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Maize and brachiaria intercropping system efficiency in the use of soil phosphorus reserves

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Introduction: The objective of this study is to contribute to a more systematic assessment of the residual effect of soil phosphorus. If the recovery of added P is of interest not only in the year of application but in subsequent years as well, this raises the following questions: (a) over what time scale should recovery be measured?, (b) can the residual P produce yields that are economically viable for the farmer?, and (c) what is the effect of the crop system, braquiaria intercropping with corn, in to optimize the use of residual phosphorus?

Material and Methods: The experiment was conducted in summer season of 2012-13, at the Embrapa-Maize and Sorghum Research Center in Sete Lagoas, MG, Brazil (19° 28' S, 44° 15' W and 732 m above sea level). The soil is clayey red oxisol under savanna vegetation. In 2003, three levels of soil P were established by broadcasting 0, 218 and 436 kg P ha^{-1}, corresponding to 500 and 1,000 kg.ha^{-1} of P_2O_5 (triple superphosphate 45 % P_2O_5), and incorporating it into the top 0.10-0.15 m of soil. After that, the experiments started its residual phase with no further applications of P fertilizers and under zero tillage soil management, as described by Coelho (2014).

Results and Conclusions: The residual value of P can be determined by measuring the increase in corn yields in the years following the initial application of P, compared with the yield obtained on soil that had not received this nutrient (Table 1).With the residual effect of P applied was possible to get gains in the grain yield in more than 20 % as compared to control. In this research there is no evidence that the use of brachiaria intercropping with corn can to optimize the use of residual phosphorus.

Table 1.Content of phosphorus in leaves, grain and grain yields of corn cultivated after soybean

P – level[1] (kg ha^{-1})	P-Soil[2] (mg dm^{-3})	Crop system	P-Leave (g kg^{-1})	P- Grain (g kg^{-1})	Grain yield (t ha^{-1})
0	6.97	Corn	1.84	1.68	7.58
(Low)	6.05	Corn+brachiaria	1.81	1.78	7.43
Means	6.51c		1.83c[3]	1.73b	7.50b
218	10.10	Corn	2.17	1.78	8.42
(Medium)	10.53	Corn+brachiaria	2.18	1.85	8.05
Means	10.32b		2.17b	1.81b	8.24b
436	23.86	Corn	2.56	2.26	9.27
(High)	23.43	Corn+brachiaria	2.58	2.35	9.28
Means	23.65a		2.57a	2.30a	9.27a
Crop system	13.34A	Corn	2.19A	1.90B	8.43A
Means	13.65A	Corn+brachiaria	2.19A	1.99A	8.25A
Overall means	13.50		2.19	1.95	8.34
CV %	42		9	8	11

[1]P-level applied in 2003; [2]P – soil in 2010, extractor Mehlich1; [3]Means in the column with the same letters do not present differences by test tukey 5%. Small letters compare P levels and capital ones crop system.

Reference: Coelho, A.M. (2014) 16th World Fertilizer Congress of CIEC, Rio de Janeiro, Brazil.