CHITOSAN IMPROVES THE MICROBIOLOGICAL QUALITY OF SUGARCANE SILAGE

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The antimicrobial activity of chitosan is well known against bacteria and fungi. The purpose of the current study was to evaluate the effects of inoculants on microbiological quality of sugarcane silage. A randomized experimental design was used, and contained 4 treatments distributed into 40 mini-silos. Treatments were randomly distributed to the mini-silos, in which: 1) Control (CON); 2) *Lactobacillus buchneri* (Lb), addition of Lb at 2.6×10^{10} cfu g^{-1}; 3) *Lactobacillus buchneri and Bacillus subtilis* (Lb + Bs), addition of Lb at 2.6×10^{10} cfu g^{-1} and Bs at 1×10^{9} cfu g^{-1}; and 4) Chitosan (CHI), addition of 1% of CHI on wet basis of sugarcane ensiled. Samples (0.2 kg) were collected on day 60 after the ensiling from five different sites of all mini-silos and homogenized to form a composite sample. Then, subsamples of 10 g of each treatment were diluted in 90 mL of sterilized sodium chloride solution (0.9%) and a serial dilution was performed from 10^{-1} until 10^{-6} in test tubes. The microorganism counting was performed in triplicate from each dilution using culture medium of MRS agar (De Man, Rogosa and Sharpe) to lactic-acid bacteria, nutrient agar to aerobic and anaerobic bacteria (48 h of incubation at 37ºC) and agar PDA (potato dextrose agar, 120h of incubation at 26ºC) for mold and yeast. . The data were analyzed by the PROC MIXED, to SAS (9.1.3. version). Microbiological data were log transformed. Differences among treatments were determined using orthogonal contrasts: C1 = control *versus* Lb and Lb + Bs, C2 = control *versus* chitosan and C3 = chitosan *versus* Lb + Bs. The three inoculants increased ($P \leq 0.002$) the number of lactic-acid and anaerobic bacteria and decreased ($P \leq 0.009$) aerobic bacteria and fungi in relation to CON. Likewise, CHI incorporation increased ($P \leq 0.003$) lactic-acid and anaerobic bacteria, and decreased ($P = 0.031$) aerobic bacteria and fungi compared to CON. Furthermore, CHI incorporation showed higher ($P = 0.001$) number of lactic-acid bacteria than Lb and Lb + Bs. Both CHI and microbial inoculants improved the microbiological quality of sugarcane silage, but CHI showed higher concentrations of lactic acid bacteria than silages treated with microbial inoculants. Chitosan may be an alternative to microbial inoculants used in sugarcane ensiling.

Keywords: *Bacillus*, chitin, inoculant.

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