Utilization of Barley Introductions in India

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Genetic variations in crop plants are very important for human welfare. Plant genetic resources (PGR) constitute the basic raw material, required essentially for the crop improvement programme. The rapid spread of improved crop varieties throughout the world has replaced many of the genetic resources essential to their continued improvement. Exchange of plant genetic resources has played an important role in broadening the genetic base of plant breeding. CIMMYT and ICARDA, the two international organizations are pioneer in the area of germplasm improvement and exchange for crops like wheat, barley, maize etc. They have catered the need of our national programme by supplying various germplasm of barley and wheat in the form of international trial and nurseries. The Indian barley programme has exploited these trials/ nurseries to enhance the genetic base of the material over last several years. Apart from these two international institutes, number of organization in Europe and America also has large barley collection and we could acquire materials from these collections through exchange of germplasm. Some of these introduced materials have been released in India as direct introduction for different production condition and number of them has been used in the hybridization programme for improvement of Indian barley varieties. Direct introductions such as Clipper in 1969 from Australia, and Alfa 93 in 1995 from Argentina, both two rowed with better malting quality were released by CVRC for cultivation in NWPZ. These varieties performed well in irrigated timely sown condition in Punjab, Haryana, Western UP and Rajasthan. However, these varieties are late in maturity and have poor straw strength with about 36.2 q/ ha yield. Another two-rowed variety BCU73 with good malt quality was introduced from Australia via ICARDA and was released by CVRC in 1997 for commercial cultivation in India. This variety is bold seeded and gives high yield (38 Q/ ha) under proper management condition and is still under commercial cultivation. Recently released new malt barley variety DWR28 (with 41.4 q/ ha grain yield) have been developed through hybridization programme utilizing BCU73 as one parent.

Apart from these entries, number of other introductions were made as feed barley like HBL113 which is a selection from exotic germplasm Zyphzee from USA (released for cultivation in Northern Hill Zone in 1995 by CVRC while another variety Sonu (a selection from cross EB233/ GIZA117) was released by SVRC for rainfed condition in Himachal Pradesh. Two six rowed husk less varieties LSB2 (a direct introduction as USA94 in 1971) and Dolma (a direct introduction as USA115 in 1974) were released by CVRC for rainfed condition in hills to be used for human consumption.

Also numbers of barley varieties namely Kailash, Ranjeet, DL-88, Himani, BHS-169, Karan16, BG-105, BH-75, RD-31, RD-57, Rajkiran, RD-2052, Geetanjali, NDB-1173 and DWR28 have been released over the years by both CVRC and SVRC having one of the parents as exotic material.

The programme has been receiving a number of international trials/ nurseries from ICARDA and CIMMYT regularly for many years. During last five years more than 2256 barley genotypes were evaluated at DWR for different traits out of which nearly 200 accessions have been selected for utilization in our breeding programme. A number of germplasm accessions and released varieties from countries like USA, Canada, Australia and other European countries were also received and evaluated during last decade which are good sources for malting quality, resistance to different diseases and pests. The entries like Bonus, Shebec, Canut, Caruso, Betzes, Quilmes, Pampa, Quilmes 27-1, Chariot, CDC McGWIRE, CDC BOLD, CDC DOLLY, CD SISLER, CDC CANDALL, CDC MANLEY, FARMINGTON, UC933, UC937, UC969, UC960, UC1047, Keel, Gairdner, Galleon, Schooner, Sloop SA, Sloop VIC, Dhow, AC Ranger, Trochu, Kasota, BOB Barley, Drummond, VIVAN were received during last few years and are being utilized in the on-going breeding programme for different purposes.

Emphasizing the need of germplasm evaluation recently the programme has started evaluating more than 5000 accessions of barley germplasm collections (both indigenous and exotic); under ICAR funded Adhoc Research Project involving 9 barley network centres. In the first year, 2003-04 crop season, a preliminary

evaluation of 1700 accessions was made for different DUS traits and resistance to biotic (yellow rust, leaf blights, covered smut, leaf stripe, aphid and cereal cyst nematode) and abiotic stresses (drought, heat, cold and salinity). Resistance sources and donors for different traits will be identified during three years evaluation and will be used in the barley-breeding programme in the country.

Realizing the importance of germplasm, focused efforts are needed to enrich the barley genetic resources through new explorations and introductions in form of various international trials and nurseries and also as specific indents for novel variability. Looking at the importance of genetic resources, efforts are to be intensified to counter the future challenges by coordinating different activities under biodiversity maintenance and conservation.

Introduction of Rice Germplasm–A Boon for India

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India is supposed to be a part of the homeland for cultivated rice. Tremendous amount of variability existed in the landraces of rice germplasm, which has been estimated to be more than 15,000 accessions. However, in the process of evolution and natural selection some of the characters were favored and some other characters got eliminated. Thus there was and has been a necessity of introducing rice cultivars from other geographical regions for the purpose of increasing the yield.

The first recorded introduction of rice cultivars into this country was that of the *indica* type rice germplasm of Chinese origin mainly for cultivation in temperate hill regions. The cultivars like CH2, CH45, CH47, CH972, CH988, CH1007, CH1039 performed very well in the western Himalayan region and some of them are still popularly cultivated in these areas. The varieties like CH4, CH45, CH55, CH62 and CH63 also proved to be very good donors for better yield and early maturity duration.

The systematic introduction of exotic rice germplasm for the purpose of genetic improvement started with the inter-racial hybridization work which was initiated during 1950-1964. The exotic *japonicas* were introduced for crossing with the native *indicas*. The *indica* cultivars were tall and application of nitrogenous chemical fertilizer resulted in pronounced vegetative growth with no yield advantage. Hence the Food and Agriculture Organisation (FAO) launched an international programme of *Japonica-indica* hybridization to incorporate the fertilizer responsive characters of japonica rice into the genotypic background of *indica* rice. The Indian Council of Agricultural Research for the Indian states launched a similar programme. The only variety, which came out of the Indian Programme, was ADT27. Under the FAO programme a variety Mahsuri was developed through selection of *indica* x *japonica* derivatives in Malaysia. This was later introduced into India and has been popularly cultivated in many states.

The limited success of *japonica-indica* project was ascribed to defective selection of the *japonica* parents. With judicious selection of the *japnica* parents, japonica-indica hybrid derivatives resulted in the development of varieties like Annanda, Pallavi, Utkal Prabha, Jagriti etc. which have been released for general cultivation with the farmers in this country. Some of the japonicas performed well in the Himalayan region and one of them Norin 18 was released for general cultivation in Himachal Pradesh. Later, Ponali types were introduced into India and some of them like Tainan 3, Kaoshiung 22, Taichung 65 etc. were released with or without further selection and/ or mutation.

After evaluating exotic collections for selecting a suitable donor for breeding work in high altitude areas of Kashmir and other Himalayan temperate regions, four Chinese varieties including CH1039 and three Russian varieties including R3073 were selected for the valley and hilly region. CH1039 was found to be a higher yielder until 1954 when indica x japonica hybridization programme started and one of the few successful crosses namely Rikku137 out yielded CH1039 in many locations. In another attempt, after a thorough multi-location screening and evaluation of a large number of rice germplasm,