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The effect of nitrogen rate and isolated lactic acid bacteria on aerobic stability of sorghum-sudangrass hybrids

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Introduction

Sorghum-sudangrass hybrids (*Sorghum vulgare* × *Sorghum sudanense*) has great potential to be widely used for silage making because of its fast growth, high yield, high nutrition value and palatability (Han, *et al*., 2013). However, it is difficult to ensure good quality from the activity of aerobic microbe after silage opening. Therefore, LAB additive was developed which improved aerobic stability of Sorghum-sudangrass hybrids significantly. Microbial silage inoculants containing heterofermentative lactic acid bacteria have long been used to improve silage aerobic stability (Muck, *et al*., 2004). The aim of this study was to examine the effect of nitrogen rate and isolated lactic acid bacteria on aerobic stability of sorghum-sudangrass hybrids silage.

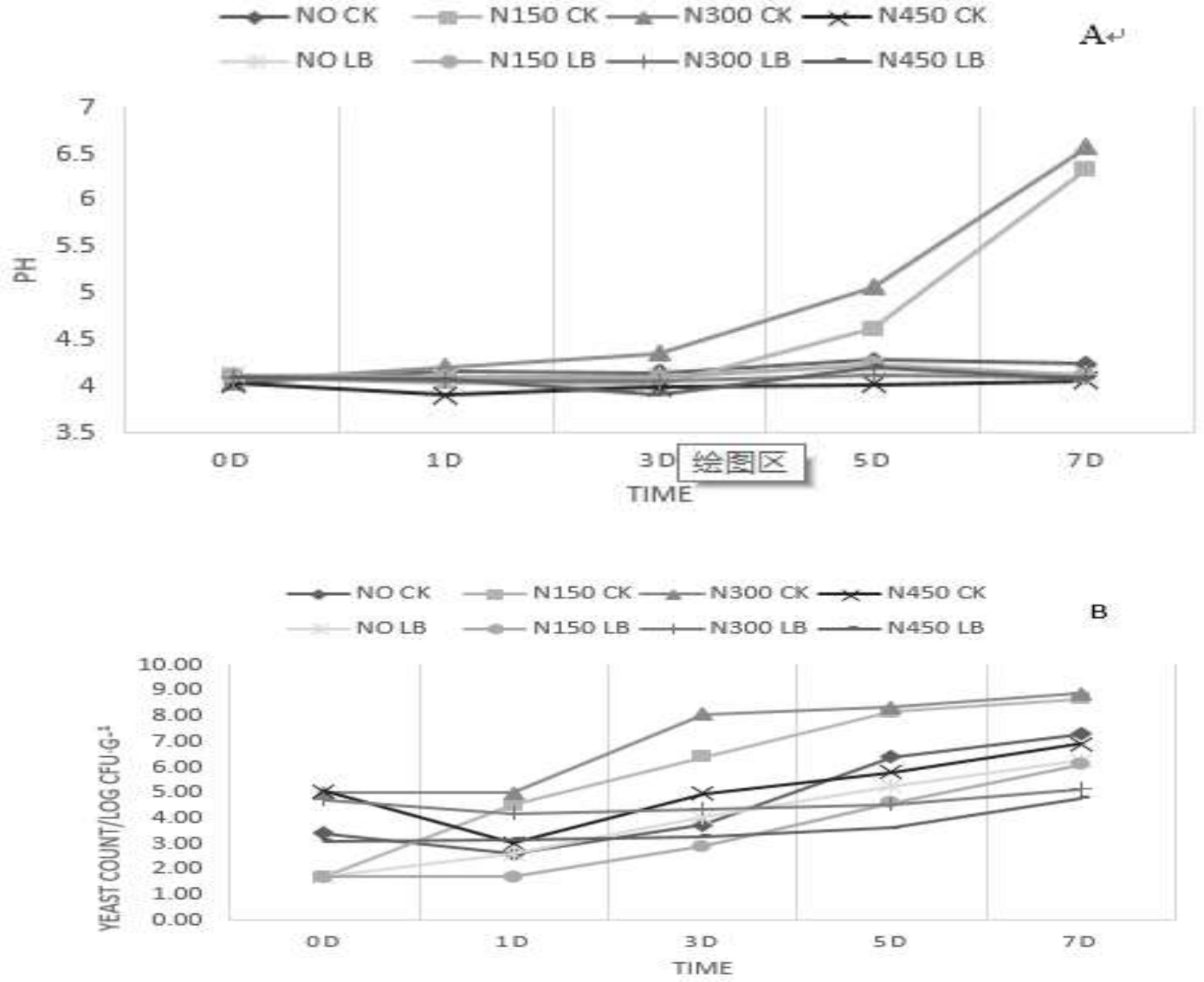
Materials and Methods

Nitrogen rate (0, 150, 300 and 450 kg N ha^{-1}) was applied on sorghum-sudangrass hybrids on 3rd July 2014, and the first cutting forage was harvested at Zhuozhou, Hebei province, China 30 days later. After harvesting, the fresh forage was chopped and wilted to DM content, 30%. Lactic acid bacteria (LAB) was identified and added as inoculants in this experiment. LAB was isolated from pickle and identified as *Lactobacillus brevis* (LB), then added to silage (10^6 CFU g^{-1} fresh forage). The control was sprayed with the same volume of distilled water. All silages were ensiled for 110 days at room temperature. After silos opening, silage from each treatment replicate was transferred to an open-top container in the lab of forage processing at Beijing. Silage boxes were covered with plastic film with holes to avoid dehydration and stored at 20^{o}C for 168 h. Silage temperature was monitored, lactic acid bacteria, yeast, moulds were counted and pH value was determined at 0, 1, 3, 5, 7 day.

Results and Discussion

The effect of nitrogen rate and isolated LAB treatments on aerobic stability of sorghum-sudangrass hybrids silage is shown in Figure 1. The pH of silage treated with N150 and N300 and added with distilled water increased as time went on, and the other treatments keep stable at about 4.10. All count of LAB tended to weak up in the experiments of stability. The yeast counts of silage treated with N150 and N300 and added with distilled water increased to 8.67, 8.89 respectively, and the other treatments have the same trend as LAB count. The moulds count was stable at 1.7 log cfu·g^{-1} in all treatments in the experiment of 7 days. Among the experiments period, only the temperature of treatments with N150 and N300 and added with distilled water rose comparing the room temperature obviously. And the temperature above environment condition of first treatment above reached to 2.0℃ after 117h of silage opening. All data of Figure 1 shows the sorghum-sudangrass hybrids silage treated with LB has better aerobic stability and the application of nitrogen rate has not specific effect on aerobic stability.

Fig. 1: The effect of nitrogen rate and isolated LAB treatments on aerobic stability of sorghum-sudangrass hybrids silage



A. pH value dynamic after silage opening
B. Yeast count dynamic after silage opening

Conclusion

This study shows *Lactobacillus brevis* played a positive role in aerobic stability of sorghum-sudangrass hybrids which inhibited the fertility of yeast. And the application of nitrogen rate has not specific effect on aerobic stability.

References

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