SILAGE FERMENTATION AND AEROBIC STABILITY OF WHOLE CROP CORN ENSILED IN LABORATORY OR BUNKER SILOS AS AFFECTED BY LAB INOCULUM

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INTRODUCTION

The effect of lactic acid bacteria (LAB) inocula on the fermentation pattern and aerobic stability of silages was usually evaluated in laboratory silos of different sizes from few milliliters to several liters under controlled conditions. These standardized conditions could bias the results by misrepresenting the effects obtained on farm, where larger amount of silage are stored outdoors under variable environmental conditions.

OBJECTIVE: to assess the effect of LAB inoculum on the fermentation profile, microbial characteristics, and aerobic stability of whole corn crop ensiled in bunker silos or in laboratory silos

MATERIAL AND METHODS

- Ensiling: whole crop corn (36% DM) was ensiled either in 20-L plastic laboratory silos and in farm bunker silos
- Treatments: untreated (NT), or LAB treated (T) with Magniva Platinum 1 (combination of *Lentilactobacillus hilgardii* and *L. buchneri*, Lallemand SAS, France)
- Conservation: laboratory silos conserved at ambient temperature for 120 d. At laboratory silos opening, treated and untreated silages were collected from the bunker silo face in the core zone
- Analyses: DM content, pH, fermentative profile by HPLC, microbial count of yeasts and molds, and aerobic stability (increase of 2°C above ambient temperature), fresh and DM densities and weight losses
- Statistics: unpaired t-test

RESULTS AND DISCUSSION

1. Acetic acid higher in T than NT silages both in bunker and laboratory silos
2. Yeast count lower in T silages
3. 1,2-propanediol only detected in T silages
4. Increase in aerobic stability due to the treatment of +117 and +76 h in laboratory silos and bunker, respectively.
5. Relationship between acetic acid content and aerobic stability:
   - laboratory silos: y = 15.8x - 60.9, R^2 = 0.95
   - bunker silos: y = 16.2x + 103, R^2 = 0.52

Figure 1. Relationship between acetic acid content and aerobic stability in bunker and laboratory silos

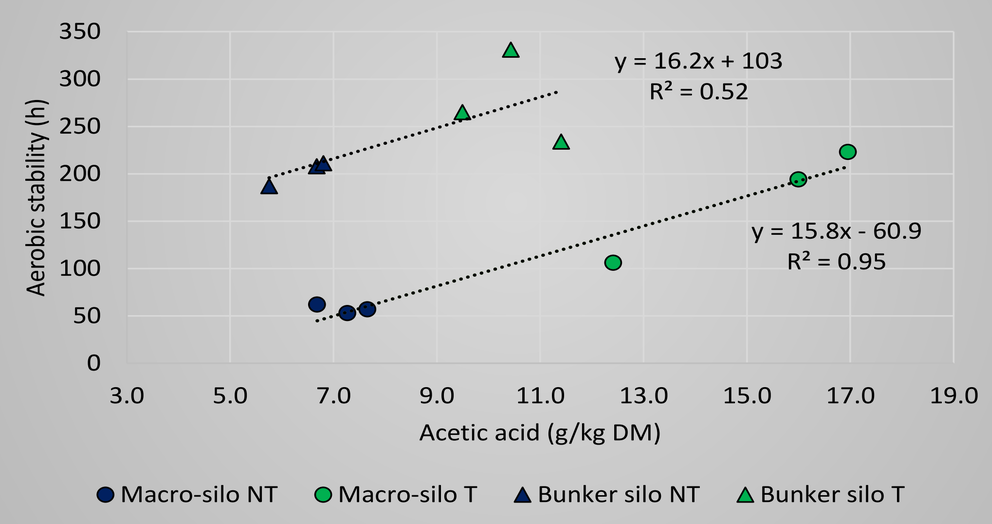

Table 1. Fermentative and microbial characteristics of treated and untreated silages

	Laboratory silo			Bunker silo		
	T	NT	*P*-value	T	NT	*P*-value
pH	3.77	3.65	0.005	3.43	3.41	0.385
Lactic acid (g/kg DM)	34.1	44.0	0.017	56.7	58.4	0.684
Acetic acid (g/kg DM)	15.1	7.2	0.005	10.4	6.4	0.003
1,2-propanediol (g/kg DM)	7.7	<0.1	-	3.7	<0.1	-
Ethanol (g/kg DM)	12.6	16.7	0.147	11.1	10.5	0.704
Yeast (log cfu/g)	2.76	4.87	0.003	<1.00	<1.00	-
Mold (log cfu/g)	<1.00	1.16	-	<1.00	<1.00	-
LAB (log cfu/g)	9.29	7.71	0.005	4.78	3.00	<0.001
Acetic acid bacteria (log cfu/g)	1.93	5.10	<0.001	1.50	2.57	0.013
Aerobic stability (h)	174	57	0.049	277	201	0.029
DM losses (%)	3.05	2.39	0.136	-	-	-

CONCLUSION

- **LAB inoculum** allowed to **improve the aerobic stability** both in laboratory silos and bunker silos, but the **magnitude of results obtained was different**
- **Some unrevealed factors**, other than acetic acid content, **can contribute to the aerobic stability of bunker silages**