Food for thought: putting wild edibles back on the table for combating hidden hunger in developing countries

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Agrobiodiversity is crucial for feeding the rapidly growing human population and also for attaining the UN Sustainable Development Goals such as no poverty, zero hunger and good health and well being for one and all, as the 2030 agenda for sustainable development. Agrobiodiversity is also imperative for dietary diversification, and for breeding the next generation of climate-smart crops for futuristic conditions. Here we discuss the importance of wild crop plants for the food and nutritional security in the developing world.

Ensuring food and nutritional security for an exponentially growing human population is one of the major sustainability challenges of the resource-poor nations in this century[1]. Providing a healthy and balanced diet for 'one and all' is imperious for attaining the first three UN Sustainable Development Goals (SDGs), i.e. no poverty, zero hunger and good health[2,3] and well being by 2030 (www.sustainabledevelopment.un.org). However, in times of global warming and changing climatic conditions, food production soley based on dwindling natural resources and limited socio-ecological adaptation framework is a herculean task for the developing countries[4–6]. Recent scientific studies have already articulated the negative impact of changing climate on yield and nutritional quality of some staple crops and thereby raised serious concerns regarding the prevalence of hidden hunger under futuristic climatic conditions[4–8]. While some prominent strategies to avert malnutrition exist, viz. (i) diet supplementation, (ii) fortification and (iii) dietary diversification (www.who.org), the later one through sustainable agricultural practices will not only help in putting nutrient-rich, traditional and wild relatives of crop plants back on the table[8–10], but also in achieving at least six out of 17 SDGs such as goal nos 1, 2, 3, 12, 15 and 16 (www.sustainabledevelopment.un.org). Here we underpin the significance of agro-biodiversity for accomplishing zero hunger and other SDGs in the developing nations.

Though many national, regional and international initiatives are operational in the developing nations to combat hidden hunger, majority of these tropical countries are seriously inflicted by lack of adequate and nutritious food resources

Table 1. Promising wild crops for food and nutritional security in tropical countries. Nutrient profile of 100 g fresh samples (Nutrient sources: USDA Nutrient Database (www.usda.org); Rubatzky and Yamaguchi[13])

Wild crop species		Vitamins	Minerals
Indian spinach (*Basella rubra* L.)		Vitamin C: 102 mg Thiamin: 0.05 mg Riboflavin: 0.155 mg Niacin: 0.5 mg Vitamin B-6: 0.24 mg Folate, total: 140 µg Vitamin A, RAE: 400 µg Vitamin A, IU: 8000 IU	Calcium: 109 mg Iron: 1.2 mg Magnesium: 65 mg Phosphorus: 52 mg Potassium: 510 mg Zinc: 0.43 mg Copper: 0.107 mg Selenium: 0.8 µg
Wild amaranth (*Amaranthus viridis* L.)		Vitamin: 41.1 mg Thiamin: 0.0 mg Riboflavin: 0.151 mg Niacin: 0.53 mg Vitamin B-6: 0.15 mg Folate, total: 56.96 µg Vitamin A, IU: 2769 IU	Calcium: 193.93 mg Iron: 2.27 mg Magnesium: 55 mg Phosphorus: 71.96 mg Potassium: 640 mg Zinc: 0.90 mg Copper: 0.15 mg Selenium: 0.90 µg
Winged bean (*Psophocarpus tetragonolobus* (L). D.C.)		Thiamin: 1.03 mg Riboflavin: 0.45 mg Niacin: 3.09 mg Pantothenic acid: 0.795 mg Vitamin B-6: 0.175 mg Folate, total: 45 µg	Calcium: 440 mg Iron: 13.44 mg Magnesium: 179 mg Phosphorus: 451 mg Potassium: 977 mg Manganese: 3.721 mg Selenium: 0.8 µg

(*Contd*)

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Sword bean (*Canavalia gladiata* (Jacq.) D.C.)		Vitamin C: 32 mg Thiamin: 0.2 mg Riboflavin: 0.1 mg Niacin:2 mg Vitamin A, IU: 40 IU	Calcium: 33 mg Iron: 1.2 mg Phosphorus: 66 mg
Pseudo cereal (*Amaranthus cruentus* L.)		Thiamin: 0.02 mg Riboflavin: 0.02 mg Niacin: 0.24 mg Vitamin B-6: 0.1 mg Folate, total: 22 μg	Calcium: 47 mg Iron: 2.1 mg Magnesium: 65 mg Phosphorus: 148 mg Potassium: 135 mg Sodium: 0.9 mg Zinc: 0.9 mg
Pearl millet (*Pennisetum glaucum* (L.) R. Br.)		Vitamin C: 1.6 mg Riboflavin: 0.29 mg Niacin: 4.72 mg Vitamin B-6: 0.38 mg Folate, total: 85 μg	Calcium: 8.0 mg Iron: 3.0 mg Magnesium: 114 mg Phosphorus: 285 mg Potassium: 195 mg Sodium: 5 mg Zinc: 1.7 mg Manganese: 1.6 mg
Ground cherry (*Physalis angulata* L.)		Vitamin C: 11 mg Thiamin: 0.11 mg Riboflavin: 0.04 mg Niacin: 2.8 mg Vitamin A, RAE: 36 μg	Calcium: 9 mg Iron: 1 mg Phosphorus: 40 mg

for ensuring good health and a healthy life to their citizens[9,11]. As a result, malnutrition is extremely high in these nations, and thereby seriously undermining the health and well-being of the millions of infants, mothers, youth and elderly peoples (www.who.org). Therefore, many concrete steps are yet to be implemented to eradicate malnutrition completely by 2030, and also achieve all other SDG targets in true letter and spirit[10,12]. However, there is also a silver lining as most of these tropical countries are bestowed with agrobiodiversity and have diverse kinds of wild and nutritious crop varieties for dietary diversification, thanks to the rich agro-biodiversity and associated bio-cultural diversity in the tropical nations[13]. An important step that can be taken by all these nations is to align their malnutrition abatement activities with SDGs, and promote cleaner and sustainable agricultural production with special emphasis on exploiting agrobiodiversity for dietary diversification. Unfortunately, most of these wild varieties of crop plants are neglected and underutilized without knowing their real potential[9,13]. So bringing back such neglected and underutilized edibles into the backyard/home gardens and putting all culinary items back on the plate is the need of the hour for combating no poverty and zero hunger[9].

Hence, we urge the large-scale cultivation and sustainable utilization of such wild crop species in a participatory approach (i.e. involving local communities and families, especially with the help of women and children, community health practitioners, diet specialists, local NGOs, self-help groups, etc.) for a successful dietary diversification programme. As an example, here we report seven such neglected and underutilized crops (Table 1), viz. pearl millet (*Pennisetum glaucum*), amaranth or pseudo cereal (*Amaranth cruentus*), winged bean (*Psophocarpus tetragonolobus*), sword bean (*Canavalia gladiata*), Indian spinach[14] (*Basella rubra*), Amaranth leafy vegetable (*Amaranthus viridis*) and ground cherry (*Physalis angulata*) for the dietary diversification programme as these species are rich in vitamins and other minerals. Fortunately, these wild species are well adapted to diverse soil conditions (even in resource poor soils) and can thrive luxuriously in the hot and humid climate of tropical regions (www.fao.org). Moreover, they need little care or agronomic practices, and grow well along the roadsides and other disturbed sites, home gardens, kitchen gardens and even in fields along with other cultivated crops. Since such crops need only minimal agronomic practices, resource-poor farmers can be benefited from the cultivation of such species. For example, the cultivation of perennial leafy vegetables like Indian spinach ensures the availability of a leaf item on the plate throughout the year. So national, subregional and regional level initiatives are required for encouraging the sustainable use of traditional crop varieties for combating malnutrition in tropical countries and also for attaining UN-SDG under the

joint supervision of State, Central and international agencies such as the World Health Organization, and Food and Agricultural Organization of the United Nations.

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