

# Effect of associations of additives on pH and NDF in sugar cane silages (*Saccharum officinarum*)

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## Introduction

An alternative to the seasonality of forage production in grazing-lands is the maintenance of feed supplies through the use of silages (Carvalho *et al.* 2007). Sugar cane stands out for silage production, mainly because of its high yield per hectare. There are, however, restrictions to its use in cattle production systems including the daily cutting demands, low digestibility of fiber and low contents of protein and minerals. Sugar cane ensiling can solve, or even reduce the seasonality of the crop and the losses by fire or frost, and has been utilized in cattle raising for these logistic and operational benefits. The fermentative losses of sugar cane silage can, however, make its utilization unviable. The predominance of alcoholic fermentations in those silages requires additives to improve the aerobic stability and reduce dry matter losses. The additives act upon the fermentation of silage, alter the ensiled mass and inhibit the development of undesirable microorganisms in the fermentation (Santos 2007). In spite of the great volume of studies in recent years on the use of additives in sugar cane ensiling, whether it be bacterial, chemical or organic, there is still significant discrepancy between the results.

The aim of this work was to evaluate the effect of different associations of additives on pH and on the neutral detergent fiber contents in sugar cane silages.

## Material and Methods

The experiment was conducted in the Instituto Federal de Minas Gerais in Bambuí-MG. The cane used for ensilage was variety SP 1049. The cane was cut 8cm above the ground in September of 2010, twelve months after planting, followed by defoliation and grinding. Leaves of both *Arachis pintoii* (forage peanut) and the forage tree legume *Leucaena leucocephala* were ground in a conventional forage chopper with average particle size between 2 to 3 cm, packed in plastic bags and utilized in the ensiling process in artificial silos with the cane. The analyses of pH and NDF were performed in the Animal Nutrition Laboratory of the Department of Agrarian Sciences (DCA/IFMG/BAMBUÍ). A completely randomized design was used with five treatments and four replicates. The treatments were sugar cane ensiled with: (1) the biological additive *Lactobacillus plantarum* 2.5 x 10<sup>10</sup> UFC/g; (2) biological additive *L. plantarum* associated with 1% CaO; (3) biological additive

*L. plantarum* associated with 1% urea; (4) biological additive *L. plantarum* associated with 15% of *L. leucocephala*; and (5) biological additive *L. plantarum* associated with 15% of *A. pintoii* cultivar Belmonte. Variance analysis was performed using the statistical package SAS (1996) and the means compared by the Tukey test ( $P < 0.05$ ).

## Results and Discussion

The associations of additives in sugar cane silages resulted in significant differences in pH between the treatments. The cane silage treated with *L. plantarum* associated with 15% *A. pintoii* showed pH similar to the control silage, with the same pH values among the tested treatments. The cane ensiled with *L. plantarum* associated with Leucaena, or with urea or CaO were similar and less acidic than the other silage treatments. According to Amaral *et al.* (2009), by treating sugar cane silage with 1% CaO, they found increases of up to 5 units of pH lower than those found in this work. Santos *et al.* (2008) reported pH values between 8.7 and 4.7 with 1% CaO or 1% limestone, respectively, similar to that of the present work, these results can be related to an increase in lactic acid production. According to Cherney and Cherney (2003), pH is an indicator of the quality of silages with a low content of DM. The increases of pH verified in that experiment do not seem to indicate deterioration and reduction in the aerobic stability of the silages.

There were significant differences in NDF contents between the silage treatments. Ensiled cane associated with 1% CaO and biological additive, had the lowest NDF compared with all other treatments. The mean NDF contents of the silage in the other treatments were statistically similar. According to Balieiro Neto *et al.* (2007), the addition of CaO in sugar cane ensiling partially solubilizes hemicellulose and the addition of 2% CaO increases *in vitro* digestibility. Cavali *et al.* (2006), testing doses of CaO in sugar cane silages, found reduction in NDF and hemicellulose and increase in digestibility. The results of the NDF contents in that experiment corroborate the findings of these authors. The association of biological additive with 1% CaO may have broken down the cell wall of the forage plant, thus improving the quality of the forage plant. As pointed out Van Soest (1994), some links which occur in the formation of the cell wall are susceptible to alkalinizing agents.

**Table 1. Effect of biological additives, associated with chemical and organic additives, on pH and and Neutral Detergent Fibre contents (NDF) of sugar cane silages (*Saccharum officinarum*).**

Additives	Means	Means
Associated – cane silage	pH	NDF (%)
(i) Biologic (control)	3.60 a	65.07 b
(ii) Biologic + CaO	4.00 bc	45.58 a
(iii) Biologic + Urea	3.93 bc	b
(iv) Biologic + Leucaena	3.80 b	58.41 b
(v) Biologic + Forage peanuts	3.43 a	57.22 b

Means followed by the same letter in the column do not differ from each other by the Tukey test ( $P < 0.05$ )

## Conclusions

The ensiling of sugar cane with the biological additive *L. plantarum* associated with 1% CaO provided both the highest pH among the associations of tested additives and the greatest reduction of NDF.

## References

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