

Maize plants managed with different levels of nitrogen fertilization

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Introduction Maize silage productive and qualitative characteristics are influenced by the techniques used at the ensiling process. Improvements in soil quality brings economic benefits to the production, therefore the expression of income potentials of the plant is related to nutrients availability, as the nitrogen (N). The nitrogen fertilization is the one who brings more increments to the dry matter (DM) production. Therefore, most tropical soils are deficient in organic residues (France et al., 2007). The search for the ideal dosage of nitrogen aims to optimum plant performance, mainly in relation to the amount of produced silage mass (SM). This paper was conducted with the aim to evaluate productive parameters and the chemical composition of maize plants to ensiling managed with different levels of nitrogen fertilization.

Materials and Methods The trial was carried out in Palmeira das Missões (27°53'58"S, 53°18'49"W), RS, Brazil. The treatments evaluated consisted of different levels of nitrogen fertilization as urea (N = 45 %): 0, 100, 200 and 300 kg urea/ha, in a complete randomized design, with three replications. Twelve plots were made with 15 m² each one. The urea was divided in two applications, being half applied when the culture presented four leaves and the remaining when it presented eight leaves. When the grains were at half milky half dough kernel stage, five plants and five ears randomly chosen were evaluated in each plot (discarding 50 cm of the borders) and analyzed for: ear diameter and length with straw (DWS and LWS, respectively) and without straw (DWOS and LWOS, respectively), cob diameter (CD) and plant height (PH). At the selected ears there were also evaluated the number of grain rows (GR) and average grains per row (AG). Ears number per plot (ENP) and plants number per plot (PNP) were also evaluated. The plants were manually harvested (discarding 50 cm of the borders) to a 20 cm height, chopped (adjusted for 2 cm mean particle) and weighed. Samples were taken for the determination of DM, CP, NDF, ADF, TDN, metabolizable energy (ME), net energy for lactation (NEL), net energy for gain (NEG), net energy for maintenance (NEM), digestible energy (DE, %DM), according to Silva and Queiroz (2002). The results were submitted to the analysis of variance and means compared by the Tukey test (5% probability). The statistical program Assistat (2011) was used for statistical analyses.

Results and Discussion Dry matter and silage mass productions (kg/ha) were higher in the treatment that received 300 kg urea/ha with no difference (P>0.05) from treatments with 100 and 200 kg urea/ha (Table 1). Similar pattern was observed for the morphological parameters (ear length without straw, plant height and average grains per line per ear) and chemical (crude protein) (Table 2). The gains in production (SM and DM) with the nitrogen fertilization occurred due to the increment in plant height, ear length, and grains production. Grain production also contributed for the higher protein content. In addition, nitrogen fertilization also provides greater protein deposition in grains, because there is a relation with N content in the plant (Brouwer and Flood, 1995).

Conclusion The nitrogen fertilization brings benefits to maize plants in the productive and chemical parameters.

References

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Table 1. Productive and morphologic parameters of maize plants managed with different levels of nitrogen fertilization (urea kg/ha).

	Treatments (urea kg /ha)				CV (%)
	0	100	200	300	
SM (kg/ha)	32.142.86 b	36.507.93 ab	39.285.71 ab	44.444.44 a	12.29
DM (kg/ha)	9.170.89 b	11.563.18 ab	12.571.43 ab	13.146.67 a	11.67
DWS, mm	56.20 a	57.13 a	58.47 a	59.8 a	2.73
LWS, cm	24.13 a	25.97 a	24.98 a	25.79 a	3.33
DWOS, mm	44.73 a	46.13 a	48.80 a	48.17 a	3.56
LWOS, cm	19.06 b	24.27 a	20.49 ab	20.24 ab	7.59
CD, mm	26.13 a	26.60 a	28.33 a	28.40 a	4.47
GR	17.40 a	17.73 a	17.87 a	17.80 a	3.33
AG	32.73 b	37.91 a	36.57 a	35.38 a	2.79
PH, m	2.28 b	2.36 ab	2.5 a	2.41 ab	3.32
ENP	108.67 a	102.00 a	117.00 a	120.00 a	9.58
PNP	89.67 a	81.00 a	85.67 a	90.67 a	5.79

Different letters in the same line differ (P<0.05) by Tukey test.

Table 2. Chemical parameters of maize plants managed with different levels of nitrogen fertilization (urea kg/ha)

Components	Treatments (urea kg /ha)				CV (%)
	0	100	200	300	
DM, %	30.21 a	31.53 a	31.00 a	29.58 a	4.47
CP, %	7.30 c	7.93 b	9.01 a	8.80 a	2.86
NDF, %	64.88 a	65.29 a	63.34 a	62.36 a	4.88
ADF, %	27.73 a	29.58 a	26.69 a	28.76 a	4.30
TDN, %	67.43 a	66.14 a	68.16 a	66.71 a	1.27
ME, Mcal/kg	2.43 a	2.39 a	2.46 a	2.41 a	1.20
NEL, Mcal/kg	1.54 a	1.50 a	1.55 a	1.52 a	1.32
NEM, Mcal/kg	1.67 a	1.63 a	1.69 a	1.65 a	1.42
NEG, Mcal/kg	0.95 a	0.91 a	0.97 a	0.93 a	2.51
DE, %	67.30 a	65.86 a	68.11 a	66.5 a	1.41

Different letters in the same line differ (P<0.05) by Tukey test.