

Status, diversity and potential of semi arid indigenous and minor vegetables of western India

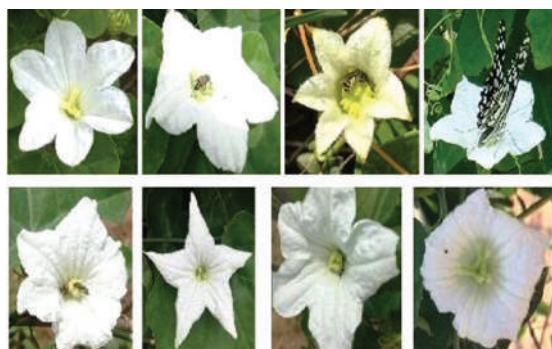
Global diversity in vegetable crops is estimated about 400 species, with about 80 species of major and minor vegetables reported to have originated in India. About 37% of cultivated vegetable species were determined to have an Asian-Pacific origin, 22% originated in the Americas, 17% are from the region spanning Europe, the Mediterranean, Near East and Central Asia, 15% originated from Saharan and sub-saharan Africa, and 10% are wide ranging species that cross several world regions. However, with the advent of cut-and-burn agriculture and green revolution/commercialized agriculture, the development project areas and related activities of these diverse resources are declining at a fast pace. Overgrazing, deforestation, and overexploitation of native resources under range situations have eroded the biodiversity of vegetable crops from this unique ecosystem. Moreover, traditional knowledge about important indigenous plant species has also decreased in the younger generation influenced by urbanization.

Status of semi-arid region of western India

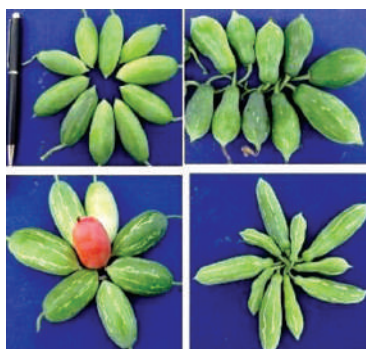
Global expansion of semi-arid region is 22.6 million square kilometer (MSK) followed by arid region (15.7 MSK). Two zones of semi-arid climate are recognized in India, one in the north, is contiguous with the desert of Thar, extending into Rajasthan, Punjab, parts of Uttar Pradesh, Kutch, Saurashtra (the Mountainous region of Gir excluded). The other semi-arid zone is situated in the south. It includes the Deccan plateau, the Coimbatore plateau located in the shadow of the Nilgiri and Palni hills and the extreme south-east corner of Madras comprising Ramanathapuram and Tirunelveli districts. The semi-arid zones of north and south are separated by a narrow humid strip composed of the Satpura range and the plain of the Tapi River. Some regions are characterized by hot and dry summer and cool winter whereas some regions are characterized by hot and wet summer and dry winter.

Potential of semi-arid indigenous vegetable

The indigenous and minor vegetables includes cucurbitaceous vegetables, viz. kachri (*Cucumis melo* var. *callosus* / *agrestis*), kakadia/snap melon (*Cucumis melo* var. *momordica*), mateera (*Citrullus lanatus*), tinda (*Praecitrullus fistulosus*), spine gourd, ivy gourd; leguminous vegetables, viz. Indian bean, cluster bean (*Cymopsis tetragonoloba*); leafy vegetables like palak, amaranths, fenugreek, coriander, fennel, drumstick leaves, brinjal, drumstick etc. have potential to fight the problems of protein, vitamins, minerals, antioxidants and micronutrients in malnutrition affected areas in western India (Table 1). Various indigenous leafy vegetables of western India are having an optimal source of nutrients such as carotene, folate, iron, calcium, zinc, proteins and dietary fibre. Therefore, documentation of traditional crop knowledge and dissemination of information relating to the indigenous



Variability in ivy gourd flower and different pollinating agents



Fruit variability in Ivy gourd



Promising line of spine gourd CHESSG-11 under semi-arid conditions

vegetable food utilization is very essential for conservation of diversity and solving nutritional problems. Cucurbits are major crops grown in different areas of the state, more specifically in western Rajasthan, and the river belt cultivation of muskmelon and watermelon has been very prominent in the past. Similarly, Shahpura Tinda (round melon) is very famous in our country. Similarly, snapmelon and kachri are also grown in a sizeable area. Similarly, watermelon (mateera) is grown in several parts of western Rajasthan and seeds of watermelon after removal of seed-coat are being exported to several Middle-East countries.

Diverse collection and improvement on semi-arid vegetable crops at ICAR-Central Horticultural Experiment Station (CIAH RS), Godhra, Gujarat

There is a potential of growing the semi-arid indigenous and minor vegetables like cucurbits (cucumber, spine gourd, kachri, snapmelon, ivy gourd), leguminous vegetables (Dolichos bean and cluster bean), leafy vegetables, brinjal, drumstick etc. with modern agricultural inputs as a sole crop, intercrop or kitchen gardening. Keeping in view, Central Horticultural Experiment Station (ICAR-CIAH), Godhra Gujarat is working to develop different technologies and varieties under semi-arid conditions which will suit to iso-climatic regions for enhancing productivity in semi-arid areas and ultimately enable to improve livelihood security of resource poor farmers. A wide range of variability was found in the part of semi arid region of western India during survey and collection, and evaluation of different genotypes of drumstick (44), ivy gourd (35), spine gourd (20), pole type Indian bean (70), bush types of Indian bean (42) at Central Horticultural Experiment Station (ICAR-CIAH), Vejalpur, Gujarat under semi arid conditions. Drumstick is an important vegetable crop cultivated in



Variability in spine gourd fruits under semi-arid conditions

semi-arid region for its green pods. Every part of this plant is valuable for food and enriched with nutrients, minerals and vitamins. In addition to its edible and nutritional value, it has tremendous potential on industrial features such as use of roots (alternate to horseradish), wood (making mats, paper and cordage manufacturing), the seeds (water clarification), oil extracted from seed kernels (lubricants in watch making and precision equipments, and in the preparation of cosmetics). In addition to this, moringa is found to have a group of unique compounds containing sugar and rhamnose, which are uncommon sugar modified glucosinolates. In Gujarat, there are two prevalent edible types, Saragvi and Saragva based on their colour and preference, the saragvi is slender, parrot green pods and preferred by consumers, whereas saragva is stout and dark green pod. Thar Harsha is a new high yielding drought tolerant cultivar of drumstick, developed at the institute. It is a late flowering and late maturing type which comes to harvest during March-May. Its hardy



Variability in fruits of Indian bean

Table 1. Recommended varieties of vegetables for semi-arid region of western India

Crop	Varieties
Cluster bean	Goma Manjari, Thar Bhadvi, Pusa Sadabahar, Pusa Mausami, Pusa Navbahar, Durga Bahar, AHG-13
Indian bean	Thar Katki, Thar Mahi, Arka Jay, Arka Bhavani, Arka Swagath
Brinjal	Pusa Purple Long, Pusa Purple Round, Pusa Kranti, Pusa Anmol, Arka Sheet, Arka Shirish, Arka Kusumakar, Arka Navneet, Arka Harshita
Ivy gourd	Thar Sundari
Bitter gourd	Pusa Do Mausmi, Arka Harit, Pride of Gujarat
Drumstick	Thar Harsha
Palak	Jobner Green, Pusa Palak, Pusa Harit, Pusa Bharti, Arka Anupama
Amaranths	Pusa Kirti, Chhoti Chauali, Badi Chaulai, CO-1, CO-2, CO-3

nature facilitate the pod setting which reach marketable size despite of prevailing drought situations and recorded with 20-30% greater marketable yield and 85.90% more total yield as compared to check under drought conditions. Each tree can bear on an average 45-48 kg pods. The pod contains higher protein (9.30 g), vitamin C (246 mg) and

vitamin A content (9783 IU) per 100 g.

SUMMARY

Semi-arid indigenous and minor vegetables afford excellent opportunities for improvement of human health, and farmer's household economic and social advancement. These vegetables are ideally suited to accomplish these objectives owing to their high economic and nutritive values and they can often serve as an engine for agricultural and economic diversification. Supplements and fortified foods can effectively address micronutrient deficiencies in the short-term, but food-based solutions, such as increasing the consumption of vegetables represent the most sustainable method of reducing and controlling micronutrient deficiencies in resource-poor communities. Supportive policies are needed to advance research, conservation, and documentation of neglected indigenous semi-arid vegetable species to protect and realize their role in nutrition-sensitive horticulture.

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Winged bean

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Winged bean is an underexploited, multipurpose leguminous vegetable crop which finds an important place in traditional diets. Almost all parts of the plant can be eaten and are consumed by incorporating in a variety of cuisines. The green pods, tubers, seeds, leaves, flowers and shoots, are rich in protein, vitamins and minerals and also possess remarkable soil nitrification properties. The protein content varies in leaves (5-15%) and green pods (1.9-2.9 %), carbohydrates (3.1-3.8 %), rich in calcium, iron and vitamins and tuber contains 10-12% crude protein. It is found that winged bean green pods have higher antioxidant activity than raw tubers. Winged bean can be grown effectively with little care and management and will not compete for available land with other crops. Promotion, augmentation and popularization of such traditional food plants through systematic scientific evidences would support their adoption in the country. An initiative has been taken at ICAR-Indian Institute of Vegetable Research, Varanasi, India by adopting winged bean as a new underexploited vegetable crop.

