Abstract. Three trials were conducted to evaluate the growth and yield responses of summer squash (*Cucurbita pepo* L.) to N rates. Preplant fertilizer rates were 50, 100, 150, 200, 250, and 300 lb/acre of N. In Ruskin, summer squash plant vigor increased linearly with N rate. However, this constant increase in vigor did not reflect on total yield, which sharply increased between 50 and 100 lb/acre of N, remaining stable afterwards. In Balm, a linear equation characterized the effect of N rates on plant vigor. However, this response was not expressed as increased total yield, since there was no significant N rate effect. At all N rates and in both locations, petiole sap N-NO₃ readings at 8 weeks after treatment (WAT) ranged from approximately 700 to 2000 ppm, which are within sufficiency levels for the crop. These results indicated that between 50 and 100 lb/acre of N could be sufficient to maximize summer squash production, depending on potential amounts of N in the soil from previous growing seasons. In this particular case, the estimated N release (ENR) potential of Ruskin soils, which was determined through wet-ashing of the organic matter, was only 25 lb/acre, whereas the ENR in the two Balm sites were 45 and 75 lb/acre of N. It is suggested, as an appropriate nutrient management practice, perform soil analysis prior to planting summer squash as a double crop to estimate residual N amounts and consequently adjusting N application rates.

Summer squash is planted in Florida either as a stand-alone crop or double-cropped after strawberry. In 2004, this crop was planted in more than 10,500 acres and produced approximately $45 million in gross sales (U.S. Department of Agriculture, 2005). However, recent surveys among growers in Hillsborough County suggest that these figures may underestimate the actual planted area of the crop, because double-cropped cucurbits after strawberry (*Fragaria × ananassa* Duch.) are erratically reported.

In this cropping system, strawberry is grown for a full season, usually between October and March, and summer squash is planted on the same polyethylene-mulched beds where drip irrigation lines and residual fertilizer are available for the second crop. The current preplanting recommendation for N application in summer squash is 150 lb/acre and petiole sap NO₃-N sufficiency ranges between 800 and 900 ppm at first harvest (Olson et al., 2006). However, growers may apply this N rate without considering the soil organic matter content and the residual N concentration from previous planting seasons. With the cost of fertilizers constantly increasing and the environmental concerns of nutrient leaching to ground water, it might be advantageous for summer squash growers knowing the amount of N needed to maximize yield. Therefore, the objective of this study was to evaluate the growth and yield responses of summer squash to N rates.

Materials and Methods

Three field trials were conducted during fall 2005 and spring 2006 at the Gulf Coast Research and Education Center (GCREC) of the University of Florida located in Balm, Fla., and in fall 2005 at a grower’s field near Ruskin, Fla. The soil in both locations was a Myakka fine sand with 1.5 to 2.5% of organic matter and pH between 6.1 and 6.5. Preliminary soil test indicated that the estimated N release of Ruskin soils was 25 lb/acre, while in the two experimental sites in Balm were 45 and 75 lb/acre in fall 2005 and spring 2006, respectively. Planting beds were pre-formed with a standard bedder and were 32 inches wide on the base, 28 inches wide on the top, and 8 inches high. Beds were not fumigated to allow normal denitrification.

Fertilizer rates were 50, 100, 150, 200, 250, and 300 lb/acre of N. In Ruskin, a 10N-OP-16.6K and ammonium nitrate were used to achieve N rates, whereas in Balm 15N-0-24.9K and ammonium nitrate were applied 4 inches off-center on bed tops between 7 and 10 d before planting. Immediately after fertilizer application, beds were covered with white high-density polyethylene mulch and metallized film in Ruskin and Balm, respectively. Treatments were organized in a randomized complete block design with six replications at Ruskin, and four and six replications at Balm. In Ruskin, experimental units were 50 ft long, whereas in Balm these were 30 ft long. ‘Crookneck’ summer squash was planted 24 inches apart on bed centers.

Plant vigor was assessed at 7 weeks after treatment (WAT) with a 0 to 100% scale, where 0% equals plant death and 100% equals optimum plant growth, and petiole sap NO₃-N concentration from the upper fully developed mature leaves was measured 8 WAT with a nitrate meter. Marketable yield of summer squash started at 4 WAT and lasted for at least six harvests in each location. Resulting data were examined with regression analysis and standard errors (P = 0.05) to establish the relationship between N rates and each summer squash variable (SAS Institute, 2000).

Results and Discussion

The treatment by trial interaction at Balm was not significant; therefore the data from the two trials at this location were combined for further analysis. However, there were significant location by treatment interactions between Balm and Ruskin, thus results from these experimental sites will be discussed separately. In Ruskin, summer squash plant vigor increased linearly (y = 37.33 + 0.12x, r² = 0.94) with N rate (Fig. 1). Based on the predicted values, plant vigor improved approximately 30% when N rates changed from 50 to 300 lb/acre. Nevertheless, this plant vigor variation did not reflect on total yield, which sharply increased between 50 and 100 lb/acre of N, remaining afterwards stable around 12.3 ton/acre. An expo-

*Corresponding author; e-mail: bmsantos@ufl.edu
nential regression equation \( y = 12.42 - 2058.26e^{-x/9.9069}, r^2 = 0.90 \) characterized the crop yield response to N rates (Fig. 2). In Balm, a linear equation \( y = 32.00 + 0.1029x, r^2 = 0.83 \) characterized the effect of N rates on plant vigor at 7 WAT (Fig. 1). However, the increased plant vigor did affect total yield (Fig. 2). At all N rates and in both locations, petiole sap N-NO\(_3\) readings at 8 WAT ranged from approximately 700 to 2000 ppm, which are within sufficiency levels for the crop. These results indicated that between 50 and 100 lb/acre of N could be sufficient to maximize summer squash production, depending on potential amounts of N in the soil from previous growing seasons. In this particular case, there was a positive response of summer squash yield in Ruskin to the application of 100 lb/acre of N, where the experimental site has been continuously worked for three years before planting summer squash and hence the amount of organic matter in the soil was the lowest among the three trials. In contrast, in Balm, where the fields are relatively new, the crop did not respond to the application of N rates higher than 50 lb/acre, likely because the estimated N release rates from the organic matter in the soil were 45 lb/acre of N or more. This is particularly applicable in situations where summer squash is double-cropped after strawberry and residual fertilizer might be available in the soil for the second crop. Therefore, it is suggested, as an appropriate nutrient management practice, analyzing the soil before double cropping with summer squash to estimate the potential N availability and consequently adjusting fertilization rates.

**Literature Cited**

