MANGANESE AND IRON CONTENTS OF BEAN LEAF INFLUENCED BY CROP RESIDUES IN NO TILL - SYSTEM[1]

I. P. Oliveira[2], E. V. Brandstetter[3], R. M. Oliveira[2], M. Thung[2]; H. Aidar[2] and J.Kluthcouski[2]

[1]Research carried out at Centro Nacional de Pesquisa de Arroz e Feijão. Caixa Postal 179. 75.375. Santo Antônio de Goiás, GO, Brazil. [2]Embrapa Arroz e Feijão, [3]Universidade Católica de Goiás

It's worldwide known about the plant behavior when the same crop is cultivated year after year on the same area. In the first year, generally crop productivity is high but yield decreases about 50% by each year with continuos cultivation system. Nevertheless, this plant behavior is paradoxical with the necessity to produce according to the principles of sustainability – to get economical production preserving the environment.

No till system in Brazil is becoming the most popular practice of cropping system. In Brazilian Central Region, this practice is being profitable to maintain high grain productivity, partially preserving the soil chemical, physical and biological properties. Factors as crop management and fertilization, among many others, have been sponsored by temporary decline of grain production. From plant nutrition point of view, plant residue has influence on grain production in a long duration cultivation.

This paper is written to alert about the use of corn, rice, sorghum, soybean and brachiaria residues and discuss their effects on iron and manganese concentrations in bean leaf harvested in areas cultivated with common bean, cultivar Pérola, under 45, 90, 135 and 180 kg/ha de N, applied 45 days after planting, in no-till system.

In general, nitrogen fertilization mainly in no till system, constitutes as an important factor for increasing crop productivity. The nitrogen recommendation for irrigated bean crop vary form 40 to 120 kg/ha of N and crop generally absorb about 200 kg/ha of N in dry season.

The basic fertilization of 150 kg/ha of 8:20:20 ($N:P_2O_5:K_2O$) formulation was applied in soil at planting. Plants were irrigated with aspersion method. Leaf samples were collected at flowering growth stage, dried in oven during 72 hours at temperature about 65° to 70°C, grind and analyzed.

The iron concentration in leaf of common bean is present in Figure 1.

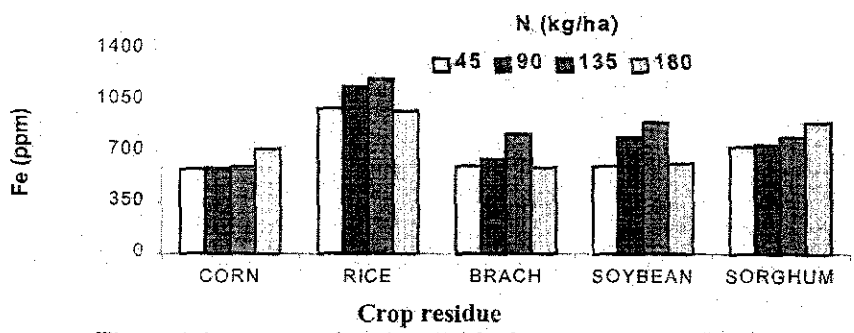

Figure 1. Fe content of dry bean leaf cultivated on crop residue.

The highest amounts of Fe were observed in bean leaves (1040 ppm of Fe) came from area in which rice crop was previously grown. According to Thung & Oliveira (1998), the toxic level of Fe for bean leaf is 500 ppm while double amounts were observed in present study. Oliveira et al. (2002) reported that rice is an exhausting crop of iron from soil. Sometimes, rice plants absorb iron in amounts higher than its own needs; then toxic concentrations can be obtained in plant residues. As a consequence, subsequent crops generally never grow well and low yield due two reasons: a) - high concentration of Fe in the organic matter produced by previously crop and b) - high absorption of Fe by the subsequent crop.

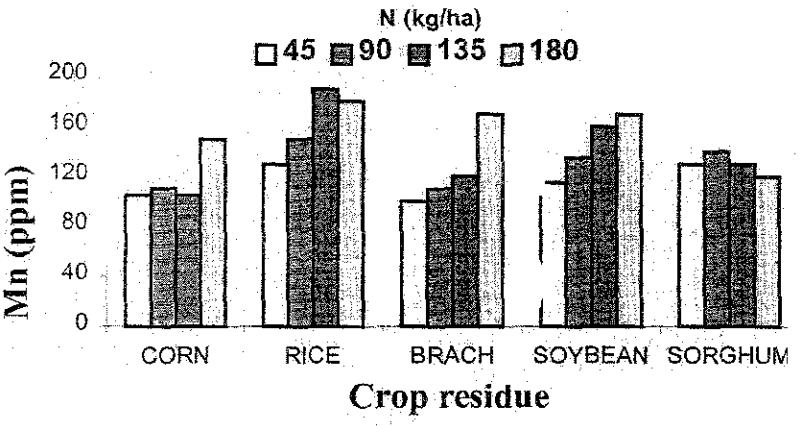

Figure 2. Mn content of dry bean leaf cultivated on crop residue

Similar to Fe, also higher amount of Mn was observed in bean leaves (165 ppm of Mn) and this Mn came from area in which residue of rice was used. According to Thung and Oliveira (1998), the toxic level of manganese for bean leaf is higher than 700 ppm while the level of Mn presented in bean leaf was lower than 300ppm, the critical level for bean crop. Oliveira et al. (2002) reported that the Mn toxicity is largely spread in Central Brazil but most of the time this toxicity would not cause plant mortality.

These results suggest that high Fe content in bean plants came from rice residue and this micronutrient requires more attention than Mn under field condition. The subsequent crops probably not only absorb toxic concentrations of manganese but in a few environmental condition would prejudice the grain production.

REFERENCES

THUNG, M.D.T. & OLIVEIRA, I.P. Problemas abióticos que afetam a produção do feijoeiro e seus métodos de controle. Santo Antônio de Goiás:EMBRAPA-CNPAF,1998. 172p.

OLIVEIRA, I.P.; FARIA,C.D.;OLIVEIRA, R.M. & GUIMARÃES, C.M. Micronutrientes residuais em solo cultivado com arroz em sistemas de rotação de culturas. Congresso da Cadeia Produtiva de Arroz. Anais... Renapa. Santo Antônio de Goiás:Embrapa Arroz e Feijão, 2002. p. 573-576. (Documentos/ Embrapa Arroz e Feijão, 134).