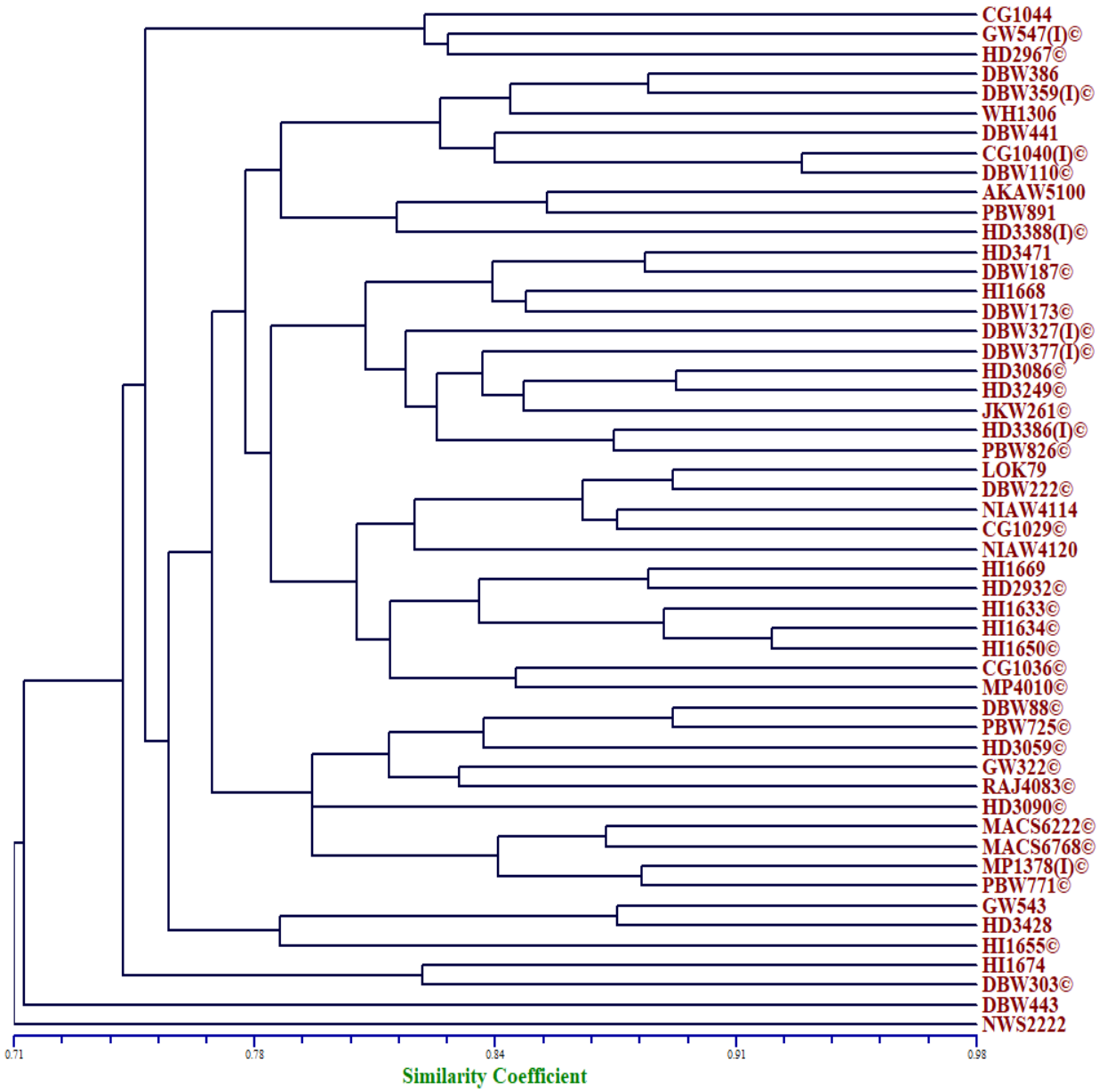
Molecular Report – Wheat AVT Trials (2023-24)

Marker-Assisted Gene Prospecting is a crucial strategy in the varietal development program aimed at improving wheat productivity, adaptability, and resistance to various biotic and abiotic stresses. This method enhances the precision of selecting desirable traits, thereby accelerating the breeding process and improving crop performance. Considering the above points, 17 AVT final year (2023-24) entries and 35 checks were analyzed using a set of 39 simple sequence repeat (SSR) and 11 allele-specific polymerase chain reaction (AS-PCR) markers linked to key genes. These included genes related to waxiness (*WxB1*), abiotic stress tolerance (*DREB*), pre-harvest sprouting resistance (vivipary, *Vp1B3*), leaf rust resistance (*Lr*), photoperiod response (*Ppd1*), and vernalization (*Vrn*). These markers were chosen to develop comprehensive molecular profiles for the genotypes, ensuring a broad representation of the genetic diversity present. The genetic relationships among the genotypes were visualized using a dendrogram constructed from the data. A total of 95 alleles were scored for PCR-based amplification profiles for screened genotypes. The dendrogram revealed distinct genetic groupings and relationships among the wheat entries. For instance, the entries LOK79 and DBW222 were found to be closely related, followed by pairs such as AKAW5100 and PBW891, DBW441 and DBW110, GW543 and HD3428, HD3471 and DBW187, NIAW4114 and CG1029, HI1669 and HD2932, and DBW386 and DBW359. In contrast, entries like NWS2222, DBW443, HI1674, and CG1044 appeared to be genetically distinct from the other entries. These genotypes grouped within a genetic similarity (GS) coefficient range of approximately 0.71 to 0.98, indicating sufficient genetic variability at the molecular level. The dendrogram also illustrated that the AVT entries occupied separate nodes, distinguishing them from the check lines. This differentiation highlights the potential of these entries to possess unique and desirable traits, which can be further exploited in wheat breeding programs to develop superior cultivars with enhanced performance and resilience.



UPGMA based clustering of final year AVT entries and checks (2023-24)

Molecular profile generated using STS markers

	WxB1		*DREB*	*Vp1B3*		*Lr10*	*Lr34*		*Ppd-D1*		*VrnA1A*	*VrnA1bR2*	*DuPW004*		*Almt*		
Entries	**425**	**690**	**700**	**569**	**652**	**300**	**150**	**230**	**228**	**414**	**965**	**1068**	**250**	**350**	**426**	**706**	**836**
AKAW5100	+	+	+		+				+		+		+				
CG1029(c)	+	+	+	+		+		+	+		+		+	+			
CG1036(c)	+	+	+	+		+		+	+		+		+	+			
CG1040(I)(c)	+	+	+	+		+		+	+		+		+	+			
CG1044	+		+		+	+	+	+			+		+	+	+		
DBW110(c)	+	+	+	+				+	+		+		+	+			
DBW173(c)	+	+	+	+		+		+	+		+		+				
DBW187(c)	+		+	+		+		+	+		+		+				
DBW222(c)	+	+	+	+					+		+		+	+	+		
DBW303(c)	+	+	+	+					+				+				
DBW327(I)(c)	+	+	+	+		+		+	+				+	+	+		
DBW359(I)(c)	+	+	+	+				+	+				+	+	+		
DBW377(I)(c)	+	+	+	+				+	+		+	+	+	+			
DBW386	+	+	+	+		+		+					+	+	+		
DBW441	+		+	+		+		+					+	+	+		
DBW443	+	+	+	+		+		+	+				+	+	+	+	
DBW88(c)	+	+	+	+				+	+		+		+		+		
GW322(c)	+	+	+	+				+	+		+		+	+	+		
GW543	+			+		+		+	+		+		+	+	+		
GW547(I)(c)	+	+			+	+		+					+			+	
HD2932(c)	+		+	+				+	+		+		+	+			
HD2967(c)	+		+		+								+	+			
HD3059(c)	+	+	+	+		+		+	+				+	+			
HD3086(c)	+	+	+	+		+		+	+		+		+	+	+		
HD3090(c)	+	+	+	+				+	+		+		+				
HD3249(c)	+	+		+		+		+	+		+		+		+		
HD3386(I)(c)	+	+	+	+		+		+	+		+		+	+		+	
HD3388(I)(c)	+		+	+	+	+		+	+				+	+			
HD3428	+			+				+	+		+		+		+		
HD3471	+	+		+				+	+		+		+		+		
HI1633(c)	+	+	+	+		+	+		+				+	+			
HI1634(c)	+	+	+	+		+		+	+		+		+	+			
HI1650(c)	+	+	+	+		+		+	+		+		+	+	+		+
HI1655(c)	+	+	+	+				+	+		+	+	+	+	+		
HI1668	+	+	+	+				+	+		+		+				
HI1669	+	+	+	+		+		+	+		+		+	+	+		
HI1674	+	+		+				+	+				+	+	+		
JKW261(c)	+	+	+	+		+		+	+		+		+	+	+		
LOK79	+	+	+	+				+	+		+		+	+	+		
MACS6222(c)			+	+				+	+				+	+	+		
MACS6768(c)	+	+		+				+	+				+	+	+		
MP1378(I)(c)	+	+	+	+				+	+				+				
MP4010(c)	+		+	+				+					+	+			
NIAW4114	+	+	+	+				+	+		+	+	+	+	+		
NIAW4120	+	+			+	+		+	+		+		+	+			
NWS2222							+	+	+				+				
PBW725(c)	+	+	+		+				+		+		+		+		
PBW771(c)	+	+	+	+		+			+		+		+	+			
PBW826(c)	+	+	+	+		+		+	+		+	+	+	+	+		
PBW891	+	+						+	+				+	+			
RAJ4083(c)	+	+	+	+		+	+		+				+	+	+		
WH1306	+	+	+	+				+	+		+		+	+		+	