Theme 1
Status and trends of global soil nutrient budget

Available phosphorus in soils of conventional and agroecological orchards of Chaco (Argentina)

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INTRODUCTION

The World Reference Base, or WRB, is a soil classification system endorsed by the International Union of Soil Science, and has established a reference soil group called Anthrosols, which groups soils with outstanding characteristics resulting from human activities (WRB,2015). Soils under orchards are modified by man by permanent removal, addition of manures and/or fertilizers, addition of mulch of different origins, among other practices. The aim of this study was to determine the available phosphorus content in horticultural systems in Chaco province, and to observe if there were significant differences in both treatments.

METHODOLOGY

Fourteen orchards were selected, 7 under agroecological management (AE) and 7 under conventional management (CO) , located in urban and periurban soils of the departments of Comandante Fernández, Sargento Cabral and General Güemes, which have a high proportion of family horticultural activity in the Chaco. AE systems (Fig.2) were characterized by applying organic amendments, such as compost and vermicompost (Gliessman, 2002), and CO systems (Fig.1) by using mineral fertilizers. In each orchard we analyzed texture, total organic carbon (TOC), available phosphorus (P), total nitrogen (Nt), and soil pH. Descriptive statistics and non-parametric analysis of variance (Kruskall Wallis) were performed. Associations between soil
physical and chemical attributes were analyzed through Pearson correlations ($P<0.05$).

Fig1: Conventional orchard of Chaco

Fig.2: Agroecological orchard of Chaco.

RESULTS

In every cases, the soils evaluated were neutral to slightly basic, loamy to sandy loam, with average silt+clay values higher than 410 $g.kg^{-1}$. TOC contents corresponded to values considered moderately well supplied to high in organic matter (mean of 1.86 $g.kg^{-1}$ TOC), with no significant differences between treatments, but with a generally higher tendency in the AE orchards. Although the soils of the province of Chaco are very well supplied with phosphorus, in this study values higher than those typical of the area were observed (Fig.3).

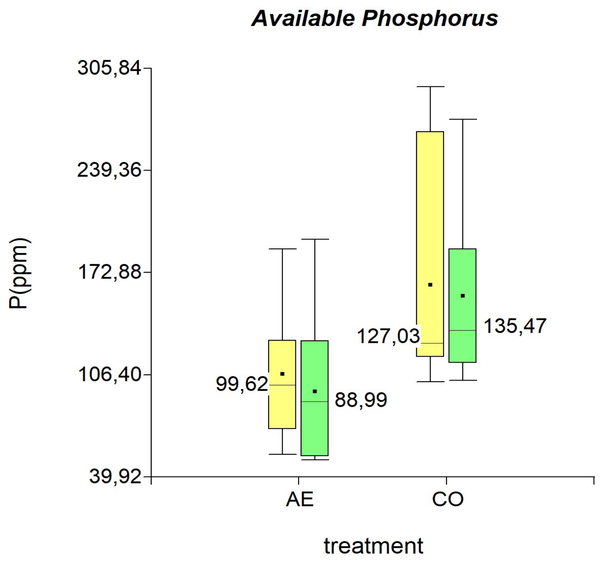

Fig.3: Available phosphorus (ppm) in agroecological orchards (AE) and conventional orchards (CO), in both depths (0-0,05 y 0,05-0,2 m.).

Soils under conventional management showed higher phosphorus content at both depths, being higher in the upper depth (maximum value of 250 ppm). At 0.05 m, 106.88 ppm and 164.84 ppm were measured for AE and CO on average, respectively, and at 0.20 m, 95.59 and 157.63 ppm were measured for AE and CO on average, respectively. Anyway, the differences between both types of management do not show significant differences. The points where the highest P values were recorded coincide with the highest Nt and TOC values.

CONCLUSIONS

It can be presumed that the extreme values of conventional orchards are attributable to the mineral fertilizers they use year after year.
We can highlight the importance of studying the soils known as Anthrosols.

REFERENCES

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