# EFFECT OF NITROGEN AND POTASH FERTILIZATIONS ON DRY MATTER YIELD AND MINERAL COMPOSITION OF PANGOLAGRASS[1]

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**ABSTRACT**

The effect of nitrogen and potash fertilizations on dry matter and protein yields and chemical composition of pangolagrass (D. decumbens Stent.) was studied in a randomized block design with four replications using a 2 x 2 factorial arrangement. Nitrogen and potash were applied after each cut as an equivalent to 3 and 2% of dry matter (65°C) yield, respectively. There were great increases in dry matter and protein yields when nitrogen alone or combined with potash was used. Potash fertilization alone had no effect on the variables described above. Nitrogen fertilization improved forage pangolagrass composition, being particularly effective on crude protein content.

**KEYWORDS**

Dry matter and crude protein yields, mineral composition

**INTRODUCTION**

In a previous study by Werner *et al*. (1974) pangolagrass yield varied from 9 to 23 t/ha year when 100 to 200 kg/ha N was applied.

Pereira *et al*. (1975) observed that in soils with critical K levels (established by Lopes, 1983) molassesgrass yield increased significantly after K fertilization (100 kg KCl/ha).

High extraction of N and K is observed when grass is harvested repeatedly in the same location. In such circumstances N fertilization has not given acceptable response (Mattos and Werner, 1979 and Monteiro *et al*., 1980). Andrade *et al*. (1991) observed an increase of 3.5 fold in dry matter yield of colonialgrass fertilized with both N and K. Such a response was not observed when N and K fertilizations were applied separately.

The aim of this study was to compare the effect of N and K fertilization, either simultaneously or separately, on dry matter and crude protein yields as well as on mineral composition of pangolagrass.

**MATERIALS AND METHODS**

A Red Yellow Podzolic soil with the following composition was used in this study: OM% = 1.7; pH (KCl)= 4.9; P (mg/dm$^3$) = 4; K = 2.1; Ca = 9; Mg = 5; H+Al = 18; S = 16 and T = 34 (all in mmol/dm$^3$ of soil) and V% = 47.

Sixteen 20 x 10 m plots were used with the sampling area of each plot being 2.5 m$^2$. A randomized block design with four replications in a 2 x 2 factorial (2 nutrients x 2 levels) was used. N and K levels were $N_0$ and $K_0$ = no fertilization and $N_1$ and $K_1$ = 3 and 2% as N and K removed in the dry matter (65°C) yield in each cut.

At the beginning of the experiment 100 kg N /ha and 60 kg $K_2O$/ha were applied on treatments with N and K fertilizations, respectively. At the beginning of the second year, 50 kg $P_2O_5$/ha was applied. Cuts for yield evaluation were effected every time forage reached approximately 35 cm. Seven cuts were taken during the experimental period.

**RESULTS AND DISCUSSION**

During the experiment K fertilization was applied to $N_0K_1$ and $N_1K_1$ treatments in the amount of 262 and 747 kg/ha, respectively. Also N fertilization amounted to 982 and 1112 kg/ha for $N_1K_0$ and $N_1K_1$ treatments, respectively.

N fertilization affected both dry matter and crude protein yields (Table 1), But a lower response to N fertilization was observed in the absence of K fertilization compared with treatments receaving N and K.

K fertilization did not affect dry matter yield when in absence of N fertilization. Pereira *et al*. (1975) observed a significant response to K fertilization even in the absence of N fertilization. The high K levels in the soil of the present study (2.1 mmol/dm$^3$) as compared to Pereira *et al*. (1975) study (1.5 mmol/dm$^3$), may explain such differences.

Crude protein concentration was affected only by N fertilization (Table 1). Such results agree with those reported by Andrade et al. (1991) with colonialgrass and by Werner *et al*. (1974) with pangolagrass.

K percentage in the plant was increased ($P < 0.05$) by K fertilization only in the presence of N fertilization. On the other hand, K plant percentage was increased by N fertilization ($P < 0.05$) irrespectively of K fertilization.

K fertilization reduced Mg percentage in the plant. This effect can be explained by the inhibition of K over Mg at the absorption sites. Inversely, N fertilization had a positive effect on Mg percentage in the plant.

P and Ca concentrations in the plant were decreased after N fertilization (Table 2), possibly due to a dilution effect. On the other hand, S content in the plant increased with N fertilization. This may be explained by an increased in amino acids containing S.

**CONCLUSION**

Dry matter and crude protein yields reached their maximum when both N and K were applied simultaneously, while K alone did not affect these variables.

N fertilization increased crude protein, K, Mg, and S levels in the plant and decreased P and Ca concentrations, while K fertilization increased plant K percentage only in the presence of N fertilization.

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**Table 1**
Effects of N and K fertilizations on dry matter and crude protein yields and forage composition (crude protein, K and Mg concentrations).

| Treatments | --Yield (kg/ha)-- | | --Composition (% DM basis)-- | | |
|---|---|---|---|---|---|
| | DM | CP | CP | K | Mg |
| $N_0K_0$ | 15061 [c] | 677 [c] | 4.97 [b] | 2.06 [c] | 0.20 |
| $N_0K_1$ | 13092 [c] | 608 [c] | 4.90 [b] | 2.07 [c] | 0.16 |
| $N_1K_0$ | 32754 [b] | 3046 [b] | 10.02 [a] | 2.43 [b] | 0.29 |
| $N_1K_1$ | 37373 [a] | 3472 [a] | 10.49 [a] | 2.76 [a] | 0.26 |

Means on the same column with different superscripts differ significantly ($P < 0.05$).

**Table 2**
Effect of N fertilization on P, Ca and S content in the forage (mean of K levels).

| Minerals | Without N | With N |
|---|---|---|
| P | 0.23 [a] | 0.19 [b] |
| Ca | 0.62 [a] | 0.56 [b] |
| S | 0.09 [b] | 0.11 [a] |

Means on the same line with different superscripts differ significantly ($P < 0,05$).