J. Wheat Res. 3(1) : 69-70 (2011)

GW 11: An efficient wheat variety for terminal heat and moisture stress conditions

A V Agalodiya*, S S Patel, B N Patel, R S Yadav and N Augustine

Received: 11 July 2011 / Accepted : 10 August 2011

Wheat is an important crop worldwide and is grown on about 210 million hectares with annual production of about 648 million metric tons (FAO 2010). The global wheat production should be increased 2% annually until 2020 to meet future demand with the compromise of global warming, end-use quality and newly evolving pathogen and pest populations under reduced water availability as well as under abrupt climatic conditions (especially heat stresses). About 35 percent of irrigated wheat area in Gujarat state is under late sown after cotton and paddy facing heat stress at grain filling stage resulting about 16 percent yield loss as compared to timely sown wheat. Further, North Gujarat and Saurastra regions covering more than 60% wheat area in Gujarat which is prone to water scarcity resulted in drastic reduction in wheat productivity. Therefore, SDAU, Vijapur has developed variety GW 11 having high stable grain yield, better terminal heat tolerance, efficient water utilization, resistance to black & brown rusts and better grain quality for Gujarat state.

The bread wheat variety GW 11 has been developed by pedigree method of selection (Singh, 1990) using Lok 1/ HW 1042// Lok 1 parentage up to F_7 generations. Cross was attempted in 1995-96 using the above parentage. The advancement from F_1 to F_7 generations was made during 1996-97 to 2002-03 by plant to row or ear to row. Bulk testing was carried out in large scale trials during 2003-04. The material was evaluated in late sown irrigated conditions under various categories of trials (PET, SST, LST, NIVT and AVT) during 2004-05 to 2007-08. The genotype was not retained for AVT IInd year testing due to lack of yield advantages over best check in the zone. Similarly, it was also evaluated under timely sown restricted irrigation conditions during 2006-07 to 2009-10. Only two irrigations (at CRI and one month after 1st irrigation) were applied against seven, six & fourteen irrigation required for optimum irrigation in North Gujarat, South Gujarat & Saurastra, respectively.

Table 1 Region wise yield performance of GW 11 (Grain yield q/ha) as compare to checks under late sown irrigated conditions and timely sown restricted irrigated conditions

Region		Proposed Variety	Check Varieties		
		GW 11	Lok 1	GW 173	
Late sown restricted irrigated condition					
North Gujarat	a	47.03(7)	43.96(6)	44.54(7)	
	b		7.83	5.59	
Middle Gujarat	a	46.59(2)	40.00(2)	42.28(2)	
	b		16.48	10.19	
South Gujarat	a	40.30(4)	38.64(4)	34.75(4)	
	b		4.30	15.97	
Saurashtra	a	33.77(4)	29.75(3)	32.40(4)	
	b		16.64	4.23	
State Mean	a	42.27(17)	39.17(15)	39.11(17)	
	b		9.42	8.08	
Timely sown restricted irrigated condition					
		GW 11	GW 273	LOK-1	GW 496
North Gujarat	a	25.76(5)	23.99(5)	20.59(5)	20.09(5)
	b		7.38	25.11	28.22
South Gujarat	a	30.51(3)	27.22(3)	29.83(3)	27.27(3)
	b		12.09	2.28	11.88
Saurashtra	a	22.58(4)	17.36(4)	19.21(4)	18.67(4)
	b		30.07	18.10	20.94
State Mean	a	25.89(12)	22.59(12)	22.41(12)	21.41(12)
	b		14.61	15.53	20.92

Figures in parenthesis indicate number of trials; a: Average yield q/ha; b: % increase over check

*Centre of Excellence for Research on Wheat,
S.D.A.U., Vijapur-382 870 (Gujarat)

The proposals for its release were made for both late sown as well as timely sown restricted irrigation conditions and accepted by the combined meeting of Agricultural Research Council (RAC) of Gujarat SAUs during April, 2009 & 2010, respectively.

Variety GW 11 (42.27q/ha) out yielded Lok 1 (13/15 tests) and GW 173 (14/17 tests) by producing 9.42 and 8.08 percent higher grain yield, respectively indicating its high terminal heat tolerance in late sown conditions. Similarly, under timely sown restricted irrigation conditions, it was also significantly out yielded GW 273, lok-1 and GW 496 by 14.61, 15.53 & 20.92 percent respectively with highest grain yield (25.89 q/ha) (Table1).

The stability analysis (Eberhart and Russell, 1966) indicates high stability of GW 11 with highest average (x), regression coefficient around 1 and deviation from regression near zero under both the conditions. Variety GW 11 produced significantly higher grain yield (25.89 q/ha) over GW 273 (7.17%), Lok-1 (18.92%) and GW 496 (32.11%) under two irrigations (60mm depth) at CRI and one month after first irrigation against normal irrigation in different zones of Gujarat indicating its higher water use efficiency.

The variety GW 11 is resistant to both leaf and stem rust having maximum rust reaction tR and 30 R. Similarly adult plant resistance indicated high degree of resistance to races 77-5 (0) and 104B (0) of brown rust and black rust race 40A (tR) & Ug 99 (5 MS) which are most dominant and damaging races. Variety GW 11 has amber colored medium bold grain with excellent grain appearance and quality parameters like hectoliter weight (78.1 & 78.7 kg/hl), protein content (12.3 & 15.3%), sedimentation value (50 & 51ml) and gluten index (71) under late sown and restricted irrigation conditions, respectively. This variety fetches about 7.3% & 13% higher price than the most dominant varieties GW 496 & GW 173.

It would be concluded that bread wheat (Triticum aestivum L.) variety GW 11 with very high stable yield, rust resistance, terminal heat tolerance, high water use efficiency and excellent grain quality will serve the purpose of enhancing productivity and improve profitability of wheat under late sowing as well as timely sown restricted irrigation conditions in Gujarat state as well as able to combat the changing climatic abruptions.

References

1. Eberhart, S. A. and Russell, W. A. 1966 Stability parameters for comparing varieties. *Crop Science* **6:** 36-40
2. FAO 2010 Food outlook. November 2010, FAO Rome
3. Singh, B. D. 1990 Plant breeding: principals and methods. (IVth Eds.) Kalyani Publisher, New Delhi