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# **EFFECT OF BURNING AND MANAGEMENT ALTERNATIVES ON FORAGE LITTER COMPOSITION OF A NATIVE PASTURE**

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## **Abstract**

The content and quantities of nutrients in forage and litter was evaluated in native pasture under grazing, submitted to burning and alternatives practices. The experimental design was a completely randomized, with three replications. The biennial burning has no effect in nutrients contents of the forage, but in the case of litter plus senescent material the concentration of Ca and Mg decreased as compared to the systems without burning. The sod-seeding treatment increased the nutrient contents in the alive and dead tissues. Nutrient accumulation on forage tissue and litter plus senescent material, was highest in the systems without burning.

**Keywords:** native pasture, improvement, burning, nutrients

## **Introduction**

Burning can change the soil and vegetation chemical composition affecting the forage quality and nutrient cycling. The average of nitrogen (N), phosphorus (P), potassium (K), calcium (Ca) and magnesium (Mg) concentration in the native pasture dry matter (DM) of Rio Grande do Sul (southern Brazil) are 1.88, 0.13, 0.95, 0.30 and 0.20%, respectively (Cavalheiro and Trindade, 1992). According to Sacido and Cauhépé (1998), burning can

increase eventually the nutrient contents in green tissues, through the greater supply of nutrients to the plants. However, these values tend to return to the original levels after a short period. The average nutrient concentration in dead tissue of a native pasture studied by Estivalet (1997), was 1.03% for N; 0.09% for P; 0.57 for K; 0.55% for Ca; and 0.26% for Mg, and only the nitrogen content tended to be reduced in burning areas. Plant growth depends on a continuous soil nutrient supply resulting in productive and persistent pastures (Hodgson, 1990) when good managed.

This work had the objective to evaluate the nutrient content and quantities present in the forage and litter of a native pasture under distinct management.

### **Material and Methods**

This work was developed in the Campos de Cima da Serra region, André da Rocha, RS, county, in southern Brazil, for one year (97/98), on a representative native pasture of this region. The studied native pasture areas were maintained under distinct management procedures as follow: without burning and without mowing for 32 years (SQ); improved for seven years with lime every 3-4 years, annual fertilization, and sod-seeding of cool season species; burned for more than 100 years with a biennial frequency. All areas were grazed. The experimental design was a completely randomized, with three replications. The pasture evaluation was made every 90 days with samples cut at 5 cm stubble height, in grazing exclusion cages. The samples were separated manually into green forage species, excluding senescent material and undesirable species. After this procedure the samples were dried in a air forced oven until constant weight. The litter represented the dead material detached from plant and present on the soil surface after the forage cutting. To this portion it was added the dead material still attached to the plant which also was dried in a air forced oven until constant weight. The tissue nutrient content was determined through the standard methods of

the Plant Tissue and Soil Analysis Laboratory of the Faculdade de Agronomia/UFRGS (Tedesco et al., 1995). The nutrient accumulation in the tissue was estimated multiplying the nutrient content in the forage and mulch plus dead material, respectively, by the forage annual quantities accumulated and by the average quantities of mulch plus dead material present in the pasture. The data were submitted to the analysis of variance, and on the averages was applied the Waller-Duncan test, at 5% level of significance.

### **Results and Discussion**

There was effect of treatments on forage nutrient contents (Table 1), except for N, which presents the same tendency of the other nutrients, it is highest for improved treatment and lowest for without burning and without mowing (SQ) and burning ( $P < 0,05$ ). This result is the consequence of higher supply of nutrients for the plants in the improved areas. Burning treatment did not alter plant tissue nutrient concentration as compared to the other management procedures. The average quantity of mineral nutrient accumulated in the green forage dry matter during the year presented expressive effect of management systems without burning. The forage accumulation of N and K is similar between SQ and improved treatments, resulting, practically, in three times more than the burning system. The accumulation of P, Ca e Mg is higher for sod-seeding, reflecting lime and fertilization of this area. These results demonstrate the potential of nutrient supply to the animals and nutrient recycling of a native pasture without burning.

N, P and K content in the mulch plus dead material were higher for improved (Table 2) and lowest for SQ and burning treatments, while in the case of Ca and Mg are higher for improved, intermediate for SQ, and lowest for burning ( $P < 0,05$ ). The average seasonal nutrient accumulated in the mulch plus dead material were higher for improved and

SQ treatments, as a result of nutrient concentration, and mainly due to the greater amount of mulch on the soil surface as compared to biennial burning.

The burning decrease the concentration of Ca and Mg in litter as compared to systems without burning. The tissue nutrient quantity accumulated was higher in systems without burning.

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**Table 1** - Average contents and accumulation of mineral nutrient in green forage dry matter of a native pasture under distinct management systems, André da Rocha, RS, 1997/98.

| Treatments        | Nutrients              |            |           |         |           |
|-------------------|------------------------|------------|-----------|---------|-----------|
|                   | Nitrogen               | Phosphorus | Potassium | Calcium | Magnesium |
|                   | ----- % -----          |            |           |         |           |
| No burning        | 1,14 a                 | 0,13 b     | 1,32 b    | 0,15 b  | 0,14 b    |
| Sod-seeding       | 1,69 a                 | 0,26 a     | 1,74 a    | 0,36 a  | 0,34 a    |
| Burning 100 years | 1,23 a                 | 0,13 b     | 1,10 b    | 0,16 b  | 0,17 b    |
|                   | ----- kg/year/ha ----- |            |           |         |           |
| No burning        | 112,71 a               | 12,39 b    | 135,16 a  | 13,96 b | 13,90 b   |
| Sod-seeding       | 121,10 a               | 20,16 a    | 128,76 a  | 27,74 a | 25,80 a   |
| Burning 100 years | 41,07 b                | 4,16 c     | 40,30 b   | 5,18 b  | 5,52 b    |

Means followed by distinct letters in the same column differ among them by Waller-Duncan test at 5% level of significance.

**Table 2** - Average seasonal contents and accumulation of nutrients in the mulch plus senescent material in native pasture under distinct management systems, André da Rocha, RS, 1997/98.

| Treatments        | Nutrients         |            |           |         |           |
|-------------------|-------------------|------------|-----------|---------|-----------|
|                   | Nitrogen          | Phosphorus | Potassium | Calcium | Magnesium |
|                   | ----- % -----     |            |           |         |           |
| No burning        | 0,79 b            | 0,07 b     | 0,23 b    | 0,31 b  | 0,19 b    |
| Sod-seeding       | 1,08 a            | 0,12 a     | 0,34 a    | 0,53 a  | 0,35 a    |
| Burning 100 years | 0,75 b            | 0,06 b     | 0,23 b    | 0,18 c  | 0,11 c    |
|                   | ----- kg/ha ----- |            |           |         |           |
| No burning        | 29,80 a           | 2,43 a     | 8,90 a    | 12,97 a | 7,41 a    |
| Sod-seeding       | 18,79 ab          | 2,42 a     | 6,61 a    | 8,95 a  | 6,02 a    |
| Burning 100 years | 6,34 b            | 0,49 b     | 1,90 b    | 1,51 b  | 0,89 b    |

Means followed by distinct letters in the same column differ among them by Waller-Duncan test at 5% level of significance.