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# Editorial: Sustaining protein nutrition through plant-based foods: A paradigm shift

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## Editorial on the Research Topic

**Sustaining protein nutrition through plant-based foods: A paradigm shift**

Proteins are one of the vital building blocks of life. The entire protein complement of an organism and its building block amino acids are derived from food. Plants provide a good source of proteins for human and animal diets. The emerging global trend for a vegan diet has put the spotlight on the scientific dimensions of plants as a source of sustainable proteins. The Research Topic “*Sustaining Protein Nutrition through Plant-Based Foods: A Paradigm Shift*” provides a comprehensive Research Topic of original research and reviews covering the multifaceted dimensions of the role of plant proteins in human nutrition and health.

What are the different sources of plant proteins and how do they affect human health? The question is comprehensively explored by [Langyan, Yadava, et al.](#) who discuss functional properties and various health issues linked with plant-based proteins. Interestingly, plants could be source analogs of meat, milk, and egg. Cost-effective extraction and processing technologies, exploration of different food wastes as an alternative source of plant proteins, their environmental impact, and studying their effect on nutrition are important goals. Translational research for upscaling emerging technologies for improving plant proteins’ bioavailability, digestibility, and organoleptic properties is expected to open new dimensions of the utilization of plant proteins.

Intake of a nutritious diet, including adequate intake of protein, is also necessary to fight pandemics, like COVID-19 ([Mortaz et al.](#)). How specific dietary profiles might help to augment public health strategies and reduce the rate and severity of COVID-19 is an open question. Supplementation of amino acid arginine significantly increases T cell function as well as enhances their numbers compared with control subjects.,

Similarly, a deficiency of amino acid methionine significantly decreases serum levels of IgG, IgA, and IgM antibodies and the relative percentage of CD3<sup>+</sup>, CD3<sup>+</sup>/CD8<sup>+</sup> and CD3<sup>+</sup>/CD4<sup>+</sup>T lymphocytes in the serum. Poor intake of sulfur-containing amino acids, like methionine and cysteine, significantly reduces the hydroxyl radical scavenging activity of superoxide dismutase (SOD) and glutathione peroxidase (GSH-Px), making the host susceptible to viral infection. The production of interleukin (IL)-1, IL-6, and tumor necrosis factor (TNF)  $\alpha$  is also dependent on the adequate availability and metabolism of sulfur-containing amino acids. These aspects of proteins, human nutrition, and disease progression need to be explored further, and plant-based foods and nutraceuticals as a source of these critical amino acids need to be researched and developed in the future.

Apart from their roles during the pandemic period, the geographical aspect of the protein story is also highlighted here. How locally available and adaptable plant species can transform the protein story of a particular population, was originally researched by [Atuna et al.](#) They assessed the nutrient value and desirability of eight improved soybean varieties, for use in soymilk, tofu, and as an ingredient to enhance staple foods in the African nation of Ghana. The soybean varieties evaluated were generally desirable for soymilk and tofu production. For every kilogram of soybean used to produce either soymilk or tofu, 3.17–3.97 kg of fresh okara—a pulp byproduct of soymilk and tofu—was also produced. Recipe refinements using okara with cassava may help fill the protein gap among the vulnerable populations of the West African Sub-region, particularly in Ghana by improving the protein quality of ready-to-eat foods.

Like soybean, maize, especially quality protein maize (QPM) is considered a significant leap toward improvement in the nutritional status of rural masses in African and other developing countries. This maize contains a higher concentration of essential amino acids, particularly lysine and tryptophan, in its kernel endosperm. [Kaur et al.](#) have optimized protein quality assay in normal and QPM kernels effectively and helped in reducing the defatting time by 24 h and protein estimation by 3 h as compared to the already established protocol. This is expected to provide a further boost in the development and commercialization of QPM. Wheat is another cereal that is also a good source of protein and has received considerable attention, especially due to its bread and bakery-making quality ([Goel et al.](#)). In this line, [Allai et al.](#) have reported a novel process to make a pregelatinized cereal bar, containing whole wheat flour, whole barley flour, and whole corn flour, blended with Indian horse chestnut flour. [Khalili et al.](#) conducted a meta-analysis, cataloging studies aiming at the application of different types of nuts and their positive effects in improving glycemia, dyslipidemia, inflammation, and oxidative stress.

The importance of legumes as protein-rich food can never be underestimated. Apart from the leading legume crops, there is a need to rediscover the potential of multifaceted orphan legumes as a sustainable source possessing high nutritional

values ([Ramya et al.](#)). [Viana and English](#) have demonstrated that dehulling and germination are potential processing methods that may be used to improve the physiochemical characteristics of salt-extracted protein concentrates from yellow eye beans (*Phaseolus vulgaris* L.), a rich source of dietary protein.

In the arena of valorization of agricultural waste for human protein, the use of leftover oilseed cakes could be a game changer ([Singh et al.](#)). Oilseed cakes exhibit higher angiotensin-converting enzyme (ACE) inhibitory activity and antioxidant activity compared to other protein isolates and thus could be a source of health-promoting products. The Food and Agriculture Organization of the United Nations (FAO) cautions that protein could be a limiting macronutrient in the human diet in the future, therefore, there is a need to intensify efforts for developing different kinds of methods and processes to extract protein from oilseed cakes. The development of faster analysis methods for protein quantification in oilseed crops, including the one reported here ([Langyan, Bhardwaj et al.](#)), can further provide necessary tools for scientific research on oilseed feedstocks for edible proteins. Castor meal is a by-product of oil extraction from the castor plant and is generally considered toxic for humans. However, [Amoah et al.](#) show, for the first time, the positive effects of castor meal on the growth, feed utilization, immune response, digestive enzyme activities, and intestinal health of a fish known by the name of hybrid grouper, which has potential as a fishery medicine. The use of oilseed cake proteins in human food and health products is very limited at present, which requires further research on the utilization of these enormously rich protein sources in the diet.

The story of plant proteins remains incomplete, without addressing the basic agronomy of crops that are targeted as a source of proteins. Agronomic interventions, like intercropping and field management in specific agro-ecologies, are essential in making these crops high yielding, profitable, and economically sustainable for farmers on one hand and getting cost-competitive protein feedstock for the food technology industry on the other hand ([Wang et al.](#)).

In conclusion, this Research Topic on plant-based foods for sustaining protein nutrition incorporates a wide canvass of original research, reviews, and meta-analysis covering multiple, if not all, aspects of current progress in this area. It is hoped that researchers will appreciate the vast diversity of the nature of the problem and feel motivated to take up new dimensions of research that will make plants a central player in protein nutrition. It would be a great contribution to fighting protein malnutrition and meeting Sustainable Development Goals.

## Author contributions

SL and PY contributed to the conceptualization and writing the primary draft. TB and TK edited the manuscript and supervision. SL, PY, TB, and TK approved the final draft.

All authors contributed to the article and approved the submitted version.

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## Conflict of interest

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