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# Editorial: Agro-morphological and nutritional profiling of crops

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## Editorial on the Research Topic

### Agro-morphological and nutritional profiling of crops

The 21st century is witnessing rapid population growth, climate change, and shifting dietary patterns, leading to a great challenge to feed and nourish billions of people sustainably. The 2030 Agenda for Sustainable Development of the United Nations' aim is to mitigate hunger, achieve food security, improve nutrition, and promote sustainable agriculture and livelihoods. Science-based interventions leading to enhanced yield and quality of crops are central to this aim.

The spectrum is wide and captivating. The comprehensive review of [Kaur et al.](#) on the diversity of *Linum* genetic resources housed in global genebanks navigates through the agro-morphological characterization of *Linum* varieties and explores how novel genomic technologies are being harnessed to unlock the hidden potential of this versatile crop. *Linum*, commonly known as flax, has been cultivated for centuries for its fibre and oil. At present, approximately 61,000 germplasm accessions of *Linum*, including 1,127 wild accessions, are conserved worldwide.

Apart from the conservation of genetic resources, it is equally important to understand how to assess the nutritional content of foods accurately. Diverse bioanalytical methods, including chromatography, microscopic techniques, molecular assays, and metabolomics, are necessary for accurate nutritional profiling and the development of robust models. Underscoring this important need, [Mondal et al.](#) have reviewed the different bioanalytical techniques, the various protocols, and their application for the development and refinement of nutritional profiling models. Evidence-based studies show that the classification of foods depends not only on the nutrition composition but also on the distribution of food in our total diet.

The Research Topic also presents ten original research papers on various aspects of morphological and nutritional profiling across diverse crops. The Food and Agriculture Organization and United Nations have recognised 2023 as the International Year of Millets to raise awareness about the health and nutritional benefits of millets—a highly diverse group of small-seeded grasses grown mainly in stressed ecologies for fodder and human food. [Wang et al.](#) investigate how nitrogen deficiency affects the folate content of foxtail millet, shedding light on the nutritional consequences of nutrient limitations. The content of folate derivatives was studied in 29 diverse foxtail millet cultivars under two soil nitrogen regimes

(0 and 150 kg N ha<sup>-1</sup>) to explore folate potential grown under low nitrogen soils. Another study on millets employs molecular docking and simulation-based approaches to probe the potential of bioactive compounds in millets.

Pulses are crucial for combating hidden hunger and malnourishment and enriching the cropping systems. Lentil (*Lens culinaris*) and mungbean (*Vigna radiata*) are two important pulse crops and a rich source of protein and essential nutrients. [Aski et al.](#) used advanced genetical statistics like Genotype, Genotype × Environment interactions and Additive Main effects and Multiplicative Interaction models to study genetic stability and Genotype × Environment interactions in 16 Indian lentil cultivars for important nutrition-related traits like iron, zinc, aluminium, and phytic acid content in grains. Their study identified promising cultivars that can be promoted for biofortification programs. The results also indicated potential for simultaneously increasing iron and zinc in lentils. In another study, [Bansal et al.](#) examine how different moisture regimes affect the seed nutritional quality of lentils. Water stress not only diminished lentil yield but also had an adverse impact on the quality of lentil grains. Consequently, when breeding for environments with limited water availability, it becomes imperative to factor in considerations for grain quality as well. Taking this kind of nutritional analysis in field-grown crops forward, [Sinha et al.](#) attempted to identify genomic regions and DNA variations associated with nutritional traits in mungbeans. They dissected the genetic architecture of grain iron, zinc, phytic acid, and tannin content in an association mapping panel of 145 diverse mungbean genotypes. Genotyping by sequencing identified genome-wide single nucleotide polymorphisms and candidate genes associated with these traits in a diverse selected panel of mungbean genotypes.

Rice is a staple food for over half of the world's population, making it a critical crop for global food security. The research article by [Gautam et al.](#) explores intra-varietal variation in a popular rice landrace grown in geographical isolation in the Andaman Islands of India. The variation was studied by employing 22 agromorphological and biochemical traits. By harnessing the diversity within a single variety, researchers can devise unique strategies to improve agro-morphological and nutritional traits to ensure sustainable food production on tropical islands. The existence of intra-varietal variations could also be important from an evolutionary biology perspective.

Apart from the islands, the far-flung high-altitude regions of Indian Himalayas are also rich in unique bioresources. *Selinum carvifolia* is a medicinal plant useful in managing ailments such as hysteria and seizures. [Srivastava et al.](#) collected *S. carvifolia* samples from different altitudes (2,150 m–3,178 m) from the Chopta region of Uttarakhand, in the Indian Himalayas. Chromatographic analysis revealed different phenolic compounds, like chlorogenic acid, gallic acid, rutin, syringic acid, vanillic acid, cinnamic acid, caffeic acid, and protocatechuic acid in *S. carvifolia*. They also analysed the cytotoxic effects and antibacterial and antifungal activity from different extracts. *S. carvifolia* extracts reduced the cell viability, indicating the anticancer potential, of this less explored medicinal plant.

Tropical pastures and the Indian grasslands system are species-rich and make up rangelands, forests, community lands, etc. that serve as one of the major roughage sources for ruminants. In India,

*Cenchrus* is an important component of such grasslands. [Singh et al.](#) evaluated 79 accessions of *Cenchrus* genus belonging to six species and report wide variability for protein fibre, energy, sugar, and other nutritional traits. They also identified promising genotypes for good silage-making quality.

Apart from India, China is also a bioresource-dense country. This Research Topic presents two interesting studies from China spanning green tea and Chinese citrus varieties. [Xiao et al.](#) studied the possible mechanisms behind tea quality that change with harvest time in Wufengshan green tea grown in high-altitude mountains. They identified flavone and flavonol biosynthesis and phenylalanine metabolism as key determinants of green tea quality. Like tea, Citrus fruits are also renowned for their refreshing flavors and health benefits. [Sun et al.](#) evaluated the biological characteristics, phylogeny, and phytochemical profile, including antioxidant activity, of the two local citrus varieties.

Our journey through this Research Topic has been nothing short of illuminating, a testament to the relentless pursuit of knowledge and innovation in the world of agriculture and nutrition. The seeds of scientific inquiry sown in these articles hold the potential to yield a bountiful harvest, nourishing billions and sustaining our planet in the face of myriad challenges.

## Author contributions

SL: Conceptualization, Data curation, Investigation, Methodology, Project administration, Supervision, Validation, Writing—original draft, Writing—review and editing. TB: Conceptualization, Data curation, Investigation, Methodology, Supervision, Writing—review and editing. CW: Conceptualization, Data curation, Investigation, Methodology, Software, Writing—review and editing. PY: Conceptualization, Data curation, Formal Analysis, Investigation, Methodology, Project administration, Software, Supervision, Validation, Writing—original draft, Writing—review and editing. TK: Investigation, Methodology, Software, Supervision, Validation, Writing—review and editing.

## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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