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Editorial: Nutritional aspects of sustainable foods

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Editorial on the Research Topic
Nutritional aspects of sustainable foods

Introduction

The rising phenomena of climate change and ecosystem imbalance, along with rapid human population growth, threaten food and nutrition security worldwide, deteriorating production activities related to crops, livestock, and fisheries. Many other components of the food system chain may be also disrupted such as storage, processing, distribution, food utilization, and consumption. In turn, this will lead to poor food diversity and food quality. A significant rise in food prices and limited access to nutritious foods are additional hazards affecting human health, especially in the populations of developing countries, low-income households, and smallholder producers who are the least able to respond to their nutritional needs without institutional assistance.

The demand for sustainable solutions to combat these changes is imperative, and this is further endorsed by the 2030 Agenda for Sustainable Development by the Food and Agriculture Organization (FAO) of the United Nations, which has set goals for major transformations in agriculture and food systems to end hunger and achieve food and nutrition security by 2030. A sustainable food system encompasses the production, distribution, and consumption of sustainable foods. Sustainable foods assure a low environmental impact by avoiding natural resource overexploitation, and they need to be affordable, culturally acceptable, and nutritionally adequate for macro- and micronutrients. The transition to more sustainable food systems shifts scientific interest toward the exploration of new, alternative sources to produce nutritionally important foods and food ingredients. Agro-food waste, plant-based sources, or aquatic sources constitute examples of sustainable sources for the production and characterization of nutrients (e.g., protein, carbohydrates, lipids, and micronutrients) and non-nutrients (e.g., phytochemicals, flavor, and pigments). Furthermore, advances in biotechnology applications can be used as a tool to increase the production of sustainable food ingredient sources. A critical feature though, of a sustainable food system is that the food produced does not pose any unintended nutritional consequences. Not only the quantity but also the quality of macronutrients like protein or the bioavailability of micronutrients in sustainable food should ensure that people consume nutrient-rich foods that meet their needs.

In this context, the current Research Topic “*Nutritional aspects of sustainable foods*” includes seven original articles on sustainable agriculture and sustainable foods in terms of nutrient quality and functional properties.

Major findings

The FAO highlights the role of sustainable land use in mitigating climate change. Šenk et al. applied the intercropping method, the cultivation of two or more crops in the same field. They experimented on two crops rich in protein and inorganic compounds, namely soybean [*Glycine max* (L.) Merr.] and common millet (*Panicum miliaceum* L.), under dry land conditions to improve crop yield quality and stability. Results showed that intercropping, especially when combined with microbial bio-fertilizer, enhanced land utilization as well as nutrient and non-nutrient absorption and availability, i.e., total phenolic compounds, Ca, Mg, Fe, and Zn. Furthermore, levels of phytic acid (anti-nutrient) and potentially toxic elements such as Al and Cr decreased. Consequently, soybean–common millet intercropping, along with bio-fertilizer application, increased the resilience and nutrient availability of soybean and millet under dry land conditions yielding considerable amounts of nutrients improving food quality and security.

In addition to sustainable land use, cultivation of varieties resistant to flood, drought, and/or saline is significant to mitigate climate change and enhance food security. For instance, date palm (*Phoenix dactylifera* L.), a fruit that has its origins in the Arabian Peninsula, Middle East, and North Africa, thrives in hot and arid climates as well as in salty soil. Hammami et al. investigated the physicochemical characteristics and the nutritional composition of commonly sold date palm varieties in the market of the United Arab Emirates. Their study provides valuable insights regarding the nutritional traits of different date palm varieties under varying salinity levels, enabling farmers to optimize production and establish new evaluation criteria.

Bioactive compounds with antioxidant properties promote sustainable food systems. To this point, a plant species rich in bioactive compounds is *Abies marocana* (needles, twigs, and cones). Zirari et al. found that *A. marocana* needles are rich in mineral elements and contain significant levels of phenols, flavonoids, tannins, and phytosterols contributing to the high antioxidant activity as measured by the 2,2-Diphenyl-1-picrylhydrazyl (DPPH) scavenging assay. Yuan et al. measured physical and chemical indicators in honey, i.e., *Dalbergia hainanensis* Merr. et Chun honey, blueberry honey, *Eriobotrya japonica* Lindl. honey, and *Rhus chinensis* Mill. Results revealed that the total flavonoid and vitamins B1 and C content, as well as elevation, explained the observed antioxidant activity of honey.

Food enrichment with alternative sources of protein is another option to enhance human health in favor of the ecosystem balance. Musika et al. aimed to develop gluten-free riceberry rice pasta supplemented with cricket powder using a statistical predictive tool (D-optimal mixture design) for optimizing formulation. Their study offers valuable insights into the physicochemical, functional, and sensory properties of this type of gluten-free pasta for the development of a nutritious, appealing, and innovative food.

Reformulation of ultra-processed foods (UPF) by the food industry toward plant-based foods rich in functional compounds

(e.g., fibers, vitamins, and antioxidants), instead of focusing on energy reduction solely, could benefit human health and food security as well. Therefore, Dötsch-Klerk et al. defined the Positive Nutrition Standards (PNS): a set of standards for food reformulation and innovation to be used by nutrition policies to increase consumption of nutrients with beneficial effects on human and planetary health. In addition to nutritional quality, dietary diversity is a major element of sustainable diets. To this end, Huang et al. showed that dietary diversity is limited by intrahousehold empowerment gaps in rural and minority regions, while inequality between different household members affects decision-making processes and the allocation of resources. In agreement with the 2010–2011 FAO report series “The state of food and agriculture”, increasing women’s access to land, livestock, education, financial services, extension, technology, and rural employment would boost their productivity and generate gains in terms of agricultural production, food security, economic growth, and social welfare.

Conclusion

The present Research Topic illustrates the broad variety of factors that can support the transition to more sustainable food systems. More specifically, (a) the sustainable land use, (b) the cultivation of varieties resistant to aridity, (c) the consumption of plant-based ingredients or foods rich in antioxidants of high bioactivity, (d) the reformulation of UPF within the food industry toward the use of functional compounds, and (e) the production of innovative foods with alternative sources of nutrients such as protein may have promising results in mitigating the consequences of climate change in favor of human and planetary health. For this reason, there is an urgent need to steer the food industry toward more sustainable, nutritious, and affordable food production and implement strategies that will reduce intrahousehold empowerment gaps, especially in rural and minority regions.

Author contributions

AG: Conceptualization, Writing – original draft, Writing – review & editing. KA: Conceptualization, Writing – review & editing. ACS: Writing – review & editing.

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Conflict of interest

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