

Breeding for Durable Rust Resistance in Coffee (*Coffea arabica*) – Field Performance of Some Tetraploid Inter-specific Hybrid Derivatives in India

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SUMMARY

Coffee leaf rust caused by the obligate parasitic fungus *Hemileia vatatrix* Berk & Br is an important disease of concern for arabica coffee (*Coffea arabica* L) cultivation round the globe. In India, leaf rust disease is much more devastating on arabica coffee as the climatic factors are favourable for high disease build up, leading to severe crop losses. In coffee, so far nine resistance genes S_H1 to S_H9 have been identified to be conditioning the resistance to leaf rust, either singly or in combination. In Indian coffee breeding programme, all the nine resistance factors (S_H1 to S_H9) have been exploited and arabica strains that manifests varying levels susceptibility/resistance to rust have been developed. The durability of resistance incorporated into these commercial strains is often constrained by the appearance of new virulent races of rust fungus. Therefore, development of coffee cultivars with long lasting durable resistance by accumulating the resistance genes is a crucial priority. In this direction, a wide array of tetraploid interspecific hybrids have been developed by interspecific and introgressive breeding strategies and these materials are under field evaluation. During the last 10 years, as part of multi-location evaluation, 17 potentially elite hybrid progenies were selected and established at Regional Coffee Research Station, R.V. Nagar. These progenies have been evaluated for growth parameters, field tolerance to rust, clean coffee yield and bean characteristics. Analysis of variance of five morphological characters revealed significant differences between the genotypes in respect of four characters establishing that the genotypes are moderately heterogeneous for plant architecture. Among the reproductive/yield contributing characters, the differences were significant only with respect to yield. Heritability was high (60%) for yield suggesting low genotype X environment interaction. Among different genotypes, S.4643 recorded highest yield of 1055 kg/ha followed by S. 4637 (855 kg/ha) and S.4632 (827 kg/ha). The genotypes differ significantly in their field reaction to leaf rust as studied for 3 years. The genotype S.4643 shows the highest resistance followed by genotypes S.4422 and S.4595. The heritability of resistance was found to be 64% indicating low genotype X environment interaction for this trait. Based on the total index score for each genotype across all characters, S.4643 showed the highest total score of 12.20 followed by S.4622 (11.91), S.4637 (11.68), S.4595 (11.59) and S.4632 (11.44) as against 10.38 in Sln.4 (Agaro) used as control. Some of these promising lines have been advanced and field established for further monitoring and evaluation. The scope and potential of the selected progenies in deriving commercial lines for the zone are discussed.