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Soil Attributes and Grain Yield of Upland Rice as Affected by Cover Crops

Embrapa
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INTRODUCTION

Better understanding of the use of cover crops in no-tillage systems (NTS) in upland rice crop could contribute to an increase in grain production.

The aim of this study was to determine the effect of pearl millet intercropped with other cover crops on mineral forms of N and urease activity in soil, nitrate reductase activity in the leaves of the follow-up rice crop, as well as the yield components of this rice crop.

MATERIAL AND METHODS

The experiment was performed in the year 2012/2013 at two locations of the Brazilian Cerrado. The experimental design was a complete randomized block with eight replications. The treatments consisted of four types of cover crop [1. Pearl millet (*Pennisetum glaucum*) - control, 2. Pearl millet + *Crotalaria spectabilis*, 3. Pearl millet + *Urochloa ruziziensis*, 4. Pearl millet + *C. spectabilis* + *U. ruziziensis*].

CONCLUSION

Among the cover crops evaluated intercropping with the cover crops pearl millet + *C. spectabilis* provided higher nitrate content in the soil than with pearl millet alone or combined with *U. ruziziensis*.

However, no differences were found for the ammonium content and urease in the soil after intercropping, neither for the nitrate reductase activity in the rice leaves, nor for the yield components of the rice crop in a no-tillage system.

Nevertheless, our results indicate that the evaluated cover crops could be an important option to be considered for upland rice crop when aiming for higher rice grain yield.



Overview of the rice cultivar used

RESULTS AND DISCUSSION

Table 1. Ammonium (N-NH₄⁺) and nitrate (N-NO₃⁻) level and urease activity in soil and nitrate reductase activity in upland rice plants at no-tillage system as affected by the local and cover crops. Goianira and Santo Antônio de Goiás, growing season 2013/2014.

Factors	N-NH ₄ ⁺ mg kg ⁻¹	NNO ₃ ⁻ mg kg ⁻¹	Urease N-NH ₄ ⁺ mg g ⁻¹ 2h ⁻¹	Nitrate reductase ⁺⁺⁺ μmol NaNO ₂ h ⁻¹ g ⁻¹ MF
Cover crops				
Millet (M)	4.33 a ⁺	9.02 b	65.85 a	2.88 a
M + <i>C. spectabilis</i> (C)	3.20 a	11.66 a	72.65 a	2.83 a
M + <i>B. ruziziensis</i> (R)	3.86 a	7.83 b	71.06 a	2.89 a
M+C+R	2.37 a	9.32 ab	75.18 a	2.84 a
Local				
Capivara	4.22 a	5.53 b	71.43 a	2.81 a
Palmital	2.60 b	13.73 a	71.06 a	2.91 a
CV ⁺⁺ (%)	33.24	26.50	30.50	14.91

⁺Means followed by the same letter vertically, do not differ by Tukey test at p <0.05. ⁺⁺Coefficient of variation. ⁺⁺⁺This evaluation was done at 3 days after emergence.

Table 2. Plant height, number of tillers, number of panicles, number of grains, mass of 100 grains and grain yield (Yield) of upland rice plants cultivated under no-tillage system (sowing at November / 2013) as affected by local and cover crops. Goianira (Palmital Farm) and Santo Antônio de Goiás (Capivara Farm), growing season 2013/2014.

Factors	Plant height cm	Tiller number	Panicles n. m ⁻²	Grains number	Mass grams	Yield kg ha ⁻¹
Local						
Capivara	75.0 b ⁺	219.9 b	212.8 b	48.5 b	26.3 a	3085 b
Palmital	86.3 a	281.0 a	275.6 a	86.1 a	21.8 b	4129 a
Cover crops						
Millet (M)	79 a	256 a	246 a	71.5 a	24.27 a	3646 a
M + <i>C. spectabilis</i> (C)	82 a	258 a	244 a	65.0 a	23.76 a	3548 a
M + <i>B. ruziziensis</i> (R)	80 a	236 a	225 a	68.0 a	24.16 a	3625 a
M+C+R	81 a	253 a	261 a	64.5 a	24.09 a	3610 a
CV (%) ⁺⁺	5.98	21.69	20.76	26.11	5.16	6.49

⁺Means followed by the same letter vertically, do not differ by Tukey test at p <0.05. ⁺⁺Coefficient of variation.

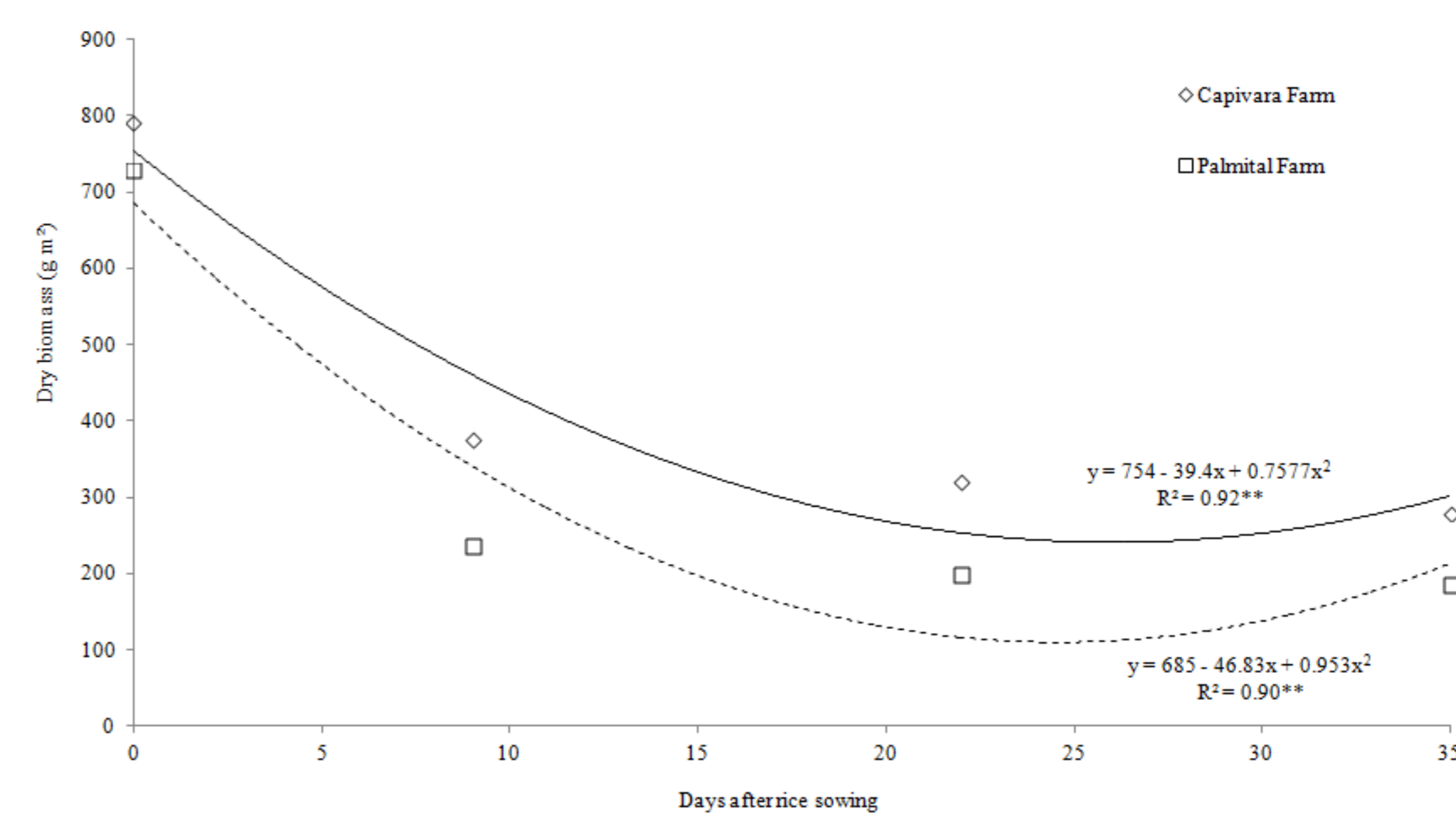


Figure 1. Average of cover crop [millet (*Pennisetum glaucum*); millet + (*Crotalaria spectabilis*); millet + *Brachiaria ruziziensis*; millet + *B. spectabilis*; and millet + *B. ruziziensis* + *C. spectabilis*] degradation in the experimental fields of Palmital Farm (Goianira) and Capivara Farm (Santo Antônio de Goiás).



Pearl millet



Crotalaria spectabilis



Urochloa ruzizensis

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