



# EXPLORING THE PHYSICO-CHEMICAL PROPERTIES OF RECOVERED INDUSTRIAL HEMP SEED (*CANNABIS SATIVA* L.) CAKE WASTE

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**Abstract:** Hemp, or *Cannabis sativa* L., is an annual plant from the Cannabaceae family used historically for textiles and food. As one of the earliest cultivated plants, it has provided fibres for ropes, clothing, and fabrics, and its seeds are known for their nutritional value. Hemp's health benefits come from its phenolic compounds. Hemp seed (*Cannabis sativa* L.) cake, derived from the cold-pressing process of hemp seed oil extraction, is abundant in protein, fibre and biologically active compounds. The recovered hemp seed leftover waste cakes were analysed to compare their physical, chemical, nutritional composition, and total phenolic content. The ash, moisture, lipid, total protein, and crude fibre levels were measured for each variety. The results will enable further research to valorise secondary byproducts generated during the hemp seed oil extraction and contribute to reducing food waste, thereby advancing the sustainability of the agri-food systems.

## • Introduction

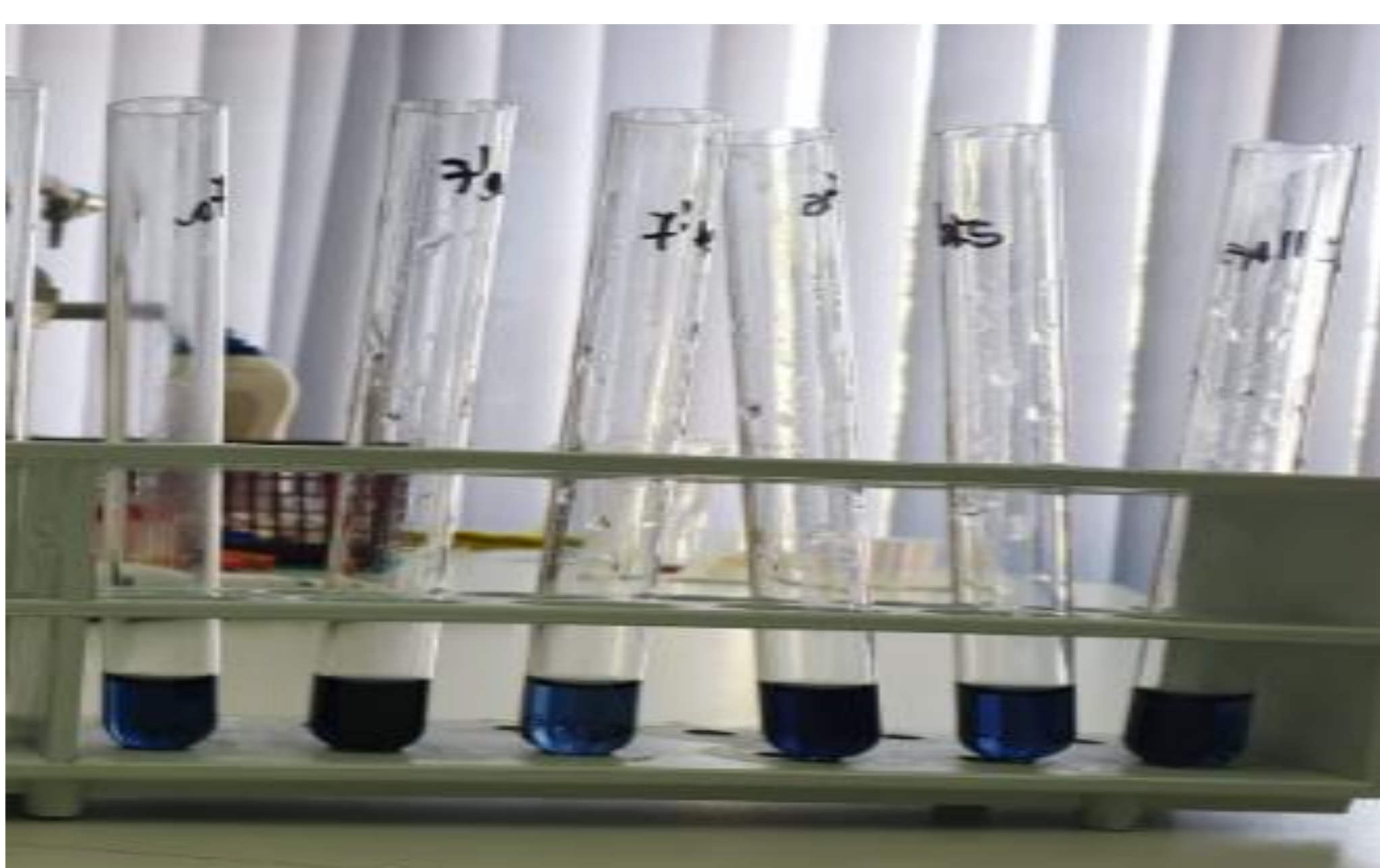
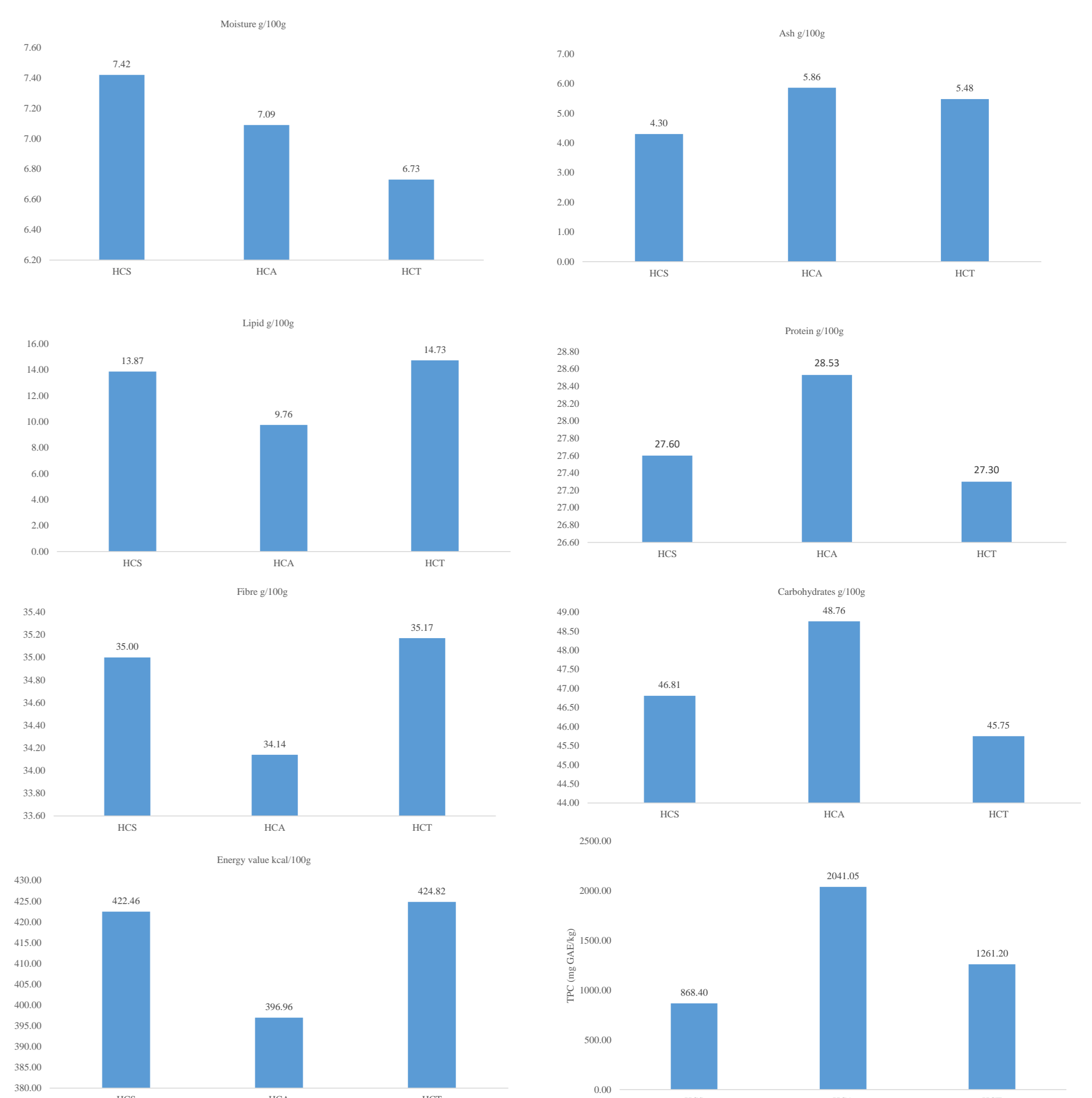
Industrial *Cannabis sativa* L. plants with low d-9-tetrahydrocannabinol (THC, <0.2%) are grown for fiber, seeds, and derivatives like oil. Hemp fiber is widely used in paper and textile production, while the seeds, an edible part of the plant, are increasingly used for hemp seed-based foods. The environmental impact of food processing has raised concerns, leading to strategies to reclassify organic waste as valuable by-products. This study analyzed the physical, chemical, and nutritional properties, including total phenolic content, of these hemp seed cakes, measuring ash, moisture, lipid, total protein, and crude fiber levels for each variety.

## • Material and method

The hemp seed varieties analyzed in this study were Silvana (HCS), Armanca (HCA), and Teodora (HCT), cultivated at the Lovrin Agricultural Research Station. The proximate composition analysis utilized ISO methods for moisture, lipid, protein, ash, and fiber determination. Total phenolic content was determined using the Folin-Ciocalteu method. The alcoholic extract (1:10) were mixed with the reagent, and incubated at 50°C. Absorbance was measured at 750 nm, with results expressed as mg GAE/kg.

## • Results and discussions

All the results obtained are presented as follows as graphical representations



## • Conclusions

Hemp seed cake is a by-product of oil extraction, commonly used as animal feed. However, its chemical composition and low cost make it an appealing ingredient for developing value-added products. The study's findings will facilitate further research into valorizing secondary by-products generated during hemp seed oil extraction, reducing food waste, and advancing the sustainability of agri-food systems.