

Mugwort Residues Reused as a Possible Modifier to Enhance Anaerobic Fermentation of High Moisture Alfalfa

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Introduction: Alfalfa are the most widely cultivated forage in the world. However, sometimes their high moisture content would easily breed detrimental bacteria and decrease the silage quality. Therefore, additives were applied in preparing alfalfa silage. Mugwort (*Artemisia argyi* L.) is herbaceous perennial plant, and is generally used as traditional Chinese medicine because of possessing various bio-active ingredients. This study aimed to investigate the effect of mugwort residues and LAB alone or in combination as additives on anaerobic fermentation quality of high moisture alfalfa, and to provide reference of using waste energy to the efficient alfalfa production.

Material and Methods: Alfalfa were harvested in early bloom stage on August, 2020. The ensiling materials were treated without additives (CK), with *Lactobacillus plantarum* at 1.0×10^6 cfu/g FM (LP), with 4% mugwort residues (M4) or mixed with LP at 1.0×10^6 cfu/g FM and 4% mugwort residues (LP+M4). The bags were vacuum-sealed and kept at room temperature (n=3). Fermentation quality was analyzed at the day 30.

Results: The fermentation quality of silage included pH, lactic acid (LA), acetic acid (AA), lactic acid/acetic acid (LA/AA), butyric acid (BA) and ammonia-N contents were affected by additives ($P < 0.01$). Compared with CK and LP-treated silage, mugwort residues addition significantly increased lactic acid (LA) content ($P < 0.05$), while the combination of LP and mugwort residues were further promoted the pH decline and LA accumulation ($P < 0.05$). The LA/AA in all treatments were below 1, indicating their abnormal fermentation. Nevertheless, in M and LP+M silages, the addition of mugwort residues reduced the AA contents ($P < 0.05$) and increased the LA/AA ($P < 0.05$). The ammonia-N contents in all silages were below 100 g/kg TN, and LP+M addition significantly decreased the ammonia-N and BA contents compared with others ($P < 0.05$).

Conclusions: The fermentation parameters of alfalfa silage with high moisture were improved by using mugwort residues, as evidenced by enhanced LA content and LA/AA. Further more, the combination of LP and mugwort residues addition ulteriorly modulated anaerobic fermentation by reducing pH, BA and ammonia-N contents. Our study provided new insight into the sustainable improvement of alfalfa silage.

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