28th Workshop on the Developments in the Italian Ph.D research on Food Science, Technology and Biotechnology

Catania, 18-20 September 2024

Innovative technological approaches using mycoprotein as a source of alternative proteins

PhD student: Roberta Montebello – email: roberta.montebello@unifg.it

Tutor: Prof. Antonio Derossi – email: antonio.derossi@unifg.it

University of Foggia – Department of Agricultural Science, Food, Natural Resources and Engineering (DAFNE).

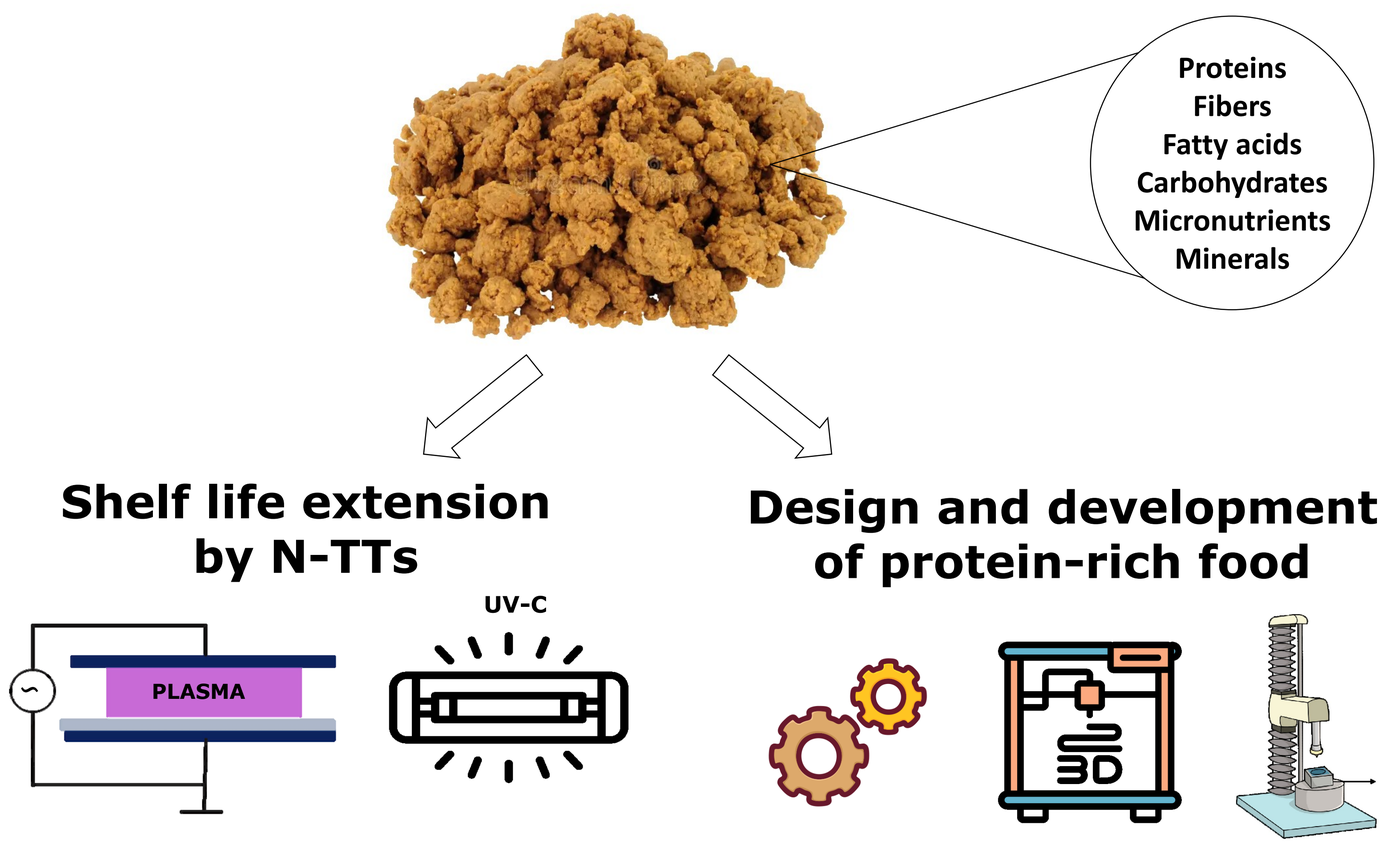
Introduction

Protein intake in the human diet is fundamental, as they are the main source of nitrogen and essential for maintaining health and bodily functions, cause they are involved in all biological activities. Currently, animal-based products dominate as the primary protein source in consumers' diets, leading to significant environmental challenges and ethical concerns. The population growth reaching 9 billion by 2050 will strain the animal protein market, making it urgent to seek alternative and sustainable protein sources (FAO, 2017). In this scenario, mycoprotein emerges as an excellent protein source, both nutritious and sustainable. Mycoprotein biomass is produced through a fermentation process of various species of filamentous fungi that can use food waste and by-products as a source of substrates (Hashempour-Baltork et al., 2020).

Nutritional properties and recent applications

Mycoprotein biomass consists mainly of proteins and fibers (Derbyshire and Delange, 2021), which are linked to hunger control, blood glucose regulation, and satiety (Kreger et al., 2012). This has driven the development of mycoprotein-based foods, particularly for frozen meat substitutes, due to its meat-like structure and texture. Furthermore, the impact of different pretreatments on the biomass remains still under-investigated.

Fig. 1 Schematic rappresentation of PhD project



Project aims

- To study technological solutions to extend the shelf life of mycoprotein biomass through the use of non-thermal technologies (NTTs) such as cold plasma and UV irradiation. Specifically, their impacts on the shelf life, nutritional properties, and sensory characteristics will be defined (Fig.1).
- To utilize mycoprotein biomass as a valuable ingredient to design and develop protein-rich food by using emerging technologies and food reformulation strategies, evaluating the impact on techno-functional, structural, nutritional, and sensory properties (Fig.1).

WP1: Shelf life extension of mycoprotein biomass by N-TTs. Description of the main kinetic degradations of mycoproteins biomass, N-TTs (cold plasma and UV irradiation) and shelf life estimation.

WP2: Designing and development of novel food products. Product development by reformulation strategies and emerging technologies and impacts on technological, nutritional and multisensory properties.

WP3: Dissemination and Communication.

Fig. 2 Gantt diagram for this PhD thesis project

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
WP1. Shelf life study of mycoprotein biomass using N-TTs																								
T1.1 Shelf-life estimation																								
T1.2 Conventional and N-TT treatments																								
WP2. Product design and development using mycoprotein																								
T2.1 Product reformulation																								
T2.1 Multi-sensory analysis and consumer trend assessment																								
WP3. Dissemination and Communication																								

References

Hashempour-Baltork et al. (2020). Journal of Cleaner Production, 253, 119958. **Derbyshire and Delange** (2021). *Frontiers in Sustainable Food Systems*, *5*, 581682. **FAO** (2017). The future of food and agriculture. Trends and challenges. https://openknowledge.fao.org/server/api/core/bitstreams/2e90c833-8e84-46f2-a675-ea2d7afa4e24/content **Bartholomai et al.** (2022). *Food and Chemical Toxicology*, *168*, 113342.