

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 *japonica* 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,

only two Chinese varieties CH13 and CH45 were found resistant to Brown spot disease which was the root cause of Bengal Famine in 1943. CH47 and CH51 were found resistant to yellow stem borer.

Introduction of *javanica* rice germplasm were also attempted and utilization of such a variety like Urangan for hybridization with a *indica* rice germplasm T90 resulted in the development of one of the most popular rice variety of Orissa CR1014.

The introduction of Taichung (Native) 1 from the semi-dwarf mutant Dee-geo-woo-gen of Taiwan in the

1960s was the most significant introduction in the history of rice breeding in India. This was the single variety adaptable to whole of India starting from Kashmir to Kanyakumari. Because of superior response to the high level of nitrogen fertilizer, this variety out yielded significantly both in *kharif* as well as *rabi* season.

Apart from these, with the establishment of International Rice Research Institute in the Philippines, several exotic germplasm including the breeding lines, cultures are being introduced every year to our country in different collaborative research programmes.