



Wild relatives of Citrus found in India

Kumar Avinash Bharati

Central National Herbarium, Botanical survey of India, Howrah-711103

E-mail: avinash.bharati@bsi.gov.in

Abstract

One of the megadiversity region of genus Citrus is falls in North East India. In addition to commercially cultivated species many less common species are under limited cultivation. Germplasm diversity of cultivated and wild genetic resources is very high in Eastern Himalayan region. These cultivated varieties, wild and semi-wild species of Citrus harbor many agronomic traits. This genetic diversity may play important role in crop improvement programme and industries used citrus as raw material. However, genetic diversity of Citrus is under threat due to selected use of cultivars to fulfil market demand, loss of wild species due to habitat loss and change in land use. Therefore, it is necessary to document and conserve the germplasm of Citrus to aid in formulation of suitable strategies for sustainable utilization, conservation and preservation. The present study has documented 18 wild relatives of the Citrus found in India. The listed taxa are expected to receive priority in national plans for promotion of conservation and may be utilized in plant breeding programmes.

Keywords: Citrus, Wild relatives, Genetic resources, Plant breeding

Introduction

Genus Citrus L. belongs to the subfamily Aurantioideae of the family Rutaceae. A total of 28 valid taxa under genus are exists in the world (<https://powo.science.kew.org/results?q=citrus>). Citrus fruits are major source of vitamin C and one of the favorite fruit in almost all the countries of the world. It is estimated that more than 500 species of fruits are found in Asia (Rao and Bhag Mal, 2002). The South and Southeast Asia represents about 300 species of native minor fruits (Arora, 1995). India is one of the 12 mega diversity rich countries of the World possessing

two hot spots of biodiversity, Northeast India falls under the “IndoBurma Region” of hot spot. However, the genetic diversity of tropical fruit trees under threat due to selected use of cultivars to fulfil market demand and change in land use (Bhag Mal et al., 2011). Conservation of wild germplasm is necessary because if species or cultivar lost from nature is a loss of unique genetic information, that had evolved over several generations. The wild genetic resources Citrus species and their natural hybrids distributed in NE India but has not been used to its full potential for

Citrus improvement programmes (Malik et al, 2012). Most of the cultivated species of Citrus are originated in eastern Himalayas and foot hills of Assam. Also, in south east Asia some wild species of Citrus are found. According to Vavilov Citrus spp. is originated in “Chinese centre”, it includes mountainous regions of central and western China and adjacent lowlands. North East India falls under “IndoBurma Region” of hot spots has many wild species of Citrus (Vavilov, 1930; Kochhar, 1981). Keeping this fact in view, *in situ* Conservation efforts have been taken and “Citrus Gene Sanctuary” at Nokrek Biosphere Reserve in Garo Hills of Meghalaya was established in 1981, covering about 10,266 ha (Singh, 1981). The Sanctuary is first of its own kind in the world.

Germplasms are basic material for crop improvement projects, it includes both cultivated and wild species and their relatives. Therefore, it is necessary to secure wild relatives of crops and intensive plant breeding programme must be initiated to tackle food insecurity and environment protection (Singh et al., 2013; Halewood et al., 2018). Genetic diversity must be documented for assessment of present genetic resources status and ethnic knowledge associated with taxon and economic potential of Citrus occurring in NE India for designing the suitable strategies for their survey, exploration, sustainable utilization and conservation.

The objective of present study was to help the plant breeders and students in using scientifically valid name of Citrus crop plants and their wild relatives on which they are working.

Methodology

Wild relatives of *Citrus* spp. were compiled from the relevant literatures like, Inventory of cultivated plants species and their wild relatives in India (Singh et al., 2013), Wild relatives of Crop plants in India: collection and conservation (Pandey et al., 2005), Wild relatives of crop plants in India (Arora and Nayar, 1984), Useful plants of India (Ambasta, 1986). The present status of

cultivated varieties are gathered from the relevant sources (Malik et al, 2012) Botanical names of the species have been updated with help of online databases such as <https://plants.usda.gov/>, <https://powo.science.kew.org/> and <http://www.tropicos.org/>. Names of the respective families are according to the APG IV system of classification.

Result and Discussion

Citrus is the third most important fruit crop of India and North East India is the one of the centre of origin. It is cultivated on large scale and different types of crops are found such as citrons, lemons, limes, mandarins, sour oranges, sweet oranges, pummelos, grapefruits, etc. Citrus is a diverse genus with huge variation in phenotype but diploid chromosome count is 28 (2n), however, some species are polyploid with 27 and 36 chromosome (2n). Total 18 wild relatives of *Citrus* spp. are enlisted along with distribution and remarks (table 1). Ten wild relatives of *Citrus* spp. are native of North-East India, three species are native of southern India, two species are native of Punjab region, two wild relatives are in Genetic plains, one species is endemic to central India, one species is native of north-west India and one species is disturbed throughout in India. According to Malik et al (2012) out of 30 Citrus species, sub-species and hybrids available in India atleast nine are available throughout India, whereas 15 are confined to Northeastern India, nine to South India, six to Northwestern India and one to central India. The present study offers germ plasm diversity which is a part of plant diversity of the India.

The documentation of wild germplasm/genetic resources will offer new genes and allelic variability to improve our crops, it helps in getting desirable traits in important horticultural crops of *Citrus* spp. Further, these listed taxa are expected to receive attention in while conservation of wild resources and sustainable use policies, also it is necessary to develop the capability of users for recognizing germplasms with correct identification and nomenclature (Singh et al., 2013).

Table 1: Wild relatives of Citrus found in India

S. No.	Scientific name	Family	Distribution	Remarks
1.	<i>Citrus assamensis</i> R.M.Dutta & Bhattacharya	Rutaceae	Khasi hills (Meghalaya)	Endemic
2.	<i>Citrus cavaleriei</i> H.Lév. ex Cavalerie	Rutaceae	NE India	Endemic to Khasi hills
3.	<i>Citrus hystrix</i> DC.	Rutaceae	Assam, Manipur, Nagaland	Leaves have insecticidal property
4.	<i>Citrus indica</i> Yu.Tanaka	Rutaceae	Assam, Meghalaya	Endangered species
5.	<i>Citrus jambhiri</i> Lush	Rutaceae	Eastern Punjab	Close to <i>Citruslimon</i> (L.)Burn.F
6.	<i>Citrus karna</i> Raf.	Rutaceae	Eastern Himalayas, Gangetic plains	Rich in essential oil
7.	<i>Citrus latipes</i> Tanaka.	Rutaceae	Khasi hills	Cold tolerant
8.	<i>Citrus limetta</i> Risso	Rutaceae	NE India	Commonly found in NE states
9.	<i>Citrus limonia</i> Osbeck	Rutaceae	Central India	Used as root stock
10.	<i>Citrus maderaspatana</i> Yu.Tanaka	Rutaceae	Peninsular India	
11.	<i>Citrus maxima</i> (Burm.) Merr.	Rutaceae	Eastern India	Under cultivation
12.	<i>Citrus megaloxycarpa</i> Lush.	Rutaceae	NE India	Under cultivation in Manipur
13.	<i>Citrus nakoor</i> Singh	Rutaceae	Peninsular India	
14.	<i>Citrus paradisi</i> Macfad.	Rutaceae	Gangetic plain	Under cultivation in Punjab
15.	<i>Citrus pennivesiculata</i> (Lush.) Yu.Tanaka	Rutaceae	Peninsular India	
16.	<i>Citrus reshni</i> (Engl.) Yu.Tanaka	Rutaceae	Throughout India	
17.	<i>Citrus reticulata</i> Blanco	Rutaceae	NW India	
18.	<i>Citrus rugulosa</i> Yu.Tanaka	Rutaceae	Foot hills of north west India	Endangered

References

- Ambasta, S. P. (Ed.). 1986. *The useful plants of India*. CSIR, New Delhi.
- Arora, R. K. & E. R. Nayar .1984. Wild relatives of crop plants in India. Wild relatives of crop plants in India.
- Bhag M, Ramanatha Rao V, Arora RK, Sajise, PE and Sthapit BR. 2011. Conservation and sustainable use of tropical fruit species diversity: Bioversity's efforts in Asia, the Pacific and Oceania. Indian J. Plant Genetic Resources 24: 1-22.
- Halewood, M., T. Chiurugwi, R. Sackville Hamilton, B. Kurtz, E. Marden, E. Welch, F. Michiels, J. Mozafari, M. Sabran, N. Patron & P. Kersey. 2018. Plant genetic resources for food and agriculture: opportunities and challenges emerging from the science and information technology revolution. New Phytologist, 217(4): 1407-1419.
- Kochhar S.L. 1981. *Economic Botany in Tropics*. Macmillan India Limited, Delhi.

- Malik SK, Chaudhury R, Kumar S, Dhariwal OP and Bhandari DC (2012) Citrus Genetic Resources in India: Present Status and Management. National Bureau of Plant Genetic Resources, New Delhi, India,
- Pandey, A., D. Bhandari, K. Bhatt, S. Pareek, A. Tomer & B. Dhillon. 2005. Wild relatives of Crop plants in India: collection and conservation. National Bureau of Plant Genetic Resources: New Delhi, India.
- Ramanatha Rao V and Bhag Mal. 2002. Tropical fruit species in Asia: diversity and conservation strategies. Acta Horti. 575: 179-190.
- Singh, A.K., R.S. Rana, B. Mal, B. Singh & R.C. Agrawal. 2013. Inventory of cultivated plants species and their wild relatives in India. Protection of Plant Varieties and Farmers' Right Authority (PPV & FRA), Ministry of Agriculture, Government of India, New Delhi.
- Vavilov, NI. 1930. The problems of the origin of cultivated plants and domestic animals, as conceived at the present time. Proceedings. USSR Congr. Genet. Plant-and Animal-Breed. 2: 5-18.

Access this Article in Online	
	Website: www.ijarbs.com
	Subject: Germplasm diversity
Quick Response Code	
DOI: 10.22192/ijarbs.2024.11.04.002	

How to cite this article:

Kumar Avinash Bharati. (2024). Wild relatives of Citrus found in India. Int. J. Adv. Res. Biol. Sci. 11(4): 15-18.

DOI: <http://dx.doi.org/10.22192/ijarbs.2024.11.04.002>