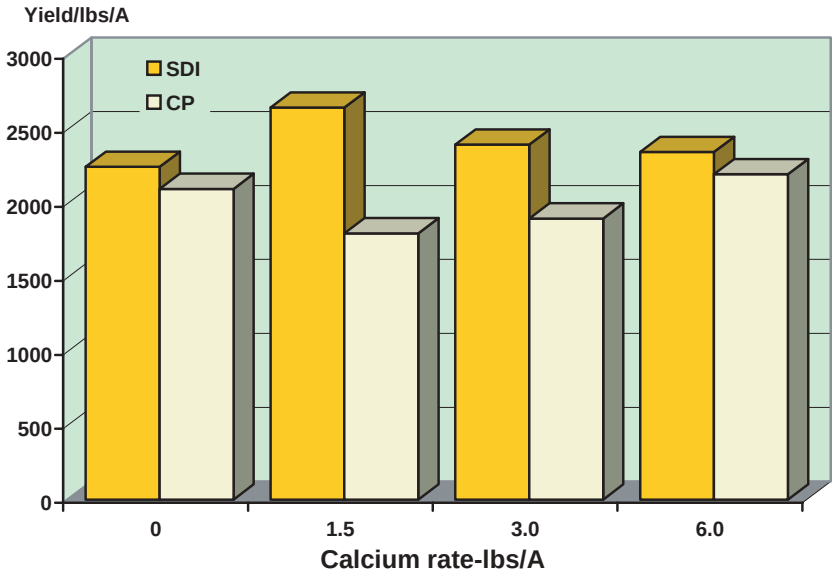

Figure 2. Peanut yield at different chelated calcium rates on SDI and CP irrigation systems.

Methodology

Sites. The SDI study was conducted at the South Research Facility 30 miles south of the Agricultural Science Center at Clovis, New Mexico. The CP study was conducted at Chandler's Farm 20 miles south of the SDI site.

Soil at both sites was Amarillo loamy fine sand with an annual average rainfall of 18 inches.

Plots were 100 feet long and 3.3 feet wide under SDI and 1200 feet long and 3.3 feet wide under the CP irrigation system.

Scheduling under SDI was based on estimated daily evapotranspiration (ET) values multiplied by crop coefficient value. The CP was irrigated at the farmers' discretion.

Design of the experiment under the SDI system was a split plot with compost application as main plots and chelated calcium as subplots. The design under the CP system was a randomized complete block system with four different calcium rates. No compost was applied under the CP system.

Variety used was Valencia-C in both studies.

Planting. Plots were planted in rows at a spacing of 40 inches between rows and 2 inches within the row (about 6 plants per foot of row or 78,408 plants per acre).

Calcium source was Librel calcium chelate with 9 percent readily soluble form of chelated calcium.

SDI vs CP

Yield. Under the SDI system, application of compost resulted in a 10 percent higher yield compared with no compost treatment (Figure 1). High rates of Ca (6 lbs/A) in combination with compost resulted in a 16 percent higher yield, compared to no compost application. Figure 2 shows that pod yields with the SDI system averaged 2,381 lbs/A while the CP system averaged 2,025 lbs/A. The yield advantage of SDI over CP may be due to constant soil water content under SDI, or higher canopy cover under SDI when compared to CP. With CP there tends to be a period of drying between irrigations that would not occur under SDI. In addition, the constant water content observed in the SDI treatment resulted in increased leaf area or leaf mass covering the soil surface. This helped prevent the soil surface from drying out as fast as with the CP treatment. Among the four Ca rates tested, an application rate of chelated Ca of 1.5 lbs/A under SDI resulted in a significant yield increase of 37 percent higher compared with the CP system.

Water efficiency. SDI averaged 0.18 inch per irrigation while CP averaged 0.5 inch per irrigation. SDI received about 21 inches of water compared with 25 inches of water applied through the CP system, or about 19 percent less water.

Dollar return

SDI peanuts had an average monetary return of $722/A while the CP system had an average monetary return of $650/A. Among the four rates of calcium tested, an application rate of 1.5 lbs/A of Ca resulted in 31 percent higher monetary returns with SDI when compared to the CP system. The next best monetary return was with an application rate of 3.0 lbs/A as shown in Figure 3.

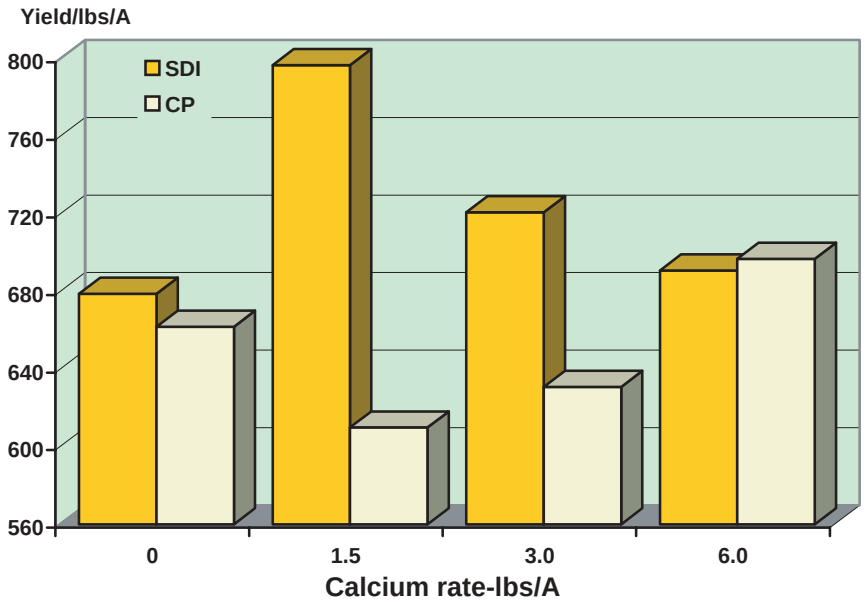

Figure 3. Monetary return of SDI vs CP systems.

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