Relationship Between Potassium Rates and Plant Density on Peanut Productivity

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Nutrients are very important for plant development and yield, including potassium (K), which has direct impact on biochemical processes of peanut (*Arachis hypogaea* L.) plants, being an activator and constituent of enzymes. Plant density can also influence peanut productivity. However, the relationship between K rates and plant density on peanut yield has not been fully investigated. The objective of this research was to evaluate the effect of potassium application and plant density on plant growth and productivity of runner-type peanut under irrigated conditions. The experiment was conducted in Attapulgus, GA using the cultivar Georgia-06G. Soil was classified as Dothan Loamy sand and the field had bahiagrass (*Paspalum notatum*) until 2018, followed by corn in 2019, prior to peanut planting on June 2, 2020. Potassium rates were 0, 25, and 50 kg ha^{-1}, applied as potassium chloride, whereas plant densities were 11.1, 15.5, 20.0, and 24.4 plants m^{-2}. The experimental design was a randomized complete block with split plot design and four replications. The plots were 3.6 m wide and 9.1 m long. Potassium application at the 50 kg ha^{-1} rate was split, with 25 kg K ha^{-1} being applied at planting and 25 kg K ha^{-1} side dressed at 30 days after emergence (DAE). Dry matter accumulation was evaluated in three plants from each plot at 30, 50, 70, 90, and 110 DAE. Leaf area index (LAI) was measured at 30, 50, and 70 DAE, whereas leaf potassium concentration was obtained at 70 DAE. Yield was assessed at harvest 154 DAE. The results showed that the highest potassium rate (50 kg ha^{-1}) resulted in less day matter accumulation at all sampling dates. There was interaction between plant density and K rates on LAI only 50 DAE, with lower LAI for the density of 11 plants m^{-2} at all rates as well as the rate of 25 kg ha^{-1} at 15.5 plants m^2. An interaction between K rates and plant density was also observed for leaf K concentration. The application of 50 kg K ha^{-1} at the densities of 11.1 and 15.5 plants m^{-2} increased leaf K concentrations. Potassium application of 25 kg ha^{-1} increased yield only at the lowest plant density. Density of 19.1 plants m^{-2} without K application resulted in maximum yield of 5072 kg ha^{-1}. Future research can be expanded to other varieties, different soil textures, irrigation availability and rainfall pattern seeking to understand the dynamics of potassium in peanut under different plant densities.