Marker assisted gene prospecting in AVT entries of wheat

Genetic and genomic resources are key to the success of present-day varietal improvement programmes. For successful adaptation and sustained improvement, genetic diversity plays a crucial role as it is must for providing much needed protection against biotic and abiotic stresses in wheat. Due to diverse agro-climatic conditions India is rich in wheat germplasm adapted to various niches. Keeping this in view, advanced varietal trial entries and checks are regularly subjected to screening with molecular markers to generate a vast amount of information. Molecular Biology Program at ICAR-IIWBR screened the final year (2020-21) AVT test entries and checks using various STS/ AS-PCR markers linked to the gene(s) of Waxiness (*WxB1*), abiotic (drought) stress related (*DREB*), vivipary (*Vp1B3*), leaf rust resistance (*Lr)*, Photoperiod response (*PD1*), vernalization (*Vrn*) and aluminum tolerance (*Almt*). The dendrogram constructed using these STS and more than 40 SSR markers depicted the genetic relationships among genotypes. Two separate clusters one for durum wheat varieties and the other for bread wheat was constructed. A close look to the dendrogram generated using the molecular marker data shows that among the durums, the lone entry HI8823 is clearly distinct from already existing varieties as checks. In case of bread wheat DBW 332 have closeness to HI1636 followed by the duo DBW296 and MP 1358. However, entries such as DBW 327, WH1252 and GW 513 are appearing distinctly when the AVT entries are compared among themselves.

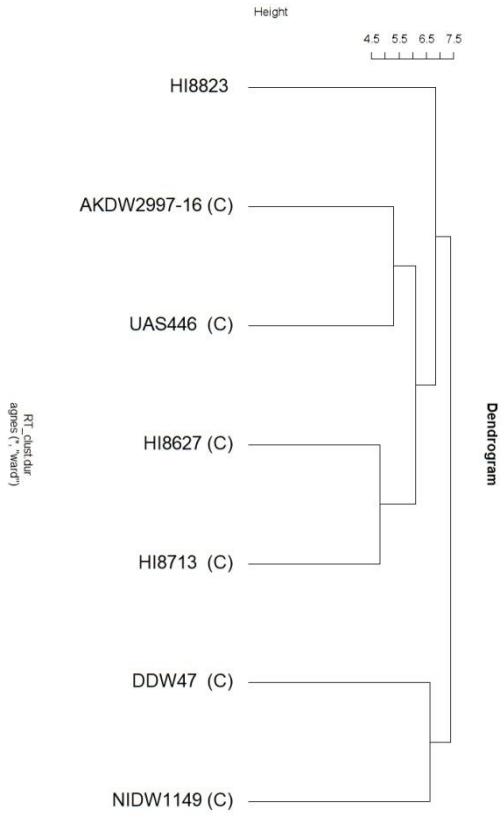

Fig. Dendrogram using SSR and STS markers showing diversity among final year AVT durum wheat lines and check varieties

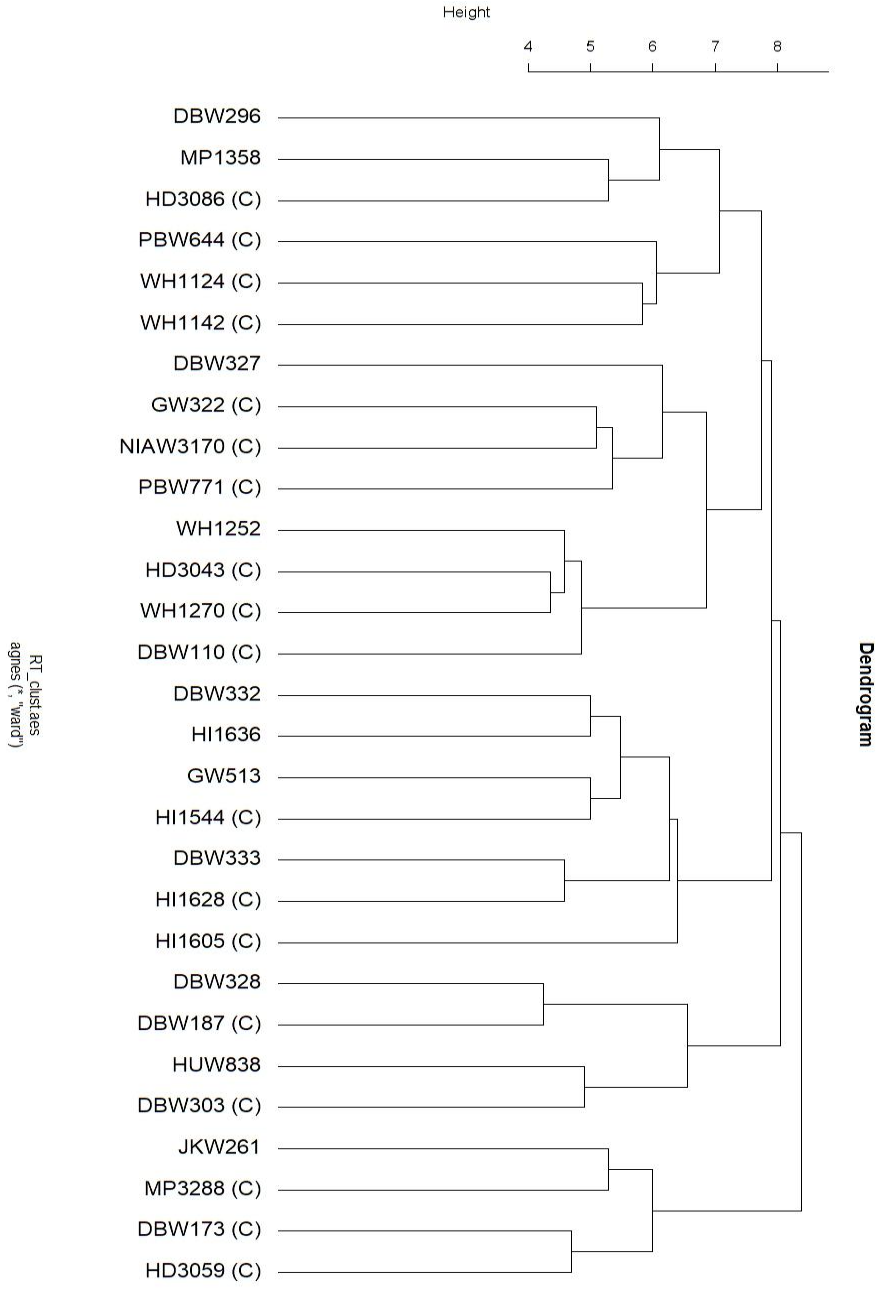

Fig. Dendrogram using SSR and STS markers showing diversity among final year AVT Bread wheat lines and check varieties

Table. STS marker based screening of final year AVT entries (2020-21) and checks.

SN	Genotype	Marker/ Allele Size															
		WxB1		*DREB*		*Vp1B3*	*Lr10*	*Lr34*		*Ppd-D1*		*VrnA1bR2*	*DuPW004*		*Almt*		
		425	690	700	569	652	300	150	230	228	414	1068	250	350	426	706	836
Bread Wheat																	
1	DBW296	+	+	+	+	-	-	-	+	+	-	-	+	+	+	-	-
2	DBW327	+	+	+	+	-	-	-	+	+	-	-	+	+	+	+	+
3	DBW328	+	+	+	+	-	+	-	+	+	-	-	+	-	+	+	+
4	DBW332	+	+	+	+	-	-	-	+	+	-	+	+	-	+	-	-
5	DBW333	+	+	+	+	-	-	-	+	+	-	-	-	+	+	-	-
6	HI1636	+	+	+	+	-	-	-	+	+	-	+	-	+	+	-	-
7	HUW838	+	+	+	+	-	-	-	+	+	-	+	+	-	+	+	+
8	JKW261	+	+	+	+	-	-	-	+	+	-	+	+	+	+	-	-
9	WH1252	+	+	+	+	-	-	-	+	+	-	+	+	-	+	-	-
10	DBW110 (C)	+	+	+	+	-	-	+	+	+	-	-	-	+	+	+	-
11	DBW173 (C)	+	+	+	-	+	+	-	+	+	-	+	-	+	+	-	-
12	DBW187 (C)	+	+	+	+	-	+	-	+	+	-	-	+	-	+	-	-
13	DBW303 (C)	+	+	+	-	+	-	-	+	+	-	-	+	-	-	+	-
14	GW322 (C)	+	+	+	+	-	-	-	+	+	-	-	+	+	+	-	-
15	HD3043 (C)	+	+	+	+	-	-	-	+	+	-	+	+	+	+	-	-
16	HD3059 (C)	+	+	+	-	+	-	-	+	+	-	+	-	+	+	-	-
17	HD3086 (C)	+	+	+	+	-	+	-	+	+	-	-	-	+	+	-	-
18	HI1544 (C)	+	+	+	+	-	-	-	+	+	-	-	-	-	+	-	-
19	HI1605 (C)	+	+	+	+	-	+	-	+	+	-	+	+	-	+	-	-
20	HI1628 (C)	+	-	+	+	-	-	-	-	+	-	-	-	-	+	-	-
21	MP3288 (C)	+	+	+	-	+	+	-	+	+	-	+	+	+	+	-	-
22	NIAW3170 (C)	+	+	+	+	-	-	-	+	+	-	-	-	+	+	+	+
23	PBW644 (C)	-	-	+	+	-	-	+	-	+	-	-	-	-	+	-	-
24	PBW771 (C)	+	+	+	+	-	-	-	+	+	-	+	-	+	+	-	-
25	WH1124 (C)	+	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-
26	WH1142 (C)	+	+	+	-	-	-	-	+	+	-	-	-	-	+	-	-
27	WH1270 (C)	+	+	-	+	-	-	-	+	+	-	-	-	+	+	-	-
Durum Wheat																	
1	HI8823	+	+	+	+	-	+	-	+	+	-	+	+	-	+	-	-
2	MP1358	+	+	+	+	-	-	-	+	+	-	-	+	+	+	+	+
3	GW513	-	-	+	+	-	-	-	+	+	-	-	-	+	+	-	-
4	DDW47 (C)	-	+	+	+	-	-	-	-	+	-	-	+	+	+	-	-
5	AKDW2997-16 (C)	+	+	+	+	-	+	+	-	+	-	-	-	+	+	-	-
6	HI8627 (C)	+	-	+	+	-	-	-	-	+	-	-	+	-	+	-	-
7	HI8713 (C)	+	+	+	+	-	-	-	-	-	-	+	+	-	+	-	-
8	NIDW1149 (C)	+	+	+	+	-	-	-	-	-	-	+	+	-	-	-	-
9	UAS446 (C)	+	+	+	+	-	+	-	+	+	-	-	-	+	+	-	-