EFFECT OF COMBINATIONS OF LACTIC ACID BACTERIA ON THE FERMENTATION OF SUGARCANE SILAGE

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Introduction

In tropical regions, sugarcane (*Saccharum officinarum* L.) is an important roughage source. However, despite its favorable characteristics for lactic fermentation, sugarcane silage preserved by natural fermentation suffers significant DM loss (≥ 20% DM), due to the conversion of soluble sugars into ethanol and CO_2 by yeast metabolism. Hence, the objective of this study was to examinate the effect of a silage inoculant based on heterofermentative lactic acid bacteria on the mitigation of nutrient loss during sugarcane silage fermentation.

Materials and methods

- Sugarcane was harvested after 14 months of regrowth at approximately 18° brix (DM = 30.3% FM).
- The treatments were: 1) control (without inoculant; **CON**); 2) SiloSolve® AS containing *Lentilactobacillus buchneri* DSM22501 (7.5 × 10^4 CFU g FM^{-1}), *Enterococcus lactis* DSM22502 (4.5 × 10^4 CFU g FM^{-1}) and *Lactiplantibacillus plantarum* DSM16568 (3.0 × 10^4 CFU g FM^{-1}) (**AS**); 3) SiloSolve® FC containing *Lactococcus lactis* DSM11037 (7.5 × 10^4 CFU g FM^{-1}) and *Lentilactobacillus buchneri* DSM22501 (7.5 × 10^4 CFU g FM^{-1}) (**FC**).
- Storage periods: 14 and 63 days.
- 5 replicates per treatment.

- Silages were analyzed for microbial counts, pH, and fermentation end-products using standard methods.

Results and discussion

Table 1. Fermentation profile and dry matter loss of sugarcane silage stored for 14 or 63 d

		Treatment[1]				*P*-value[3]		
Item	Storage, d	CON	AS	FC	SEM[2]	T	S	T × S
DM[4], %FM	14	28.0^{c}	29.1^{b}	30.2^{a}	0.18	<0.01	<0.01	<0.01
	63	26.5^{d}	29.3^{b}	30.2^{a}				
Lactic acid bacteria, log CFU g FM^{-1}	14	6.81^{c}	8.62^{a}	7.88^{b}	0.068	<0.01	<0.01	<0.01
	63	5.93^{d}	5.64^{d}	4.75^{e}				
Yeast, log CFU g FM^{-1}	14	3.73^{ab}	3.59^{b}	3.55^{b}	0.180	0.16	<0.01	0.47
	63	4.45^{a}	4.38^{a}	3.93^{ab}				
pH	14	3.22^{d}	3.13^{e}	3.15^{e}	0.005	<0.01	<0.01	<0.01
	63	3.45^{a}	3.28^{c}	3.31^{b}				
Lactic acid, %DM	14	4.92^{cd}	6.72^{ab}	4.22^{d}	0.260	<0.01	<0.01	0.08
	63	5.86^{abc}	6.94^{a}	5.66^{bc}				
Acetic acid, %DM	14	1.47^{d}	2.91^{c}	4.14^{a}	0.079	<0.01	<0.01	0.08
	63	1.77^{d}	3.49^{b}	4.36^{a}				
Ethanol, %DM	14	9.24^{b}	4.49^{c}	1.09^{e}	0.145	<0.01	<0.01	<0.01
	63	12.2^{a}	5.07^{c}	2.12^{d}				
1,2-Propanediol, mg kg DM^{-1}	14	367^{c}	273^{c}	1786^{a}	79.2	<0.01	<0.01	<0.01
	63	289^{c}	924^{b}	1921^{a}				
DM loss, %DM	14	9.89^{b}	5.19^{cd}	2.12^{e}	0.633	<0.01	<0.01	<0.01
	63	15.9^{a}	5.53^{c}	2.60^{de}				

[1]CON: control (without inoculant), AS: SiloSolve AS; FC: SiloSolve AS. [2]Standard error of the mean. [3]T: effect of inoculant, S: effect of storage period, T×S: interaction between inoculant and storage period. [4]Dry matter corrected for losses of volatile compounds during oven drying.
[a,b,c,d] Tukey test (α = 0.05).

Conclusion

Either SiloSolve® AS or SiloSolve® FC were effective in inhibiting yeast metabolism and mitigating dry matter loss during sugarcane silage fermentation. SiloSolve® FC was more effective than SiloSolve® AS.