Lactic acid bacteria inoculation mitigates gas production potential losses during aerobic exposure of catch-up crop.

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Anaerobic digestion of energy crops, residues, and wastes is of increasing interest to reduce the greenhouse gas emissions and to facilitate a sustainable development of energy supply. Production of biogas provides methane that can be used for replacement of fossil fuels. Gas yield per hectare and kilogram dry matter must be maximized and losses minimized. In this experiment a catch-up crop (Metha 20, LIDEA seeds) consisting of a mixture of 58% sorghum (*Sorghum bicolor x Sorghum sudanense*), 28% sunflower (*Helianthus annus*), and 14% niger (*Guizotia abyssinica*), was used. Crop was harvested October 6th, 2022 after 3 months of growth, copped, and inoculated with a mix of homo and heterofermentative lactic acid bacteria (LAB, 150 000 cfu/g) and enzymes or untreated as control. Samples were ensiled in 13 L-silos for four months with five replications each. Directly after opening an aerobic stability test was carried out for eight days. At opening and at the end of the aerobic test, a biomethane potential (BMP) test was performed and fermentation products were analysed by wet chemistry. The aerobic stability of non-inoculated silages was shorter compared to inoculated silage (63 *vs* 138 hours below +2°C room temperature, respectively, P=0.03). Most fermentation parameters were improved by inoculation as reflected by a lower pH at both openings and after the aerobic stability test for inoculated silage compared to control (3.9 *vs* 4.2 and 3.9 *vs* 6.7 respectively, P<0.01) and stayed stable during aerobic exposure while control had significant losses. Dry matter losses were significantly higher for control after fermentation and aerobic exposure (2.1 *vs* 1.1 tons/ha DM respectively, P=0.016). Biogas production was similar for control and treatment after opening (310 mL CH4/g DM, P= 0.273) but difference was significant after aerobic exposure as control lost potential for gas production (287 vs 331 mL CH4/g DM respectively, P<0.01). An adapted inoculant reduces the losses and conserve the energetic potential of the forage.