RECOVERY AND STORAGE OF NUTRIENTS DUE TO THE INTRODUCTION OF *UROCHLOA* IN INTENSIFIED GRAIN PRODUCTION SYSTEMS: A STRATEGY FOR CONSERVATIVE CYCLING

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INTRODUCTION

The use of fertilizers is essential to obtain high grain yields in the Brazilian savannah (Cerrado), but it represents a significant part of production costs. It also has environmental implications, as nutrient losses from the soil-plant system become potential water or atmosphere contaminants.

The introduction of forage grasses aiming at the diversification and intensification of annual crop systems has been shown to be a promising practice, with economic and sustainability gains. Plants with a robust root system, such as brachiaria (*Urochloa* spp), contribute to the greater recovering of nutrients (Crusciol and Soratto, 2010; Salton and Tomazi, 2014; Crusciol et al., 2015).

This study aimed to assess the biomass production and the N, P and K accumulation in plant shoots and roots in a cycle of off-season grain sorghum, when monocropped or intercropped with *Urochloa ruziziensis* (ruzigrass), in an oxisol of the Cerrado region.

METHODS

The evaluations were carried out from fertilization strategy trials that included the off-season sorghum cultivated in monocropping or intercropping with ruzigrass, in succession to soybean, at the Fazenda Decisão, municipality of Unaí, Minas Gerais State. The soil is classified as very clayey Yellow Red Latosol (Oxisol), with high fertility, presenting 41 and 34 g kg^{-1} of organic matter, 38 and 23 mg dm^{-3} of Mehlich P, and 183 and 157 mg dm^{-3} of exchangeable K, in the 0-10 and 10-20 cm layers, respectively.

The selected treatments were three NPK fertilization options (1 - control without NPK, 2 - replacement of nutrients removed at harvest, and 3 - standard management of the farm) in monocropped and intercropped systems, with four replications.

At harvest, the biomass of stem, leaves and grains of sorghum, as well as the shoot of ruzigrass, was determined. Roots were collected in trench profiles, sampling from soil monoliths that were 25 cm wide by 10 cm thick and at a depth of 100 cm, from the sorghum row towards the center of the interrow. Samples of plant materials were analyzed to determine the concentration of nutrients and subsequent calculation of the amounts accumulated in each compartment.

RESULTS AND DISCUSSION

The introduction of ruzigrass reduced sorghum grain yield by 15%, regardless of fertilization level, indicating the need for adjustments in the management of these species to decrease the competitive pressure for resources. However, the intercropping increased the amount of aboveground plant residues by 44%. In addition to incorporating more carbon, the presence of ruzigrass promoted a substantial increase in the system's capacity to acquire and store N, P and K (Figure 1, Table 1), a fact that ensures a greater flow of these nutrients in the cycling process and subsequent availability to soybeans in the following season.

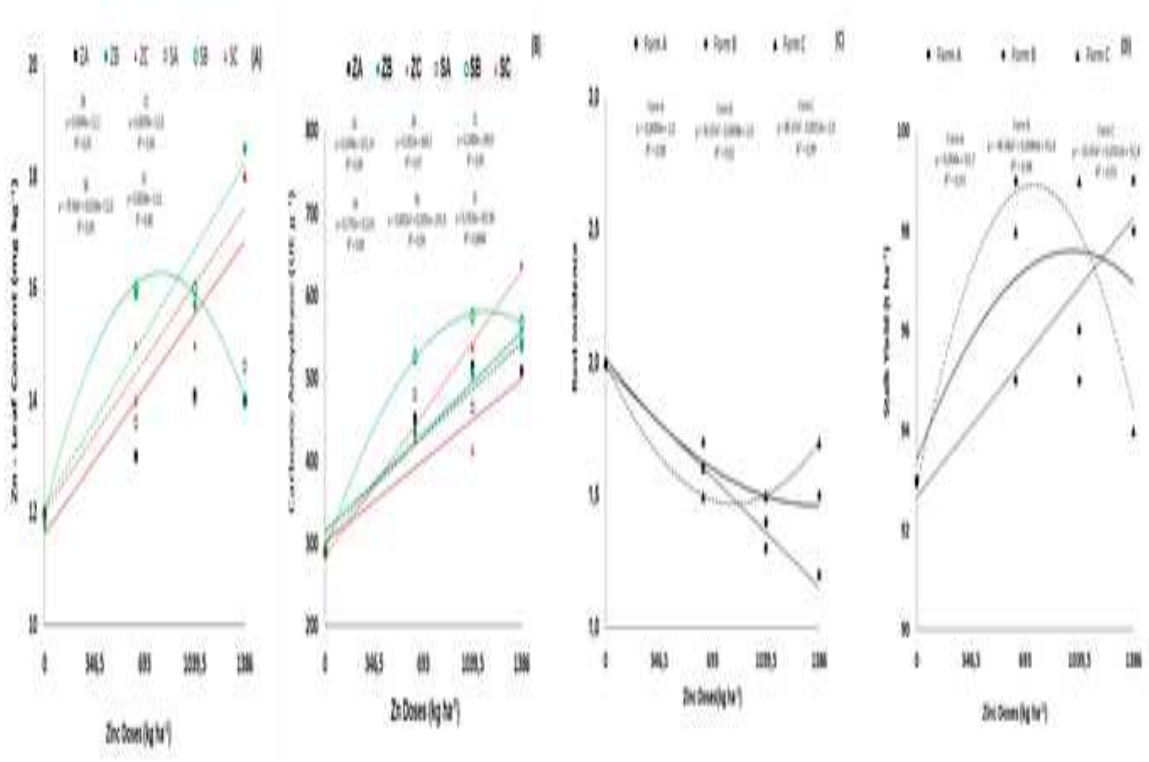

Fig. 1. Biomass production and nutrient accumulation in N, P_2O_5 and K_2O equivalents (kg ha^{-1}) in shoot and root components, in systems of grain sorghum intercropped with ruzigrass and monocropped. Average of three fertilization treatments. 2019.

Table 1. Percent difference (%) of the intercropped versus the monocropped sorghum system in terms of grain yield(1), shoot(2) and root(3) biomass production and nutrient storage in plant residues (shoot + root)(4). Average of three fertilization treatments.

Grain(1)	Shoot(2) (+ grain)	Shoot(2) (- grain)	Root(3)	N(4)	P(4)	K(4)
-15	11	44	198	65	101	54

CONCLUSIONS

The intensification of grain production systems by introducing *Urochloa* modifies the nutrient fluxes in the soil-straw compartment, by increasing plant residues and nutrient accumulation that will serve as a source for subsequent crops, while helping to prevent nutrient losses.

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