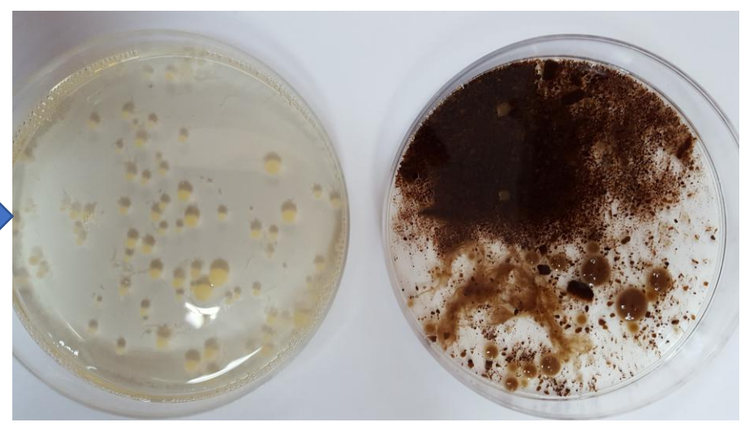
P4.22.

Submerged fermentation with *Trametes versicolor* using spent carob pulp for enhanced laccase production

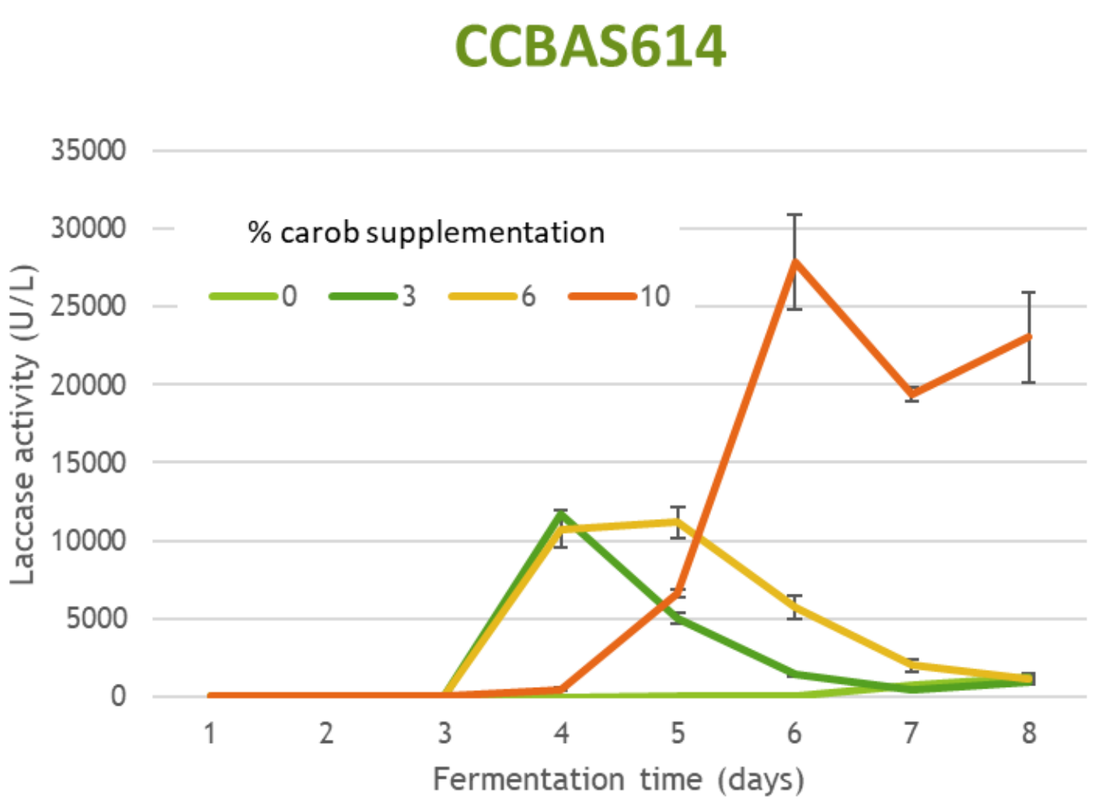
BARÇIN KARAKAŞ-BUDAK, EROLL BYTYQI
Akdeniz University Faculty of Engineering, Department of Food Engineering, Antalya, Türkiye
E-mail: barcink@akdeniz.edu.tr

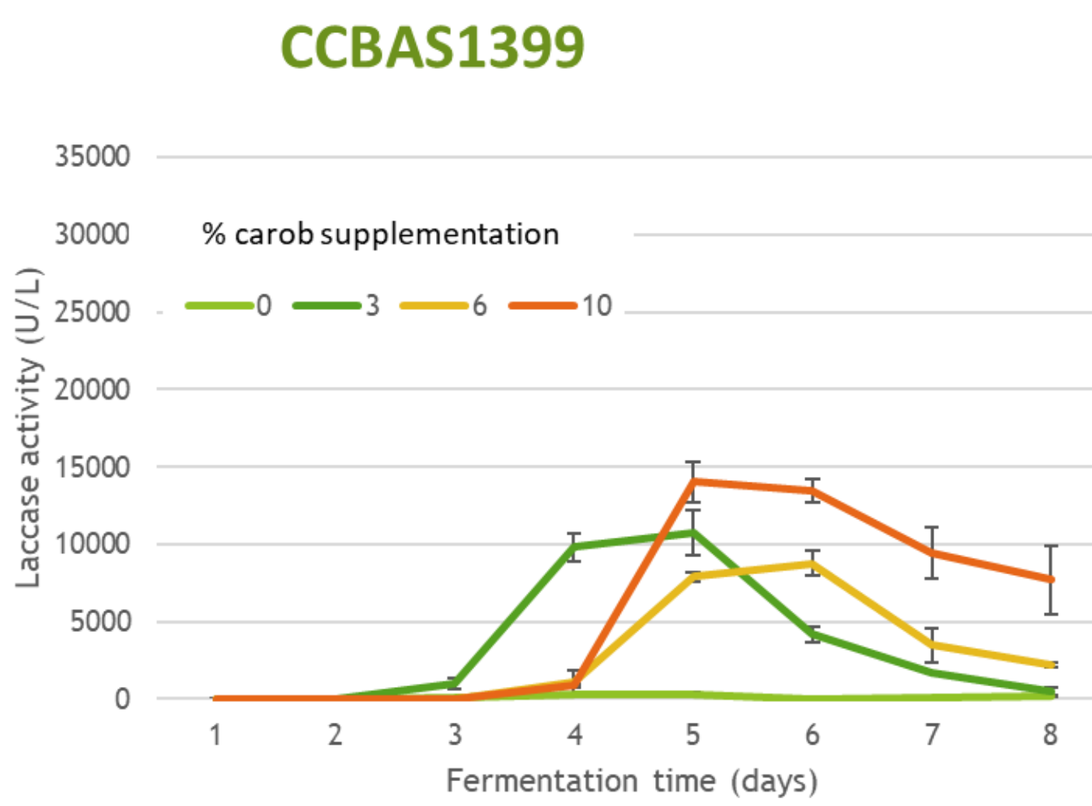
ABSTRACT: Trametes versicolor is a white-rot fungus known for its ability to produce extracellular oxidative enzymes, particularly laccase. Laccase has wide applications in food industry operations, including juice clarification, beer and wine stabilization, sediment removal, textural modification in bakery products, and treatment of food processing wastewaters. This study investigated whether supplementing a defined medium with 3%, 6%, or 10% spent carob pulp (CP), a by-product of carob syrup production, could enhance laccase production in submerged T. versicolor fermentations. Two strains (CCBAS614 and CCBAS1399) were cultivated under shake-flask conditions, and extracellular laccase activity was monitored throughout fermentation. At the end of the cultivation period, total glucan, β-glucan, α-glucan, dietary fiber, ash, protein, and dry mass were also quantified. Baseline laccase production without CP supplementation ranged between 0.3–1.2 U/mL for both strains. In contrast, supplementation with sterilized, milled CP led to pronounced increases in enzyme activity. The highest laccase activities were obtained with 10% CP supplementation: on day 6 for strain CCBAS614 (27.9 U/mL) and on day 5 for strain CCBAS1399 (14.0 U/mL). These findings demonstrate that spent carob pulp is a promising low-cost substrate for enhancing laccase production using T. versicolor.

Keywords: Trametes versicolor; Laccase production; Submerged fermentation; Spent carob pulp; Agro-industrial by-products



Laccase is a multicopper oxidase enzyme that catalyzes the one-electron oxidation of a wide range of phenolic and non-phenolic compounds while reducing molecular oxygen to water. It is widely produced by fungi, particularly white-rot fungi such as *Trametes versicolor*, where it plays a key role in lignin degradation. Due to its broad substrate specificity, laccase is extensively used in biotechnological applications including bioremediation, food processing, textiles, and biosensor development.





- DM (no CP addition) resulted in low levels of laccase production; ~170-1200 U/L by day 7
- Significant increase in laccase activity was observed in CP added samples, after day 3 for %3-6 supplementation and after day 4 for 10% supplementation
- Peak laccase activity
  - with 3-6% supplementation were about 10 U/mL for both strains
  - with 10% supplementation was 25-30 U/mL for CCBAS614 and 12-16 U/mL for CCBAS1399

Third COST CA22134 FoodWaStop meeting , 5-6 February Zadar, Croatia