

Scotland's Rural College

Editorial

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Editorial: Biological and biotechnological applications of natural bioactives

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Editorial

Phytochemicals in fruits, vegetables, whole-grain meals, and medicinal plants are bioactive compounds that influence metabolic processes and improve health [1, 2]. Different crop/plant species are vital components of the biological system, and play important roles in metabolic pathways. Natural bioactive compounds and biochemicals contain essential and non-essential components and biobased biochemicals. These are enriched with bioactive nutrients such as carbohydrates, glycans, proteins and peptides, pigments, polyphenols, fibres, minerals, vitamins, natural antioxidants, nutraceuticals, organic acids, biobased nanoparticles, biocomposites, and others that occur naturally, and are part of the food chain and have been shown to have a variety of biological and biotechnological functions [3]. These bioactive compounds represent a new area of bio-functional compounds, resulting in increasing numbers of nutritional products with potential agriculture, food, medical and health-care applications to the well-being of humans [4]. Because the primary goal is to prevent or treat various chronic/degenerative diseases, in vitro and/or in vivo, biological activities could be used to validate the healing efficiency of natural health products. In addition, natural bioactive compounds can be used to treat in vitro and in vivo functions such as antioxidant, antimicrobial, anti-inflammatory, antibacterial, and anticancer properties [5].

Under the particular research topic "Biological and Biotechnological Applications of Natural Bioactives and Biochemicals" a total of 08 articles were published that included a diverse area of topics like plant growth promotion, production of chondroitin and antibiotics, preparation of nanoemulsion, diagnosis of COVID-19 and cancer diseases, and formulation of the natural compound. The current special issue contains seven research articles and one review article dealing with natural compounds and biochemicals extractions and their agricultural and biomedical applications that reflect the recent developments. A study by Britto et al. [6] states that trehalose, a biogenic cell-wall elicitor obtained from *Trichoderma atroviride* (TaCWE) showed significant induced

disease resistance against leaf spot disease caused by *A. brassicicola* and plant growth promotion in the broccoli plants. Chondroitin sulfate (CS) is the most abundant glycosaminoglycan that has been produced from microbial fermentation of engineered microbial strains to improve CS yields in different hosts and is used for a wide range of applications, especially as a supplement for the treatment of osteoarthritis diseases [7]. The *Phyllanthus niruri*-based nanoemulsion was formulated in the presence of 1% plant extract, 5% of *Citrullus lanatus* seed oil, and 1% of sodium alginate solution which exhibited significant antimicrobial potential against bacterial and fungal pathogens as per Pathania et al. [8]. Mostafavi et al. [9] reported that biogenic silver and gold nanoparticles (NPs) revealed great attention for the treatment of antineoplastic potential against leukemia cancer cells due to their exclusive physicochemical properties and this nanostructure could be used to increase drug bioavailability and its targeted delivery to an innovative therapeutic agent. Nanoemulsion fabricated with clove oil was studied for numerous physicochemical characteristics such as particle size, zeta-potential, stability, and poly-dispersity index, which displayed potent antimicrobial activity against bacterial pathogens (*E. coli* and *B. subtilis*) [10]. Dubey et al. [11] have explained in their review article how to design nano-nutraceuticals to deactivate virus that can inhibit the binding of the virus with receptors and support immunity and accomplish pre and post COVID-19 infection. The major antibiotics such as Abyssomicin C, allicin, anthracimycin, berberine, biochanin A, caffeic acid, daptomycin, kibelomycin, piperine, platensimycin, plazomicin, taxifolin, teixobactin, and thymol which showed strong antibacterial activity against ESKAPE (*Enterococcus faecium*, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Acinetobacter baumannii*, *Pseudomonas aeruginosa*, and *Enterobacter* spp.) pathogens and mechanisms improved by ESKAPE pathogens to respond antibiotics have been discussed by Jadimurthy et al. [12]. To investigate how the inoculants Native Efficient Microorganisms (NEM) and the commercial product EM1® affected the production of rootstock *Poncirus trifoliata* (L.) Raf seedlings and the development of young Sweet Orange "Valência" (*Citrus sinensis* (L.)

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Osbeck) and Murcott tangora plants (*Citrus sinensis* x *Citrus reticulata* Blanco). Finally, it was examined that natural microbial bioactive formulation could be used for the development of citrus plants as a state by Diering et al. [13].

We are happy to deliver this special topic in Biotechnology Reports. We are confident that this special issue is very interesting and relevant to the Journal's readers and also sharing the information of bioactive natural products and biochemicals with their biological applications in diverse areas that must be beneficial for the other scientific researchers. The information presented above is promising, but it is still restricted. Finally, we owe a debt of gratitude to all of the contributors, a total of 40 authors, for the scientific knowledge contained in the reviews and research articles assembled for this ebook. We are convinced that the material in this ebook will be attractive and valuable to the readers. It will serve as a starting point for further research into "Biological and Biotechnological Applications of Natural Bioactives and Biochemicals."

This VSI highlights important aspects that need to be focused upon for the commercial development of biobased natural products. It is recommended that greener technologies offer sustainable bioproducts for applications in a range of sectors.

CRedit authorship contribution statement

Ajit Kumar Passari: Writing – original draft, Writing – review & editing. **Minaxi Sharma:** Writing – review & editing. **Zeba Usmani:** Writing – review & editing. **Vijai K. Gupta:** Conceptualization, Writing – review & editing, Supervision.

Declaration of Competing Interest

The authors declare no conflict of interest.

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