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PASTURE IN STEEP SLOPING AREAS: PROBLEM OR SOLUTION?

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INTRODUCTION

In Brazil, pastures are the main source of livestock food for in extensive farming. Replacing natural forests for pastures in order to increase livestock areas is being a problem in some parts of the country, since it can, eventual unbalance the environment by changing important physical attributes of soil. Therefore, the objective here was to diagnose the current state of a soil, which is under a remnant of native Atlantic Forest (control), and pastures in different positions related to this forest and the pasture itself. The area is a upper end a middle part of a steep landscape in in the northeaster region of the country.

MATERIAL AND METHODS

The treatments consist of: Natural forest (control) – NF, pasture next to the forest – P1, (both in the upper third of the slope), pasture below the forest – P2, and bellow the pasture itself – P3 (both in the middle third of the slope), in a completely randomized design, with two split plots (high and low elevation within each treatment area), with the soil being sampled in three layers.

The physical attributes evaluated were: aggregate stability (pondered mean diameter – PMD, saturated hydraulic conductivity (Ko), and resistance to penetration (RP).

RESULTS

Elevation within the treatments were significant only for the pondered mean diameter – PMD, in the 0 - 0.10 m layer, which shows that the variation in altitude within the treatment does not affect the other soil attributes. On the other hand, in this same layer, P1 and P3 showed higher PMD values values in their respective elevations.

Even though the PMD value of pasture areas differed from those ones from the control (Table 2), these PMD values showed to be higher than the PMD limit bellow which the soil's susceptibility to erosion is high (2.30 mm).

As for Ko, the average values of the control, related to the other treatments, as observed in Table 2, is mainly due to the maintenance of the soil structure, since there is the preservation of native vegetation.

Comparing penetration resistance, as can be seen in Table 2, the control presents the lowest average values, when compared to the others. These values are above the limit that restricts root growth, which is 2.00 MPa.

Table 2. Stability of aggregates of soil under native forest and pasture in steep-sloping condition.

	PMD (mm)	Ko (mm h^{-1})	RP (MPa)
	0 – 0.10 m		
NF	3.29 a	212.95 a	1.01 c
P1	3.23 a	8.84 b	2.33 b
P2	3.13 b	14.39 b	2.90 a
P3	3.05 b	29.37 b	2.78 a
	0.10 – 0.20 m		
NF	3.28 a	251.52 a	1.58 b
P1	3.18 b	8.31 c	2.32 b
P2	3.11 b	18.14 b	3.73 a
P3	3.15 b	104.05 b	3.60 a
	0.20 – 0.40 m		
NF	3.26 a	171.93 a	1.89 b
P1	3.08 b	10.63 b	2.18 b
P2	3.09 b	30.30 b	4.50 a
P3	3.05 b	145.24 a	3.91 a

Means followed by the same letter do not differ significantly by the Scott-Knott test at 5% probability level.

CONCLUSIONS

- Even in steep-slopping conditions, a fraction of the native forest can replace by pastures without compromising the soil quality, as long a good management of these pastures can be done, in order to maintain the soil structure;
- In adequate management conditions, pastures are also a solution for land using.

Table 1. ANOVA (mean values) for PMD, Ko e RP for 0 - 0.10 m; 0.10 - 0.20 m, and 0.20 - 0.40 m of soil.

CV	DF	0 - 0.10 m			0.10 - 0.20 m			0.20 - 0.40 m		
		PMD	Ko	RP	PMD	Ko	RP	PMD	Ko	RP
Treat	3	0.094**	76971.07**	6.01**	0.044*	101342.95**	8.60**	0.074**	55696.07**	13.17**
Error 1	12	0.009	5588.13	0.18	0.009	1608.55	0.53	0.005	5352.21	1.39
Elevation	1	0.018*	2322.54ns	0.62ns	0.017ns	1656.98ns	0.53ns	<0.001ns	2829.63ns	0.44ns
Treat x Elev.	3	0.007*	1193.29ns	0.50ns	0.002ns	176.21ns	1.04ns	0.014ns	2480.84ns	0.86ns
Error 2	12	0.002	1368.56	0.42	0.005	9671.78	0.45	0.007	1629.94	1.27
Total cor.	31	----	----	----	----	----	----	----	----	----
CV 1 (%)	----	2.92	112.60	18.96	3.01	41.99	25.94	2.33	84.07	37.76
CV 2 (%)	----	1.38	55.72	28.68	2.26	102.97	23.96	2.64	46.39	36.10

ns: non significative; *: significative at 5%; **: significative at 1%; PMD – pondered mean diameter - mm; Ko: saturated conductivity of water -mm h-1 ; RP: resistance to penetration - MPa