

Effect of combination homofermentative and heterofermentative inoculants on corn silage fermentation

Shelby Serrano, Zuri Hobson-Gladney, Mukti Bhandari, and Dr. Tanya Gressley

Objective

Quantify changes in the fermentation profile and microbial environment of corn silage samples inoculated with a combination of heterofermentative and homofermentative inoculant.

Material and Methods

- Corn silage harvested from the University of Delaware farm and initially portioned into 10 piles for the two main treatments
 - Control: 5 piles treated with water
 - Eurosil: 5 piles treated with inoculant containing *Lentilactobacillus buchneri*, *Lactobacillus plantarum*, and *Pediococcus pentosaceus* applied at 200,000 cfu/g
- Corn silage was portioned into 6 additional piles for positive controls
 - Eurosil3X: 3 piles treated with Eurosil inoculation applied at 600,000 cfu/g
 - Safesil: 3 piles treated with Safesil chemical inoculant mixed per packaging instructions
- Corn silage samples were packed into 7.5 L buckets and ensiled for the following days:
 - Eurosil and Control: Days 1, 2, 7, 21, 56, and 112
 - Eurosil3X and Safesil: Days 56 and 112
- Silage was analyzed for pH, dry matter (DM), concentrations of LAB, enterobacteria, yeasts, and molds, ammonia, water soluble carbohydrates (WSC), fermentation acids.

Results

- Control and Eurosil, all days:
 - Aerobic stability, acetic acid, and methanol concentration (Figure 1) were all affected by ensiling time and inoculant type ($P < 0.05$)
 - D56 and D112 with positive controls
 - Aerobic stability (Figure 2) was also affected by inoculant ($P < 0.001$)
 - Ammonia concentration, lactic acid/acetic acid ratio, and methanol concentration were affected by ensiling time and inoculant type ($P < 0.05$), with ammonia and methanol being lowest in Safesil samples, and lactic acid/acetic acid lowest in Eurosil3X.

Figure 1

Aerobic stability in hours for Control and Eurosil, also comparing acetic acid, and methanol concentrations within samples ensiled for 1, 2, 7, 21, 56, and 112 days.

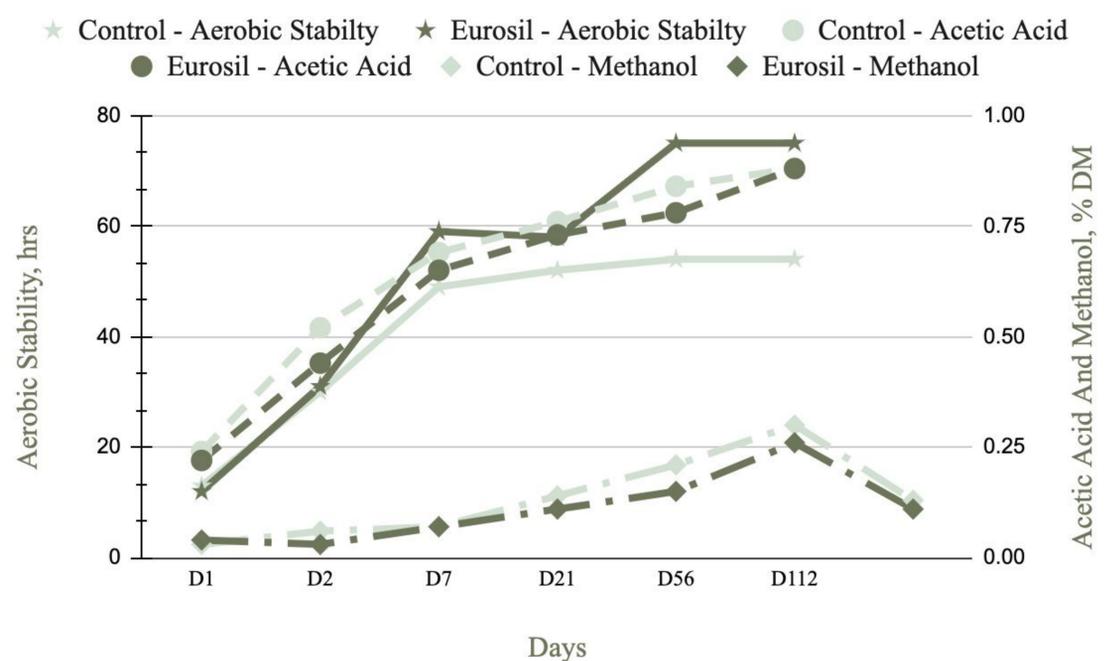
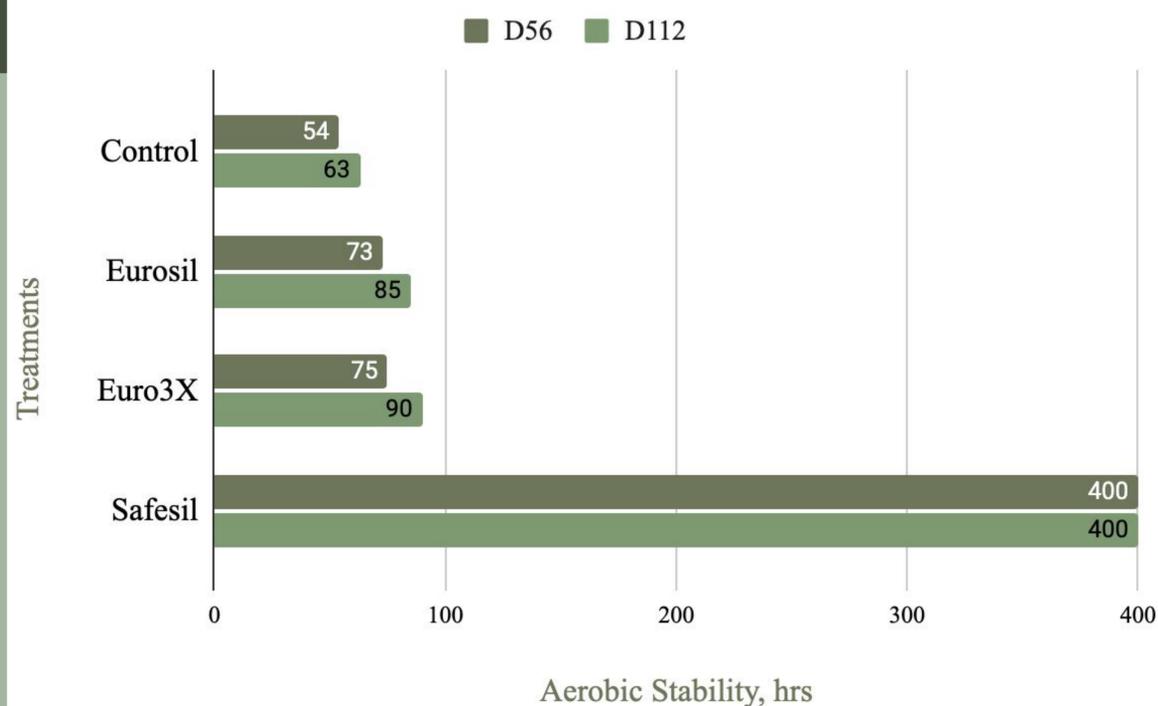


Figure 2

Aerobic stability in hours for Control, Eurosil, Eurosil3x, and Safesil treatments after ensiling for 56 or 112 days.



Conclusion and Future Directions

- The inclusion of both heterofermentative and homofermentative lactic acid bacteria improved ensiling by increasing acetic acid concentrations, and also increasing aerobic stability compared to the control. Future directions include analysis of microbial DNA to perform population analysis and ensure inoculated organisms are responsible for improvement in ensiling.