

## Utilization of Exotic Introductions for Crop Improvement in Vegetables

**Chitra Pandey, J Radhamani and Anjali Kak**

*Germplasm Conservation Division, NBPGR, Pusa Campus, New Delhi-110 012, Delhi*

India has made a significant progress in vegetable production in last three decades. It is the second largest vegetable producer next to China. It ranks first in cauliflower production, second in onion and third in cabbage. NBPGR has made significant contribution towards introduction of vegetable germplasm with greater potential value. Exotic germplasm of different temperate, tropical and sub-tropical crops have been introduced by NBPGR from 40 countries. Moreover exotic introductions played an important role in the development of improved varieties in vegetable crops. Introduction in the form of wild species, breeding lines, primitive cultivars as well as commercial varieties have resulted in the development of indigenous varieties in introduced crops like tomato, chilli, capsicum, cauliflower, cabbage, carrot, turnip, pea (Chadha and Kalloo, 1993). NBPGR has assembled a total of 1,678 exotic germplasm accessions comprising various vegetable crops namely tomato (934), brinjal (232), okra (273), vegetable pea (15), vegetable soybean (12), cabbage (156), radish (26), carrot (6), methi (28) and spinach (9). A total of 52 new varieties have been developed utilizing the exotic germplasm in different groups of vegetables (Shanmugam *et al.*, 1995 and 2003), viz. solanaceous (31), cucurbitaceous (6) cole crops (5) and root crops (10). Some of the outstanding examples are as mentioned in Table 1. The utilisation of plant genetic resources in crop improvement rests mainly on identification of introduced germplasm for the specific traits possessed by them. Some of the resistant sources identified in different crops are given in the Table 2.

It is very well realized that the production, consumption and availability of vegetables have been increasing and shall increase in future also. Despite a large number of varieties and hybrids developed, the productivity of vegetable crops has not improved significantly. There are very few varieties and hybrids carrying high degree of resistance to various diseases, pests and environmental stresses. Multiple disease resistant varieties are yet to be developed therefore there is an urgent need to identify the potentially valuable traits which possess genes for resistance to be identified and incorporated in the crop improvement programmes to

**Table 1. Exotic Germplasm used for varietal development in India**

Crop Group	Crop	Varieties developed
Solanaceous	Tomato	Pusa Ruby (Sioux), Pusa Early Dwarf (Red Cloud), Pusa Red Plum ( <i>L. pimpinellifolium</i> ), Punjab Chhuhara (EC 55005), Pusa 120 (Hawaii line), Pusa Saurabh (V-685 Canada), Arka Vikas (Tip Top), CO-2 (USSR TYPE), HS101 (Exotic Culture), HS110 (Exotic Line), Hisar Anmol ( <i>L. hirsutum</i> cv <i>glabratum</i> ), NDTR-1 ( <i>L. peruvianum</i> ), Punjab Tropic (USA-216-17-BK-DS-D3-03-DBK CAUSTMIO), ATV-1 (EC 8819 Denmark), ATH1 (Hawaii-7992), Sonali (US 43-1, Tamuchico111), Pusa Gaurav (Glamour x Watch), Parbhani Yashashri (PI134417), Utkal Kumari (TipTop).
	Chilli	Sindhur (Hot Portugal), Bhagyalaxmi (Thohian).
	Capsicum	Arka Basant (Sorksan), Arka Basanti (Titan), Arka Gaurav (Golden Calwender), Nishat1 (World Beater).
	Brinjal	Pusa Anmol (PPL), Junagarh Oblong (Black Beauty), Punjab Harayna Brinjal 4 (Pusa Purple Long), Arka Naveen (Supreme).
Cucurbitaceous	Cucumber	Pusa Sanyog (Japanese Gynoecious), Phule Shubhangi (Poinsette)
	Musk melon	Pusa Sharbat (USA 4), Punjab Sunher (Edsito)
	Water melon	Arka Jyoti (Gimoon Sweet), Pusa Bedana (EL-RA2),
Cole crops	Cabbage	Golden Acre (Copenhagen Market), Pride of India (Copenhagen Market), Pusa Mukta (EC 24855, EC 10109)
	Cauliflower	Pusa Snowball-1 (EC 12013, EC 12012), Pusa Shubhra (PI277275)
Root crops	Radish	Pusa Chetki (Denmark selection), Pusa Nishant (Singapore selection), Pusa Himani (Capsicum White), Pusa Reshmi (Green Top)
	Carrot	Pusa Kesar (Nantes), Pusa Yamdagni (EC 9981), Selection 21 (Nantes)
	Turnip	Pusa Swarnima (Golden Ball x Japanese White), Pusa Kanchan (Golden Ball)
	Sugarbeet	IISR Composite (US75, Dobrovicaka)

**Table2. Sources of Resistance to major biotic and abiotic stresses identified in the introduced germplasm in some important Vegetable Crops**

Crop and Stresses	Introduced source of resistance
<b>Tomato</b>	
Bacterial wilt	EC 467725-935, EC 438314-317, EC 182761-182874, EC 26511-13
<i>Fusarium</i> wilt	Pan American, Florida, PI 79532
Root knot Nematode	Nemared, VNF-8, Florida, Hawaii cross
Heat tolerant lines	EC 198416, EC 501573-83, EC 479027, 31, 34, 36, 139, 140, 141 and 143
<b>Brinjal</b>	
Bacterial wilt	EC 104107, Florida Market
<i>Phomopsis</i> fruit rot	EC 305069, 316274
Tolerance to frost	Black torpedo, Long Tom '4'
Tolerance to drought	Supreme, Violette round
<b>Chilli</b>	
Cucumber mosaic virus	EC 312342-312349
PBNV mosaic virus	EC 121490
Aphids	EC 28, 30 and 34
<b>Okra</b>	
YVMV	EC 133408, EC169333, EC 169334, Ghana red
Jassids	EC 305656, 305694, 305695
<b>Pea</b>	
Powdery mildew	EC 342007
<b>Cucumber</b>	
Downy mildew, powdery mildew	Poinsette (PM, DM)
<b>Muskmelon</b>	
Downey mildew, powdery mildew, Anthracnose	Crimson sweet, shipper
<b>Cabbage</b>	
Black rot	EC 24855, EC 28770, Cabbage Standby
<b>Cauliflower</b>	
Black rot	Aemel, Olympus, Lawyana
<b>Onion</b>	
Purple blotch	EC 328494, EC 328492, EC 328501, EC 321463

meet the ever increasing demand of the vegetable production in India.

#### References

Chadha KL and G Kalloo (1993) In: *Advances in Horticulture* Vol. 5. Malhotra Publishing House New Delhi-12.

Shanmugam C, MS Shukla and DS Mishra (1995 and 2003) Compendium of Proceedings of Central Committee on Crop Standards Notification and Release. Dept. of Agriculture and Cooperation, Ministry of Agriculture, Govt. of India, New Delhi.

NBPGR Annual reports, 1995, 1996, 1997, 1998, 1999, 2000, 2001, National Bureau of Plant Genetic Resources, New Delhi.

## ***In vitro* Conservation of Exotic *Allium scorodoprasum* Germplasm**

**Ruchira Pandey, Aparajita Das, SR Apte and KS Negi**

*Tissue Culture and Cryopreservation Unit, National Bureau of Plant Genetic Resources, Pusa Campus, New Delhi-110 012*

Introduction of new plant material from wide and varied sources is an integral part of plant genetic resources activity programme. Extensive efforts were made by National Bureau of Plant Genetic Resources (NBPGR) to introduce the exotic germplasm of *Alliums* from different parts of the world to strengthen the *Allium* germplasm resources activity.

*Alliums*, representing an important genus amongst bulbous crops, are mostly used as a vegetable, spice or as a medicine (Chandel and Pandey 1992). These are either propagated through bulbs as some species are seed-sterile or propagated through seeds as well as bulbs. Since, it is a cross-pollinated crop, propagation through seed results in a highly heterogenous progeny.