

INTRODUCTION

Mato Grosso state is the Brazil's largest producer of grain crops, and the Vale do Araguaia region, in the state's northeast, is an agricultural frontier region that accounts for more than 16% of the state's soybean output (IMEA, 2015). Few studies have been conducted to investigate the influence of production system or silt content in the soil on the potassium nutrition of crops, especially in soils with high concentrations of non-exchangeable K, characteristic of this region of Mato Grosso state. The objective of this study was to assess the forms of exchangeable and non-exchangeable K in soils under different management systems and uses.

MATERIAL AND METHODS

Studied region was the Vale do Araguaia (Araguaia Valley - Figure 1), which basically contains four soil classes: Dark-Red Latosol (Oxisol); Red-Yellow Latosol (Oxisol); and Plinthosol (Plinthaquox) and Red-Yellow Argisol (Ultisols). The predominant clay minerals are kaolinite, hematite, goethite and gibbsite, except in the Plinthosol, where hematite is absent (Ker, 1997; Galvão et al., 2007). Soil samples were collected from 91 sites. Soil samples were collected in areas cultivated with soybeans, in a line transversal to the rows, at depths of 0-20 cm and 20-40 cm. Soil samples were also collected in areas of pasture and native vegetation (Cerrado or forest). Cropped areas were chosen for contrast regarding the use before planting soybeans: corn, millet, *Urochloa* (Brachiaria) or fallow .

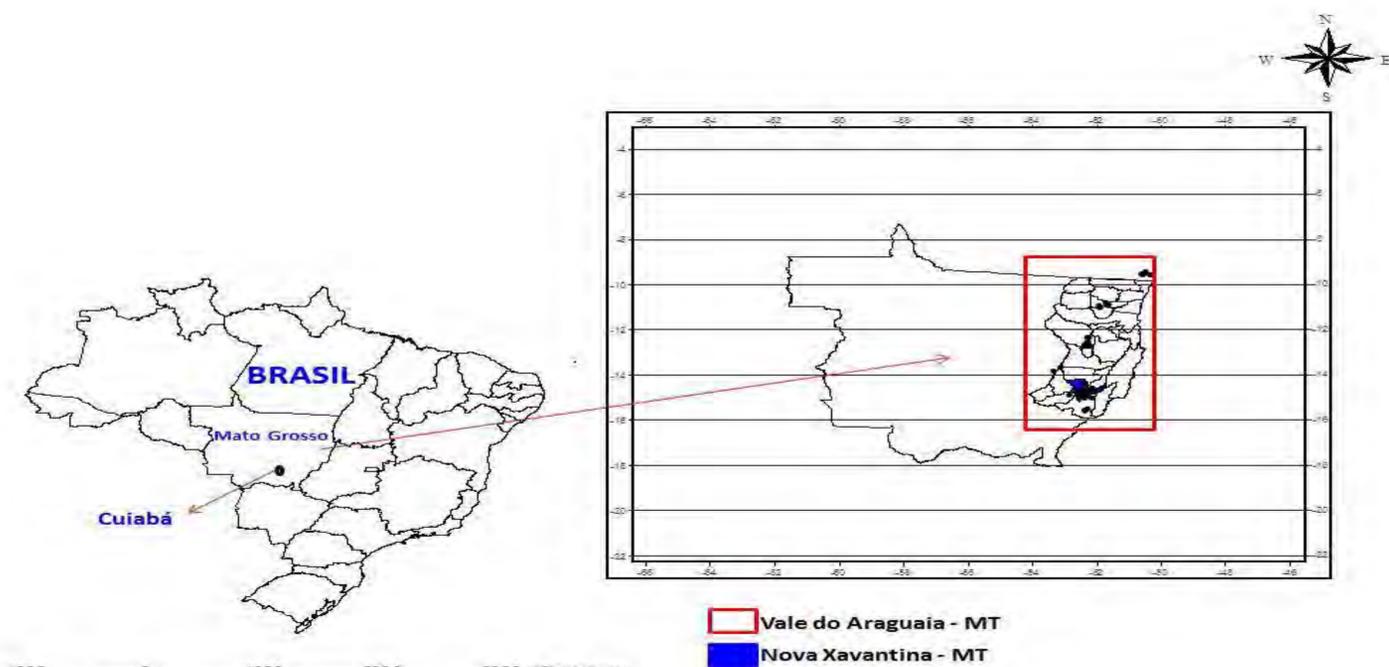


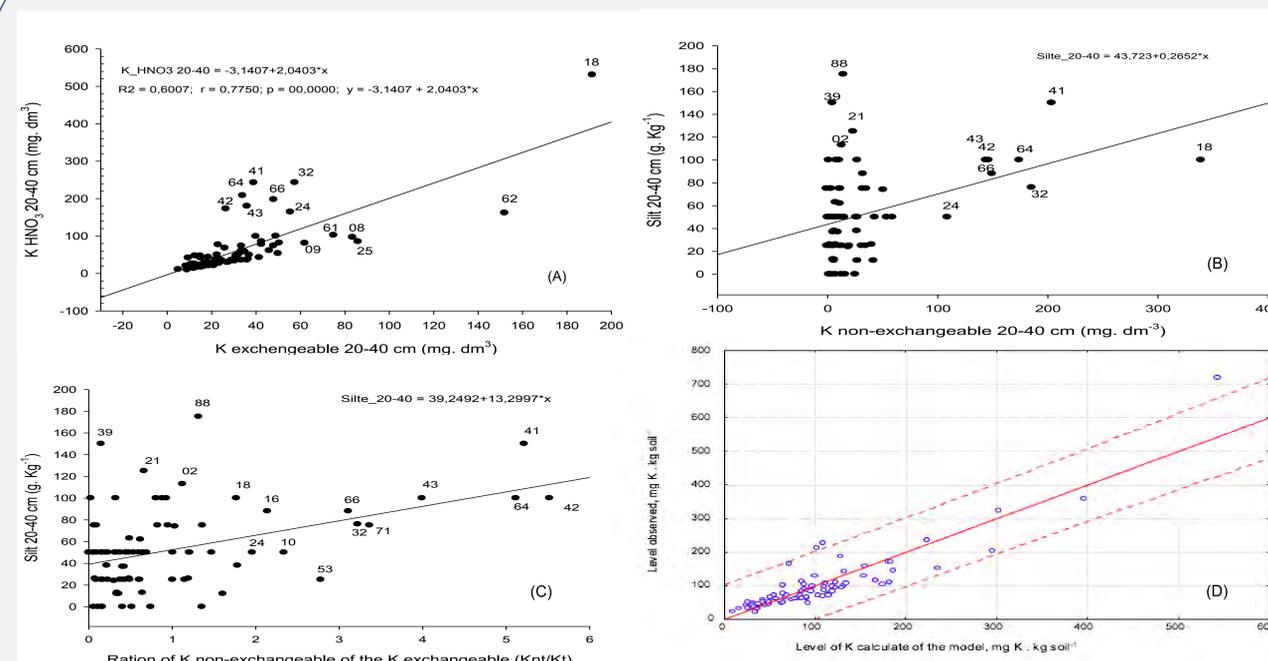
Figure 1. Map indicating the region where the soil samples were collected.

ACKNOWLEDGMENTS



Results and Conclusions

The soils in the Vale do Araguaia region presented high levels of non-exchangeable K, in some cases the concentration of non-exchangeable K was up to 2.39 times more than that of exchangeable K in the top layer, and up to 5.52 times more in the 20-40 cm layer. The ratio between non-exchangeable K and exchangeable K in relation to the levels of silt. It can be seen that the levels or silt are correlated with higher levels of non-exchangeable K in these samples.



Relation of levels of exchangeable K and K extracted in nitric acid (HNO₃) (A) and non-exchangeable K and silt in the 20-40 cm (B), Ratio between levels of non-exchangeable K and exchangeable K in relation to silt levels in the 20-40 cm (C). Multiple regression of K extracted in nitric acid (HNO₃), (D)

Table 1. Simple pairwise linear correlation coefficients between the levels of exchangeable K, non-exchangeable K and silt in the two soil layers (0-20 cm and 20-40 cm).

Variable	Non-Exch K (0-20cm)	Exch K (20-40 cm)	Non-Exch K (20-40 cm)	Silt (0-20 cm)	Silt (20-40 cm)
Exchangeable K (0-20 cm)	0.66*	0.77*	0.58*	0.12	0.20
Non-exchangeable K (0-20 cm)		0.66*	0.95*	0.28*	0.35*
Exchangeable K (20-40 cm)			0.53*	0.10	0.13
Non-exchangeable K (20-40 cm)				0.26	0.39*

*significant at the level 1% of probability.

Conclusions

The levels of silt were directly correlated with the levels of non-exchangeable K and based on the values of exchangeable K and the silt concentration, the levels of non-exchangeable K (extractable in HNO₃) can be estimated.

Forage species used as cover between crops or as pasture in silt-rich soils absorb exchangeable K and non-exchangeable K from the subsoil, recycling K to the arable layer with mineralization of residues.