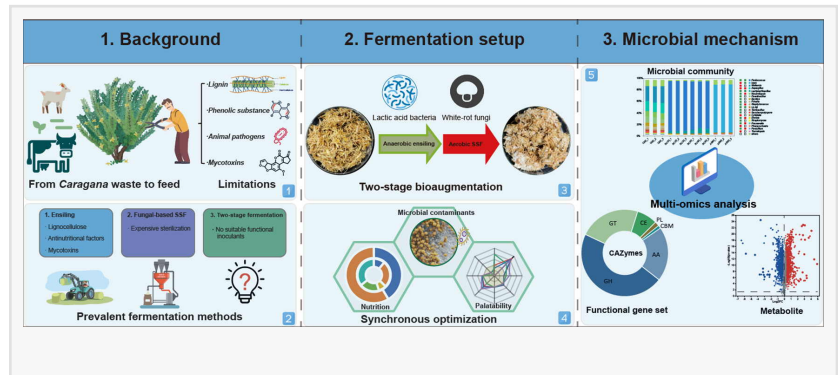


Valorization of the Caragana Waste via Two-Stage Bioaugmentation

NANJING, CHINA, September 24, 2024 /EINPresswire.com/ -- Caragana korshinskii kom. (CKK) waste, a common forestry byproduct in northwest of China, presents challenges in its transformation into alternative ruminant feed due to its initial nutritional limitations and unappealing palatability.



Conventional strategies, such as ensiling and fungal-based solid-state fermentation (SSF) cannot effectively address this issue in practice. Herein, a two-stage bioaugmentation (TBA) process was devised, leveraging the benefits of ensiling and SSF. During the anaerobic ensiling phase, CKK waste was inoculated with *Lactiplantibacillus plantarum* LP1, effectively suppressing potential animal pathogens such as *Aspergillus* and *Nocardiopsis* while enriching the material with potential probiotics like *Pediococcus* and *Lactiplantibacillus*, reaching an abundance of 95.7%. In the subsequent aerobic SSF stage, the ensiled CKK underwent inoculation with the white-rot fungus *Irpex lacteus* F17, which became enriched to 87.9%.

Comprehensive multi-omics analysis identified *Irpex* as the key taxon, possessing an extensive redox enzyme system that led to the improvement in nutrient composition, reduction of astringent phenolic substances, and mitigation of mycotoxins. As a result, the crude protein content of the CKK increased by 39.2%, while lignin, total phenolic substances, and tannic acid content decreased by 24.4%, 52.2%, and 51.4%, respectively. The mycotoxin levels, including aflatoxin B1, zearalenone, and vomitoxin, were rendered negligible, confirming the safety.

Overall, this study demonstrates the TBA strategy can successfully transform challenging and unpalatable CKK waste into a nutrient-enriched and safe mycelium-based bioproduct, thereby enabling the valorization of a previously underutilized forestry resource as a promising alternative feed.

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