

From Waste to Taste: Unlocking Alternative Proteins from Oil Press Biomass

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INTRODUCTION

Edible oils, integral to European cuisine and industry, have seen a steady evolution in their production dynamics over the years. Europe, with its diverse agricultural landscape, produces a variety of oilseeds that serve as the raw material for edible oil production. Among European nations, Germany, France, and the Netherlands are the frontrunners in oilseed production and subsequent oil extraction. These countries house some of Europe's largest oilseed crushing facilities. Rapeseed (or canola) is the dominant oilseed crop in Europe, particularly in the Northern and Western regions. Sunflower seeds have a significant presence in the Southern and Eastern parts of Europe. Additionally, countries like Italy and Spain are renowned for their high-quality olive oils. In recent years, there's been a push towards sustainable farming and oil production practices. The European Green Deal and the Farm to Fork Strategy emphasize reducing the environmental footprint of agricultural activities, including oilseed farming.

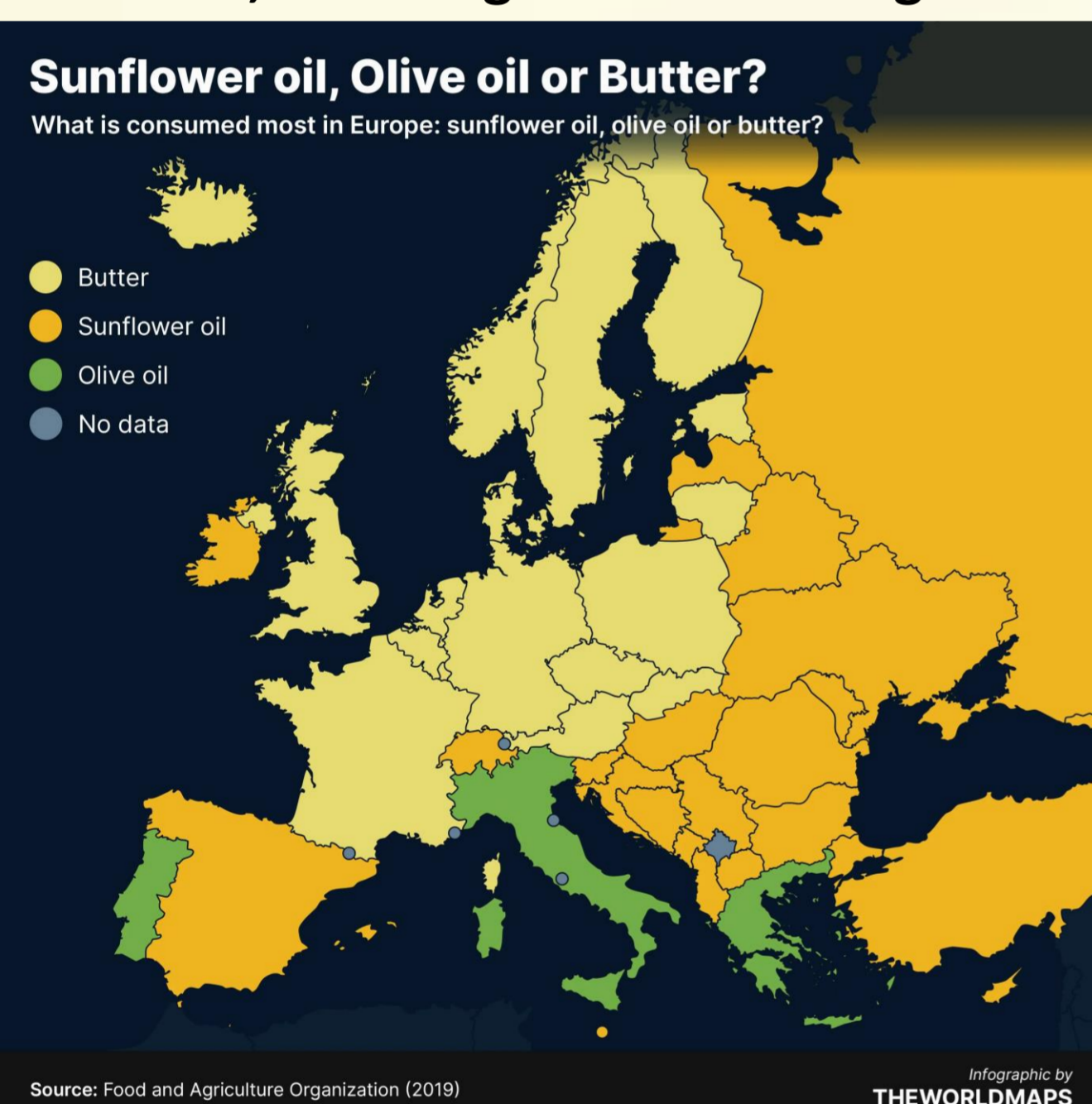


Fig. 1 Fat consumption in Europe

The edible oil market in Europe has witnessed trends leaning towards healthier options. (Fig. 1) There's a growing demand for cold-pressed oils, organic variants, and oils with a better fatty acid profile. Additionally, the non-GMO movement has also influenced consumer preferences in the region. Climate change poses a challenge as irregular weather patterns can affect oilseed yield. The reliance on imports, particularly palm oil, has also led to discussions about sustainability and deforestation. Advancements in technology have paved the way for efficient extraction methods, reducing wastage and ensuring higher oil yields. Additionally, research is underway to improve the nutritional profile of oils and to explore the potential of underutilized oilseed varieties. The exploration of alternative protein sources has garnered significant attention in the field of sustainable agri-food research, particularly given the global challenges of food security and the environmental impact of conventional protein sources. This research elucidates the potential of oilseed cakes – the by-products from oil pressing processes – as valuable protein-rich sources. Utilizing state-of-the-art analytical methods, we have characterized the flour composition derived from oilseed cakes of hemp, linseed, sunflower, and pumpkin. Our primary objective is to quantitatively and qualitatively evaluate the protein content within these residual biomasses, highlighting their potential utility in diverse applications. By presenting comprehensive compositional data, we aim to underscore the feasibility and potential implications of these oilseed cakes as sustainable alternatives in protein procurement and utilization.

DETERMINATION OF PROTEIN CONTENT

Using the Tango spectrometer from Bruker (Ettlingen, Germany), samples were measured directly without any extraction (fig. 2, 3)



Fig. 2 FT-NIR BRUKER Tango

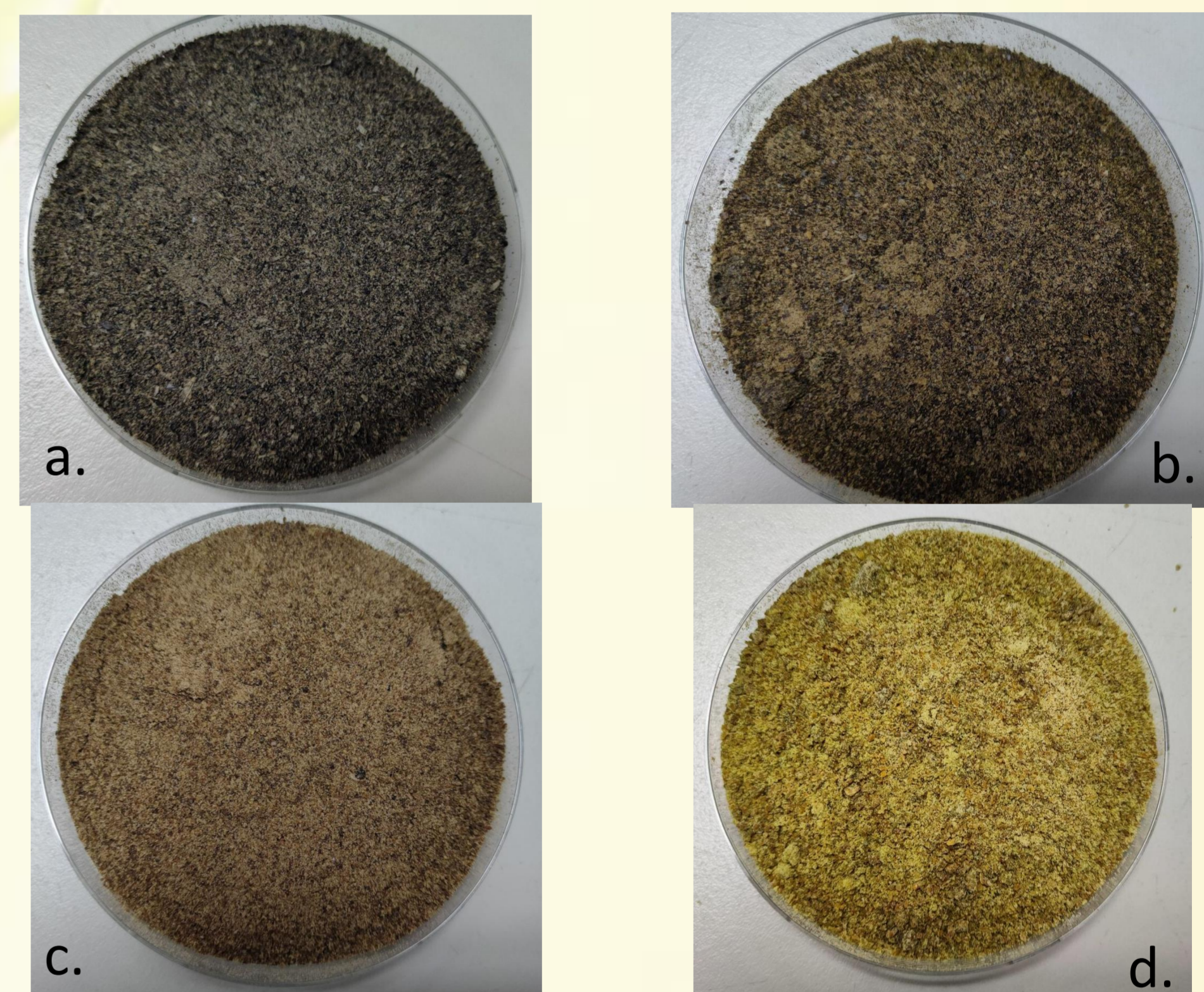


Fig. 2 Samples of seeds srot analyzed: a. sunflower, b. hemp; c. linen; d. pumpkin

Analysis	Sunflower	Hemp	Lin	Pumpkin
Protein content %	23.5	33.2	32.8	50.6

CONCLUSIONS

- ❖ Oilseed cakes, which are by-products of oil pressing processes, have been identified as significant sources of protein. This research emphasizes the potential of these residual biomasses in serving as sustainable alternatives for protein procurement.
- ❖ Among the oilseed cakes studied, pumpkin exhibited the highest protein content at 50.6%, followed closely by hemp and linen with 33.2% and 32.8% respectively. Sunflower had the lowest protein content at 23.5%. Given their rich protein content, these oilseed cakes can be explored for various applications, including animal feed, protein supplements, and even as ingredients in food formulations.
- ❖ Utilizing these by-products not only offers a sustainable means of protein acquisition but also aligns with the global trend of reducing waste and promoting the circular economy.

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