Organic melon response to natural phosphates in sequential culture in the São Francisco River Valley.

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Introduction

The application of soluble fertilizers, chemically treated, is not permitted in organic agriculture. Therefore, the natural phosphates (NF) and the thermal treated phosphates are options that could be used as phosphate sources. However, the efficiency of the NF depends on their own characteristics, including its origin, on the properties of soil, the way they are used and on the characteristics of the plant to be cultivated (Chien & Menon, 1995; Novais & Smyth, 1999). This work aimed to evaluate the behavior of melon crop cultivated with natural phosphate in sub-middle of the São Francisco River Valley.

Methodology

The trial was carried out in the first semester of 2005, four months after harvest of a previous experiment, with was carried out in the second semester of 2004 with the same treatments. The experiment were set up in the Senador Nilo Coelho Irrigation District, in Petrolina-PE, Brazil, in an Argisol (Ultisol) that presented originally the following characteristics: sand = 90%, silt = 6%, clay = 4%, pH in H O = 6.0, Ca = 16 mmolc dm^{-3}, Mg = 7 mmolc dm^{-3}, K = 2 mmolc dm^{-3}, Al = 0.5 mmolc dm^{-3}, CTC = 40.3 mmolc dm^{-3} and P = 5 mg dm^{-3}. The experimental design was a randomized blocks, with three replications and the following treatments: 1) without phosphorus, 2) 50 kg ha^{-1} of P O in the triple super phosphate form, 3) 100 kg ha^{-1} of P O in the triple super phosphate form, 4) 150 kg ha^{-1} of P O in the triple super phosphate form, 5) 100 kg ha^{-1} of P O in the thermo phosphate form, 6) 100 kg ha^{-1} of P O in the natural phosphate of Gafsa form, and 7) 100 kg ha^{-1} of P O in the natural phosphate of Irecê form (Fosbahia). The melon, cv. AF 682 was planted in the 2.0 x 0.40 m space, and irrigated by dripper. All treatments received an uniform fertilization with 2,500 L ha^{-1} cured manure, 50 kg ha^{-1} of N as urea and 80 kg ha^{-1} of K O as potash sulphate. The manure and the phosphates were applied in furrow before planting. Urea and potash sulphate were applied by fertirrigation. The productivity and mean fruit weight (MFW) data were submitted to variance analyzes and test of means. Regression equations were adjusted for the productivity data related to the treatments control and doses of P in the form of triple super phosphate (Snedecor & Cochran, 1971).

Results and Discussion

The fruit productivity and the AWF data contained in the Table 1 show that the melon continued responding to the application of phosphate in the second cropping season. The natural phosphates were lower than the triple super phosphate (TSP) for both parameters evaluated. To evaluate the phosphates efficiency the triple super phosphate equivalent (TSPEq), was calculated, considering the productivity of the melon of the triple super phosphate in the dose of 100 kg ha^{-1} of P O as 100 %. The values of the TSPEq were 68.4%, 60.7% and 52.5% for the thermo phosphate, phosphate of Gafsa and Fosbahia, respectively. On the other hand, in the first cropping season, the efficiency of the thermo phosphate, phosphate of Gafsa and Fosbahia in relation to the TSP assumes the sequence of 101.5%, 72.3% and 67.3%, showing that the thermo phosphate was the more indicated P-fertilizer to be used in the organic melon cultivation. The maximum productivity of melon, estimated by the derivative of the equation, $y = 6{,}8915 + 0{,}1493x - 0{,}000597x^2$, R^2=0,973, was 16.22 t ha^{-1} achieved with the dose of 125 kg ha^{-1} P O , in the triple super phosphate form. In the first cycle (data not included), the maximum productivity of melon was 25.46 t ha^{-1}, obtained with

118.6 kg ha^{-1} of P_2O_5. In the second cycle, the occurrence of pests and the incidence of disease may have impaired the development of the melon, diminishing the fruit yield. Nakayama et al. (1984) observed that in the first year of cultivation of soybean in a Latosol (Oxisol) the TSP was over the phosphate of Gafsa, but from the second to the fourth harvest the phosphate of Gafsa matched the TSP. In three cultivations with wheat, except the first one, the phosphate of Gafsa was similar to the TSP (Knordorfer, 1978).

Table 1. Productivity and mean fruit weight (MFW) of the second cycle of the melon in relation to P doses and P fertilizer[1]

Phosphate	Doses (kg ha^{-1} de P_2O_5)	Productivity (t ha^{-1})	MFW (kg)
Without phosphorus	0	6.62 c	0.446 d
Triple super phosphate	50	13.68 ab	0.846 ab
Triple super phosphate	100	15.04 a	0.914 a
Triple super phosphate	150	16.13 a	0.915 a
Thermo phosphate	100	10.29 bc	0.698 bc
Phosphate of Gafsa	100	9.13 c	0.571 cd
Fosbahia	100	7.90 c	0.519 d
V.C. (%)	-	17.4	12.8

1. Means with the same letter within rows are not significantly different by the Duncan test at 5%.

Conclusions

At the second cropping season the treatments that received triple super phosphate presented higher production and higher mean fruit weight. Among the natural phosphates, the thermo phosphate provided the best response in relation to the productivity and mean fruit weight.

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