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AGRO-ECOLOGICAL CHARACTERISTICS OF PROMISING BREAD WHEAT VARIETY “NURAFSHON”

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Abstract:

The article analyzes the main agronomic and biological characteristics of the promising ‘Nurafshon’ (84/111) bread wheat variety under different agroecological conditions. The assessment considered the degree of yellow rust infection, plant height, growing-season duration, 1000-grain weight, and yield. The ‘Nurafshon’ variety showed 0% yellow rust infection at all three locations, demonstrating the most stable performance for this trait among the evaluated genotypes. The variety had an average plant height of 98.7 cm, a growing period of 224.3 days, a 1000-grain weight of 43.9 g, and an average yield of 71.1 c/ha. Across locations, yield ranged from 69.3 to 72.2 c/ha, with a difference of only 2.9 c/ha, or approximately 4.2%. These results indicate relatively stable productivity across environments. The combination of yellow rust resistance,

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relatively large grain size, and stable yield performance makes ‘Nurafshon’ a promising genotype for further multi-environment testing under arid and variable agroecological conditions.

Keywords: Bread wheat, Nurafshon, agroecological adaptation, yellow rust, 1000-grain weight, growing period, yield, breeding.

Introduction

Bread wheat (*Triticum aestivum* L.) is one of the major crops supporting food security and grain production in Uzbekistan. Under the country's conditions, in addition to high yield potential, adaptability to drought, heat, cold, salinity, and biotic stresses is an important criterion in wheat breeding. In the Aral Sea region and other arid areas, water scarcity, soil salinity, and sharp temperature fluctuations directly affect crop productivity and yield stability. Therefore, evaluation of new genotypes should consider yield, grain size, phenological duration, and disease resistance together rather than focusing on a single trait.

The use of international genetic resources in wheat breeding in Uzbekistan provides opportunities to develop varieties combining high yield potential, broad adaptation, and agroclimatic stability. Such genetic materials can contribute to increasing the efficiency of local breeding programs [2].

Disease resistance is also of particular importance in the evaluation of wheat varieties. In particular, the presence of DN genes associated with resistance to the Russian wheat aphid (*Diuraphis noxia*) has been identified in Uzbek wheat cultivars using molecular markers, emphasizing the importance of developing complex resistance in breeding programs [1].

The objective of this study was to evaluate the promising ‘Nurafshon’ variety of bread wheat under three agroecological locations based on its principal agronomic and biological traits, identify its stable and superior characteristics,

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and develop a scientifically grounded conclusion for further breeding and production trials.

The study used the promising ‘Nurafshon’ (84/111) bread wheat variety together with data from six other genotypes for comparative evaluation. The experiment covered three locations, whose names are retained in their abbreviated form as presented in the source table. The evaluation criteria were yellow rust infection (%), plant height (cm), growing period (days), 1000-grain weight (g), and yield (c/ha). For each variety, the arithmetic mean of the values recorded at the three locations was calculated, and ‘Nurafshon’ was comparatively assessed against the mean performance of the other genotypes.

Table 1 shows that the most important advantage of the ‘Nurafshon’ variety is its stable response to yellow rust. Yellow rust infection was recorded at 0% at all three locations. Among the comparison genotypes, mean yellow rust infection was 66.7% in Vassa, 5.0% in ESPADA/KARAHAN, 3.3% in the PRL-2/PASTOR sample, 8.3% in both ESPADA//KS82142/PASTOR and BABAX... samples, and 6.7% in CLEARWHITE(YR15;GPC)-AVINT sample. Thus, ‘Nurafshon’ demonstrated the highest phenotypic stability for this trait across all environments.

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Table 1. Agroecological characteristics of the evaluated bread wheat genotypes

No.	Variety / genotype	Location	YR, %	PH, sm	GP, day	TKW, g	Yield, c/ha
1	Vassa	SRIA	60	113,0	225	36,0	55,0
		SRIPGR	80	105,0	226	39,0	48,0
		SRIRA	60	115,0	228	41,0	50,0
2	ESPADA/KARAHAN	SRIA	5	94,9	219	43,6	74,8
		SRIPGR	5	100,0	224	41,0	64,0
		SRIRA	5	94,0	224	42,5	66,0
3	PRL-2/PASTOR/VOLV/...	SRIA	5	103,6	220	44,7	74,2
		SRIPGR	5	96,0	226	42,6	68,3
		SRIRA	0	100,0	226	44,8	70,1
4	84/111 NURAFSHON	SRIA	0	106,0	215	45,0	71,7
		SRIPGR	0	92,0	228	43,1	69,3
		SRIRA	0	98,0	230	43,7	72,2
5	ESPADA//KS82142/PASTOR	SRIA	5	85,0	215	45,8	75,7
		SRIPGR	10	95,0	227	44,0	71,4
		SRIRA	10	102,0	229	47,2	76,6
6	BABAX/...	SRIA	5	100,0	222	43,8	73,5
		SRIPGR	10	102,0	226	41,3	63,2
		SRIRA	10	110,0	228	42,3	67,4
7	CLEARWHITE(YR15; GPC)-AVINT	SRIA	5	98,5	218	42,7	75,4
		SRIPGR	10	108,0	228	41,1	62,4
		SRIRA	5	110,0	228	43,1	64,3

Phenologically, ‘Nurafshon’ had a growing period of 215–230 days, with an average duration of 224.3 days. The shortest period (215 days) was recorded at SRIA, while the longest (230 days) occurred at SRIRA. This variation indicates that the phenological development of the variety changes in response to agroecological conditions. Nevertheless, the three-location mean remained close to that of most of the other genotypes, indicating no pronounced deviation in its vegetative cycle.

Regarding grain size, the 1000-grain weight of ‘Nurafshon’ ranged from 43.1 to 45.0 g, with an average of 43.9 g. The highest value was recorded at SRIA (45.0

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g), while the lowest was observed at UGRITI (43.1 g). The mean value was very close to that of the PRL-2/PASTOR sample (44.0 g) and higher than that of most of the other genotypes. This suggests good genetic potential for grain formation and grain filling.

Yield of 'Nurafshon' ranged from 69.3 to 72.2 c/ha, with an average of 71.1 c/ha. The highest yield, 72.2 c/ha, was recorded at SRIRA, while the lowest, 69.3 c/ha, was recorded at SRIPGR. The difference between the maximum and minimum values was only 2.9 c/ha, corresponding to approximately 4.1% of the mean. This relatively small difference indicates the ability of the variety to maintain comparatively stable productivity across locations.

From the perspective of integrated breeding criteria, these results make 'Nurafshon' particularly interesting because three important traits are combined: phenotypic resistance to yellow rust, a relatively high 1000-grain weight, and comparatively stable yield across environments. Such a combination is important for modern breeding, because the ability of a variety to maintain yield under stress conditions can be as important as its maximum yield potential.

Conclusion

The analysis indicates that the promising 'Nurafshon' (84/111) bread wheat variety possesses a valuable combination of traits associated with agroecological adaptation. The variety showed 0% yellow rust infection at all three locations. Its average plant height was 98.7 cm, growing period 224.3 days, 1000-grain weight 43.9 g, and yield 71.1 c/ha. The approximately 4.1% variation in yield across locations indicates relatively stable productivity.

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