

Evaluating Ultrasonic-Assisted Extraction of Psilocybin

Root Sciences has begun a new chapter in research and development — exploring how functional and psychedelic mushrooms are extracted and refined.

Our first study compared conventional solvent extraction with ultrasonic extraction, evaluating improvements in efficiency, yield, and purity. Conducted in partnership with **Industrial Sonomechanics** and **Tryptomics**, leaders in ultrasonics and alkaloid testing, respectively, the study provides invaluable data to a budding new industry.



The Ultrasonic Advantage

Conventional solvent-based extraction involves soaking biomass in a solvent, dissolving many of the desirable compounds. However, with some feedstocks, this method can lead to lower yields because a portion of the valuable material remains trapped inside intact cells. Ultrasound-assisted extraction (UAE) introduces high-frequency sound waves into the solvent/biomass mixture, creating microscopic bubbles that rapidly form and collapse. This process, known as acoustic cavitation, generates enough force to break open tough cell walls — releasing the compounds inside and enabling faster, more efficient extraction.

Preliminary Research Insights

Initial testing showed that conventional solvent extraction can leave behind up to one-third of the active ingredients, significantly reducing yield and eating away at profitability. Incorporating ultrasonication greatly improved the recovery of target alkaloids from *Psilocybe cubensis* biomass across all solvent systems tested. Although methanol proved to be a highly effective solvent, non-toxic alternatives performed nearly as well. Additional factors — including temperature, solvent-to-biomass ratio, and extraction duration — also influenced overall efficiency. By following Root Sciences’ recommended parameters, degradation can be minimized while maximizing yield and productivity.

To further evaluate these effects, nine extractions of dried, ground *Psilocybe cubensis* biomass were conducted using various solvents, both with and without ultrasonication. This study design allowed for direct comparison of how ultrasonication impacts yield, product purity, and extraction efficiency. Across all solvents examined, ultrasound-assisted extraction consistently improved overall extraction performance.

Study Highlights

- Ultrasonication extraction increased yield and efficiency without reducing purity
- Yields increased by 27% (Hydroethanol), 46% (MeOH), and 98% (EtOH)
- No negative impact of final product purity, with Total Alkaloid Content as high as 3.5%
- Extraction efficiencies as high as ~85%

