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Kabul 13: A New Ug99 Resistant Wheat Variety for Afghanistan

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I. Introduction

Wheat is Afghanistan's major food grain crop occupying 80% of cereals' acreage in the country. Afghans rank among the highest consumers of wheat at about 200Kg/capita/annum. Inspite of all the attention, Afghanistan still has to import wheat to meet its domestic demands. The wheat production in the country is highly erratic as about 55% of the wheat acreage is rainfed with very low productivity ranging from as low as 200Kg/ha to a maximum of one tonne per ha. Irrigated wheat on the other hand has been maintaining higher productivity levels of upto three tonnes per ha and has enabled Afghanistan harvest upto five million tonnes in some good years like 2009 and 2012 (FAO, 2012). More than a dozon new wheat varieties have been released in Afghanistan, however, rust races have also been keeping pace and rendering varieties susceptible (Zamarai et al., 2013). This requires continuous varietal development and the variety Kabul 13 was released this year for irrigated regions. This is a Ug99 resistant high yielding varietiy and is resistant to all the prevalent rust races in the country.

II. Material & Methods

Kabul 13 was introduced in Afghanistan through 29th Elite Spring Wheat Yield Trial (ESWYT) from CIMMYT Mexico in the year 2008-09. This trial was conducted in a simple lattice design with two replications at Kabul, Baghlan, Kunduz, Takhar, Nangarhar, Herat, Balkh and Helmund regional research stations (RRS) of Agricultural Research Institute of Afghanistan (ARIA). This promising genotype with a pedigree of WAXWING*2/TUKURU was then tested in an Advance Yield Trial (AYT) during 2009-10 at Kabul and again during 2010-11 in a National Uniformity Trial (NUT) at seven RRS at Kabul, Baghlan, Kunduz, Takhar, Nangarhar, Herat and Balkh. The last two year trials were conducted in a randomized block desin (RBD) with three replications. The recommended agronomic practices were followed to raise the crop. Data were recorded on days to 50% flowering, days to maturity, grain yield (Kg/ha) and plant height (cm) in all the trials during the first two year trials. During the final evaluation trial, other ancillary traits like 1000 kernel weight, grain colour and other grain features described elsewhere in the paper were also recorded.

III. Results &Discussion

Inan average year, irrigated wheat occupies less than 50% of total wheat area in the country but contributes up to 70 to 90% of the total production (APR, 2012). This implies that irrigated wheat is the dependable domain for food security in Afghanistan. The varietal development for irrigated wheat has to be a continuous effort since evolution of new rust races renders existing varieties susceptible (Zamarai et al., 2013). The variety Kabul 13 was tested in trial under the name #124, 29th ESWYT (Table 1). This entry yielded higher than the check varieties under fall sown irrigated conditions. Kabul 13 was tested for a total of three years (Table 2) in different parts of the country and it yielded 9.1 to 29% higher than the check varieties on three years average. This variety attains 50% heading in about 105 days and matures in 137 days (Table 1) with an average yield of 6.1tonnes per ha. It is an early maturing genotype and is well adapted to South Asia. It has adult plant resistance to stem rust based on Sr2/Yr30+; Lr46/Yr29/ Sr gene complexes. Since it is a derivative of Waxwing, it is likely to have a yet unidentified moderately effective race specific gene that interacts with Sr2/ Yr30; Lr26/ Yr29/ Sr and some other minor genes.

IV. Conclusion

Irrigated wheat constitutes the main wheat production domain for predominantly wheat eating Afghanistan. Continual evolution of new virulent rust races require that a proactive wheat varietal development programme is in place. Kabul 13 is a new high yielding wheat variety introduced from CIMMYT, Mexico as part of 29th Elite spring wheat yield trial. This Ug99 resistant wheat variety was found to be resistant to all prevalent rust races and yielded more than six tonne average per hectare in three years' trials conducted at several places in the country. Kabul 13 is poised to assist Afghan wheat farmers boost Afghan wheat production in time to come.

References

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Table 1. Description of Kabul 13

Parameter		
Name under which tested	29th ESWYT #124	
Proposed Name	Kabul 13	
Parentage / Source	WAXWING*2/ TUKURU	
Growth Habit	Erect	
Plant Height (cm)	104	
Days to heading	105	
Days to Maturity	137	
Spike Size	Medium	
Spike shape	Tapering	
Stem solidness	Hollow	
Ear density	Medium	
Straw	Soft	
Glume colour	White	
Awns	Present	
No. Spikelets/ spike	21	
Flag Leave Attitude	Erect	
Average Yield (Kg/ha)	6171	
1000-kernel weight (g)	45	
Beak length	Medium	
Grain colour	Amber	
Grain texture	Hard	
Protein (%)	11.7	
Disease Reaction		
	Afghanistan	**Njoro, Kenya**
Stripe Rust	10 R	20-25MS
Brown Rust	0	0
Black Rust	0	30M
Karnal Bunt	0	-

Table 2. Summary of yield evaluation trials for entry no. 124 of 29th ESWYT

Genotype	**Yield in tonne per ha***			**Average**	**% Superiority**
	2008-09	2009-10	2010-11		
29th ESWYT # 124	6176 (8)	5086 (1)	6322 (7)	6171	
Ariana 07	5842	4844	6281	5655	9.1
Darulaman 07	3812	-	5758	4785	28.9

- Figure in parenthesis is the number of test locations.