

Supplementary material:

Table 1: Significant markers in the investigation

No	Molecular Marker Name	Linked Gene	Base Pairs	Annealing Temp	Locus
1	XgWM-234	Lr ₅₂	229,250bp	55 °C	5BS
2	XgWM-501	Yr ₅	176bp	60 °C	2B
3	XgWM-259	Lr ₄₆ /Yr ₂₉	105bp	55 °C	1BL
4	XgWM-11	Yr ₁₅ , Yr ₂₆	213bp	50 °C	1B,1BS
5	XgWM-130	Lr ₃₄ /Yr ₁₈	121,126bp	60 °C	7A
6	XgWM-37	Lr ₁₉	189bp	60 °C	7D
7	XgWM-44	Lr ₂₁ , Lr ₂₂	184,176bp	60 °C	7B
8	XgWM-437	Lr ₁₉ /Sr ₂₅	109,111bp	50 °C	7D
9	XgWM-210	Lr ₂₁ , Lr ₂₂	303,189bp	60 °C	2B,2D
10	XgWM-295	Lr ₃₄	254,258bp	60 °C	7D
11	XgWM-533	Sr ₂	316bp	60 °C	2-3-B
12	SCS-265	Lr ₁₉	130bp	60 °C	7D
13	SCS-253	Lr ₁₉	736bp	60 °C	7D
14	Xbrac-352	Lr ₃₄ /Yr ₁₈	150,211bp	60 °C	7DS
15	STS-638	Sr ₁₅ , Lr ₂₀	232bp	55 °C	7A
16	STM-773	Sr ₃₂ ,Sr ₃₆	192,162bp	64 °C	2B
17	CFA 2019 Sr ₂₂	Sr ₂₂	234,500bp	55 °C	7AL
18	Xgdm-87	Lr ₅₀	110bp	50 °C	2B
19	S30-13L	Lr ₅₁	790bp	52 °C	1S
20	Lr ₁	Lr ₁	110bp	60 °C	5DL
21	Lr ₄₇	Lr ₄₇	450,380bp	55 °C	7AS
22	KSUD-14	Lr ₂₁ ,Lr ₄₀	885bp	54 °C	1DS

Table 2: Leaf rust resistance markers validation for wheat genotypes. Positive sign shows the presence of rust resistance genes in genotypes while, Negative sign shows the absence of rust resistance genes in genotypes

Genotypes	gWM-234 Lr52	gWM-44 Lr21,Lr22	gWM-37 Lr19	gWM-295 Lr34	gWM-210 Lr21,Lr22	Lr1	Lr51	Lr47	gdm-87 Lr50	KSUD -14 Lr21,Lr40	SCS-253	SCS-265
V-4189	+	+	+	-	+	+	+	+	+	+	+	+
Lasani	+	+	+	+	+	-	+	+	-	+	+	+
V-4188	+	+	+	-	+	+	+	+	+	-	+	+
V-4022	+	+	+	+	+	+	+	+	+	+	+	+
AARI-10	+	+	+	+	+	+	+	+	+	+	+	+
AS-02	+	+	+	+	+	-	+	+	-	+	+	+
Inqlab-91	+	-	+	+	-	+	+	-	+	-	+	+
Sehar	+	-	-	-	-	+	+	+	+	+	-	-
Uqab-02	+	+	+	+	+	+	+	+	+	+	+	+
Pasban-90	+	+	+	-	+	+	+	+	+	+	+	+
TW-76001	+	+	+	+	+	-	+	+	-	-	+	+
TW-76002	+	+	+	+	+	+	+	+	+	+	+	+
TW-76003	+	+	+	+	+	-	+	+	+	+	+	+
TW-76004	-	+	+	+	+	+	+	+	+	+	+	+
TW-76005	+	-	+	-	-	-	+	+	-	+	+	+
Parwaz-94	+	-	+	-	-	+	+	+	+	-	+	+
TW-76007	+	+	+	-	+	+	-	+	+	+	+	+
TW-76008	+	+	+	-	+	+	+	+	+	+	+	+
TW-76009	+	+	+	-	+	+	+	+	+	+	+	+
TW-76010	+	+	+	+	+	+	+	+	+	+	+	+

Table 3: Strip rust resistance markers validation for wheat genotypes. Positive sign shows the presence of rust resistance genes in genotypes while, Negative sign shows the absence of rust resistance genes in genotypes.

Genotypes	XgWM-11 Yr ₁₅ , Yr ₂₆	XgWM-501 Yr ₅	XgWM-259 Lr ₄₆ /Yr ₂₉	XgWM-130 Lr ₃₄ /Yr ₁₈	Xbrac-352 Lr ₃₄ /Yr ₁₈
V-4189	-	+	-	+	+
Lasani	-	+	+	+	+
V-4188	-	+	-	+	+
V-4022	+	-	+	+	+
AARI-10	-	+	+	+	+
AS-02	+	+	+	-	-
Inqlab-91	-	-	+	+	+
Sehar	+	+	-	+	+
Uqab-02	+	-	+	+	+
Pasban-90	+	+	-	+	+
TW-76001	+	-	+	+	+

TW-76002	+	-	+	+	+
TW-76003	+	+	+	+	+
TW-76004	+	+	+	+	+
TW-76005	-	-	-	+	+
Parwaz-94	+	+	-	+	+
TW-76007	+	+	-	-	-
TW-76008	-	+	-	+	+
TW-76009	+	+	-	+	+
TW-76010	+	+	+	+	+

Table 4: Stem rust resistance markers validation for wheat genotypes. Positive sign shows the presence of rust resistance genes in genotypes while, Negative sign shows the absence of rust resistance genes in genotypes.

Genotypes	XgWM-533 Sr ₂	XgWM-437 Lr ₁₉ /Sr ₂₅	STS-638 Sr ₁₅ , Lr ₂₀	CFA 2019 Sr ₂₂	STM-773 Sr ₃₂ ,Sr ₃₆
V-4189	-	+	+	+	+
Lasani	+	+	+	-	+
V-4188	+	-	+	-	+
V-4022	+	-	+	-	+
AARI-10	+	+	+	+	+
AS-02	+	+	+	-	+
Inqlab-91	+	+	+	+	+
Sehar	+	+	+	+	+
Uqab-02	+	+	+	+	+
Pasban-90	+	-	+	+	+
TW-76001	-	+	+	+	+
TW-76002	+	+	+	+	+
TW-76003	-	-	+	+	+
TW-76004	-	+	-	-	+
TW-76005	-	-	+	+	+
Parwaz-94	+	-	+	+	+
TW-76007	+	+	+	+	+
TW-76008	+	+	+	+	+
TW-76009	-	+	+	+	+
TW-76010	+	+	+	+	+