

BEAN PRODUCTION INFLUENCED BY N APPLICATION IN NO TILL SYSTEM ON DIFFERENT CROP RESIDUES¹

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Bean grain is an alimentary base of Brazilian population, being cultivated in all national territory, using varied techniques that embraces from subsistence cultivation to technical plantation (irrigation and no till system). No till system is one of the more advantageous practices of crop management in tropical areas in the last ten years. In Brazilian Savannah, that system comes increasing intensively embracing grain productivity and soil conservation. However, the use of crop residue depend on hard studies in relation to plant nutrition, that's why the N fertilization can cause losses in the soil chemical capacity, maintenance of fertilizers response, as well as in the sustainability of the productive system (Fageria & Ghevi 1999).

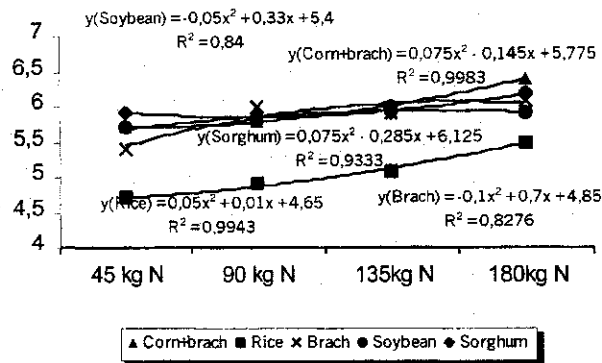


Figure 1. Concentration of N in bean leaf, cv. Pérola, cropped in irrigated no till system under increasing doses of N (kg/ha).

In no till system, the plant residue on top soil helps to maintain the free water for a longer time period, that influences the uniform seed germination and provides an increase of water infiltration and reduces the evaporation and soil temperature. In this system there is an economy of electric energy due to the decrease of irrigation frequency. Nutrient imbalances can reduce the productivity of irrigated bean crop in no till system and the most frequent nutrient deficiency occurs in relation to the N, since in this system where the N demand is larger than in traditional system.

The experiment was carried out at Santa Fé Farm, in the municipal district of Santa Helena of Goiás, objecting to obtain information about bean productivity, cv. Pérola, on different crop residues and N doses. The bean was sowed in one oxisol spacing 0.5m between lines, with 16 to 18 seeds/meter, on crop residue of corn, rice, brachiaria, soybean and sorghum using the basic fertilization of 150 kg/ha of NPK of 8:20:20 formulation in soil previously amended. Plant irrigation was made accord to aspersion modality. Four doses of N as ammonium sulfate were studied (45, 90, 135 and 180 kg/ha). Leaf samples were collected at bean flowering stadium, dried in stoves during 72 hours at temperature among 65 and 70°C, grind and sent for analyses. Soil samples were collected before planting and after harvest time.

The doses of N that allowed the highest leaf N concentrations of corn, rice, sorghum, brachiaria and soybean were 40, 50, 79, 156 and 182 kg N/ha (Figure 1). The low amount of N fertilizer demanded for plants cultivated on corn residue can be explained by N complementation came from corn plant decomposition.

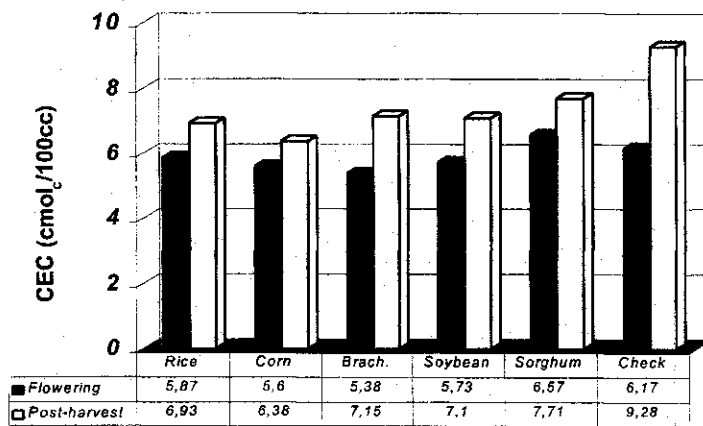


Figure 2 . Cátion Exchange Capacity (CEC) of soil under five crop residues, at flowering stage and after the harvest of bean, cv. Pérola, in the no till system.

Cátion Exchange Capacity (CEC) increased during the plant growth on field, that contributed for Ca increase (from 4.4 to 5.3 $\text{cmol}_c/100\text{cc}$), K (from 0.46 to 0.63 $\text{cmol}_c/100\text{cc}$) and H (of 7.8 for 9.45) occurred into the soil. These results reflect the effect of crop residues plus the soil amendment that propitiated high productions and improved the soil fertility. Considering that pH was reduced and basic cations and hydrogen had their concentrations increased, researchers have suggested that through decomposition of soil organic matter, organic radicals are produced and complex the exchangeable cátions and liberate H for soil solution (Franchini et al 2000). The organic matter of soil presented a little increase at post harvest time. Sorghum residues propitiated larger increases of CEC, producing as organic matter as check treatment. These higher CEC and organic matter in check treatment are due to high seed weeds infestation without no crop growing in consortium. High organic matter concentrations observed in areas where sorghum was cropped are due to the high production of organic matter of easy decomposition by this crop.

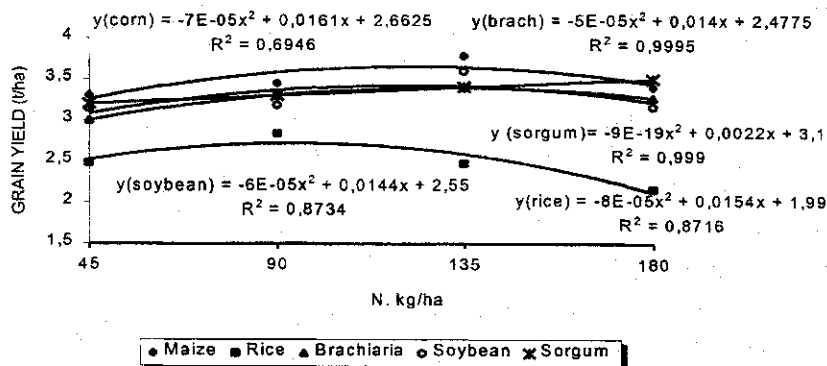


Figure 3. Effect of the N fertilization on bean production cropped on different crop residue.

The bean crop produced on residues of rice, braquiária, soybean, sorghum and corn were 2.6; 3.2; 3.3; 3.5 and 3.6 t/ha, respectively (Figure 3).

References

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- Franchini, J.C. et al. Alterações na fertilidade do solo em sistemas de rotação de culturas em semeadura direta. Revista Brasileira de Ciência do Solo, Viçosa, v.24, n.2, p.459,467, 2000.