**Valorizing agricultural waste: Utilizing corn plant leftover to grow yeast biomass, as a potential source of sustainable protein**

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**Abstract**

Rising concerns about sustainability, food security, human health, and animal welfare, drive the shift to sustainable protein alternatives. We studied upcycling post-harvest leftover corn leaves and stalks to grow yeast. Yeast biomass is a great source of proteins and other nutrients, useful for developing protein-rich alternatives for animal-based products. After harvest, we shredded the plant, dried it, then chemically and enzymatically hydrolyzed cellulose and hemicellulose, and obtained ~3.5% sugar in the substrate. Next, we used the substrate to grow biomass of a GRAS yeast strain, Yarrowia lipolytica, capable of utilizing also pentoses from hemicellulose, and obtained ~1 gram of yeast biomass using 15~ grams )dry mass( of corn waste. The yeast was separated from the substrate, freeze dried and analyzed for composition. The combination of acid-then-enzymatic pretreatment to the shredded corn plant biomass resulted in the highest yeast protein yield per dry corn plant biomass (28 g/kg), compared to hot water (1.8 g/kg), acid (9.7 g/kg), or enzymes (8.6 g/kg) pretreatments. While further optimization would be required to facilitate practical application, the process shows promise of converting agricultural waste into an alternative source for novel food proteins. In the future, when available land and water resources become scarce and expensive, animal agriculture inevitably diminished, and resource utilization and waste valorization become imperative, the process presented here is likely to become economically and environmentally rewarding.

**Reference**

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