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[C3.3-4] Soil Management Strategy for Enhancing Crop Yields

Evaluation of the Recovery 15n-Ammonium Nitrate in Capim-Marandu Grass Pasture and Corn Cultivated in a Crop-Livestock Integration

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The biggest limitation to the sustainable of the no-tillage system (NTS) in regions of dry winter is the low biomass accumulation during autumn/winter and winter/spring because of unfavorable weather conditions, such as low water availability and temperature. To minimize the problem is growing in Brazil the intercropping of cash crops such as corn, soybeans, rice and sorghum with palisade grass (Brachiaria brizantha cv. Marandu). However, in the intercropping may occur competition for nitrogen between intercropped species, affecting the yield of corn or forage or both. However, not always the corn has had its grain yield limited by the intercropping. Then we have the question if the residual nitrogen fertilizer applied to corn is sufficient to meet the demand from the forage specie that will develop in succession, since there are still no nitrogen fertilizer recommendations for this production system. Additionally, there is another question about the viability of nitrogen application on forage after corn harvesting and its effect on the following crops. The cultivation of cover crops in the off season preceding corn crop in NTS may be promising strategy for supplementation of nitrogen to the following crop. The quality and quantity of plant residue and availability of mineral N in the soil solution have direct influence on the use of nitrogen originating from these residues by following corn. The use labeled source of 15N constitutes the method to quantify more accurately the efficiency of nitrogen utilization. The study aimed at evaluating the total nitrogen accumulation and the nitrogen accumulated in the intercropping corn and B. brizantha evaluating the total nitrogen concentration from the fertilizer ammonium nitrate under different rates (15NH4NO3) applied in the forages plants after corn harvest, and the residual effect of this practice in the following corn crop in the next growing season.

The experiment was carried on at field conditions, at College of Agricultural Science, in Botucatu (SP-Brazil), in a structured Oxisol cultivated under no-tillage system. The climate of the area according to the Koppen climate classification is Cwa, altitude tropical with dry winters and hot and rainy summer. In the first year there was an annual average maximum temperature of 25.1 °C, minimum 16 °C and annual rainfall of 1330 mm. While in the second year there was an average annual temperature of 26.5 ° C, minimum 16.5 ° C and annual rainfall of 1396 mm. The experimental design was in completely randomized block in split plot design. The main plot were two modalities of crop system (intercrop corn and B. brizantha simultaneously, intercrop corn with B. brizantha sowed at corn topdressing fertilization). The subplots were four nitrogen rates (0, 30, 60 and 120 kg ha-1 of N). In the sub plots were allocated micro parcels in which it was applied enriched ammonium nitrate (15NH4NO3) with the same nitrogen rates.

The time of intercropping deployment significantly affected dry matter production, amount of nitrogen in the plant derived from the fertilizer and efficiency of nitrogen utilization by forage plants; The nitrogen application in autumn on B. brizantha implemented by the intercrop with corn, both at sowing and in nitrogen fertilization, provided increased productivity of forage up to a dose of 60 kg ha-1; The higher accumulation and nitrogen use efficiency of fertilizer use by B. brizantha coming from both intercropping times occurred at 160 days after fertilization, regardless of N rates; The residual nitrogen, applied in B. brizantha, did not affect the nitrogen nutrition of the following corn, but increased the grain yield at doses of 60 and 120 kg ha-1 of N, when the corn was grown on straw from the intercrop deployed at corn topdressing fertilization. Based on our results, it can be inferred that the earlier intercrop allowed higher dry matter production of the grass. On the other hand, the intercrop deployed later allowed producing higher grain of the following corn after forage fertilized with nitrogen.

Keywords：*Zea mays, Brachiaria brizantha, no-tillage system, nitrogen fertilization, sustainability.*