EC NUTRITION
Editorial

Underutilized Crops: Way to Attain Global Nutritional Security

Sajad Majeed Zargar[1]*, Samiullah Naik[1] and Rakeeb A Mir[2]

[1]Proteomics Laboratory, Division of Plant Biotechnology, Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Srinagar, J&K, India

[2]Department of Biotechnology, BGSB University Rajouri, J&K, India

***Corresponding Author:** Sajad Majeed Zargar, 1Proteomics Laboratory, Division of Plant Biotechnology, Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Srinagar, J&K, India.

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As per report of Food and Agriculture Organization [1], 821 million children, women and men are suffering from protein-calorie undernutrition, whereas over 2 billion people are suffering from hidden hunger. Nutritional security attained through consumption of underutilized food crops have great potential to eliminate/suppress several physiological disorders [2]. Underutilized crops such as, *Fagopyrum* (buckwheat), *Panicum mi liaceum* (proso millet), *Paspalum scrobiculatum* (kodo millet), *Chenopodium* (chenopod), *Amaranthus* (amaranth) etc. are highly preferred for cultivation, especially for food, fiber, fodder, oil and in particular in traditional medicine therapeutics. However, changing dynamics of food habits, taste and easy access to foods based on major utilized crops have severely declined the cultivation and utilization of underutilized crops. Researchers across the globe are striving to revive underutilized crops, considering their resilient features to withstand abrupt changing climactic conditions and wide range of adaptability. In addition to possibly alleviating hunger, the nutraceutical features of these crops, such as, rich source of micronutrients, and alternative foods to circumvent physiological imbalances have largely attracted scientific communities to focus their research on these crops. Apart from that, due to their resilient features, these crops can be cultivated on large scale to improve the bioeconomy and alleviate poverty in undeveloped and developing countries. Buckwheat grown in North Western Himalaya is one such underutilized crop that needs immediate scientific intervention.

Buckwheat as a functional food

Functional foods, due to their nutritional values play pivotal role in preventing several disease and evade nutritional deficiencies, to promote normal healthy state of humans [3]. Buckwheat is best example to serve as leading functional food, due its salient features of being utilized in several forms or food products, such as flour, chaomian, dried noodles, pancakes, cat's ears, snacks, dumplings, flakes, manufacture of tea, wine etc. Apart from later properties, food products derived from buckwheat are recommended for people suffering from coeliac disease, colon cancer, obesity and hypercholesterolemic conditions, largely due to presence of gluten free proteins [4]. Moreover, extracts from different parts of buckwheat plant, such as, seed hull, stem, and roots possess antitumor capacity [5]. The presence of rutin, a polyphenol in it has gained global attention, due to its several biological and medicinal properties such as, anti-inflammatory, anti-hypertension, vaso constrictive, anti-oxidative, anti-carcinogenic, positive inotropic and spasmolytic effects. In addition, rutin possess several physiological properties, such as, maintaining flexibility of arteries and veins, shielding of gastric lesions, protection against UV light and X rays, improves eyesight and hearing, circumventing oxidative stress and prevents gall stone formation [3].

Nutrigenomics of Buckwheat

Overall, functional dynamics of foods from underutilized crops, such as, buckwheat can be deeply explored by nutrigenomics, a field employed to investigate the impact of nutrients and other bioactive components on genomes with respect to gene expression and metabolism [6]. It describes the approach used in gene discovery for understanding the impact of nutritional components. Nowadays, the nutrigenomics seeks to interpret the impact of dietary components on the genomes, transcriptomes, proteomes and metabolomes [7]. Any short-term advancement in food security will need to include modification of staple crops such as, wheat, rice and maize through conventional breeding or transgenic approaches. However, a focus purely on the productivity of current major crops, cannot meet the challenges of nutritional security. Strategic solution to this global maniac is adoption of underutilized crops, the plant species being composite part of the culture and diets of the people living with them for centuries. Moreover, the nutritional aspects of most of these crops have been undermined; as such, the need of hour is to explore their nutritional values and to mine gene(s) and regulatory networks governing their nutritional status. Among major underutilized crops, buckwheat is of prime focus due to its high nutritional values. This crop is majorly found inhabiting mountainous ranges of India, Pakistan, Nepal, Bhutan, Myanmar, China, Japan, Korea, Iran and Afghanistan.

As mentioned in earlier section, buckwheat is highly balanced in terms of minerals and important proteins, aminoacids, such as, lysine with substantial amounts of vitamins B1 and B2 [8]. The biological properties of buckwheat grain protein is also superior to other food stuffs/grains and is almost similar to milk (casein) protein and egg protein. The unique qualities of this underutilized wonder crop plant instigated scientific society to sequence its genome in 2016 and establish an updated Buckwheat Genome DataBase (BGDB) ([9]; http://buckwheat.kazusa.or.jp). In this interesting and urging context, we here propose a collaborative research for buckwheat nutrigenomics. Moreover, it is pertinent to mention that our group has collected diverse buckwheat germplasms from North-West Himalayas and established the nutritional and nutraceutical profiles of buckwheat germplasm. We are in process of mining QTLs/candidate genes responsible for these traits in buckwheat.

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