

Genetic Diversity Assessment in Indian Germplasm of Barley (*Hordeum vulgare* L.) using g-SSR Markers

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Abstract—Barley is the fourth most important cereal crop in the world, which ranks next to maize, wheat and rice. India produced a total of 1.75 million ton of barley during the year 2013 with an acreage of 0.7-0.8 lakh hectares. Amongst the cereals, barley is a crop with high adaptability. It is grown in different agro-climatic conditions, from hilly regions to plains, under both irrigated and rainfed conditions, making it one of the most hardy crops. As a consequence, the germplasm of barley is rich in genetic diversity and also harbors immense allelic richness which contributes to superior agronomic performance. The national genebank established at ICAR-NBPGR, holds a collection of 7,555 accessions of cultivated barley (*Hordeum vulgare* L.). In an attempt to provide DNA profiles of the released varieties of barley, we used genome wide SSR markers, to study the genetic diversity prevalent in the barley germplasm. In addition to the random SSR markers, candidate gene based SSR markers were designed to target abiotic stress tolerance to salinity, drought and cold. A total of 15 random g-SSRs and 10 candidate gene based SSRs were used to assess genetic diversity in 96 germplasm lines. These included released varieties and registered germplasm of barley. The average PIC of the g-SSR markers was 0.40 and the average number of alleles amplified by these markers was 3.5 with a maximum of 5 alleles and a minimum of 2 alleles amplified. The average genetic diversity among the germplasm accessions was 0.37, ranging from as low as 0.02 to as high as 0.89. This indicates that these germplasm accessions were quite diverse in nature. Cluster analysis revealed that the varieties originating from one centre clustered together, an observation which is also concurrent to the pedigree information.