



Research Report

CRP-DS Action site: Fergana Valley, Irrigated System

Year 2014-2015

Activity title: Identify new improved varieties of cereals (wheat, barley, maize and rice), vegetables, legumes (chickpea, lentil, mungbean, soybean), oil-seed and fodder and other non-traditional crops to fit into the prevalent crop-livestock system on the basis of adaptive trial

Reporting Center: ICARDA

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Experiment: Comparative performance of yellow rust resistant new varieties and currently commercially grown varieties of winter wheat in Fergana Valley, Uzbekistan

Objectives:

- a. To determine comparative performance of yellow rust resistant new varieties and commercially grown varieties of winter wheat in Fergana valley in Uzbekistan
- b. To identify superior winter wheat varieties

Methodology

Number of wheat varieties – 17 (Table 1)
Number of replication – 2
Plot size – 50 m²
Experimental design – RCBD
Crop planted – 20 October, 2014
Management practice – Farmer's practice
Traits evaluated – Grain yield and 1000-kernel weight

Results

Analysis of variance showed significant differences among the 17 varieties for both grain yield and 1000-kernel weight (TKW) (ANOVA not presented). Grain yield and TKW of the 17 varieties ranged from 3.59 to 5.33 kg/ha and 36.0 to 45.2 g, respectively (Table 1).

Table 1. Performance of winter wheat genotypes in the farmer's field in Kuwa, Fergana, Uzbekistan in 2014-2015 wheat growing season.

Variety number	Variety name	Yellow rust severity (%) [†]	Grain yield (t/ha)	%Check	1000-kernel weight (g)
2	Buniyodkor ¹	10	5.33 a [¶]	136	45.2 a
12	Shams ¹	15	14.84 b	123	41.2 b-e
17	Yaksart ¹	30	4.84 b	123	39.6 e-h
10	Hisorak ¹	5	4.75 bc	121	37.7 i
4	Elomon ¹	30	4.63 bcd	118	42.6 b
6	Gozgon ¹	5	4.58 bcd	117	39.2 f-i
5	Farovon ¹	20	4.58 bcd	117	38.0 hi
16	Turkiston ¹	40	4.43 b-e	113	37.8 i
9	Hazrati Bashir ¹	30	4.40 b-f	112	36.0 j
1	Barhayot ¹	20	4.35 b-f	111	41.9 b
8	Grom ²	40	4.30 c-f	110	39.7 d-g
15	Tanya ^{2,3}	80	4.16 d-g	106	40.2 c-f
11	Krasnodar-99 ^{2,3} (check)	80	3.92 e-h	100	38.2 ghi
3	Chillaki ^{2,3}	100	3.92 e-h	100	41.7 bc
7	Grasiya ²	100	3.90 fgh	99	41.3 bcd
14	KR11-9829 ¹	20	3.78 gh	96	41.6 bc
13	KR11-9824 ¹	20	3.59 h	91	38.0 hi
	LSD _{0.05}		0.46		1.6
	CV (%)		5.0		1.8

[†]Data recorded under artificial inoculation study in Kibray, Uzbekistan

¹New varieties developed through collaboration with ICARDA and International Winter Wheat Improvement Program (IWWIP).

²Varieties from other sources.

³Widely grown varieties in Fergana valley in Uzbekistan.

[¶] Means within a column followed by different letters are significantly different based on Duncan Multiple Range Test (DMRT) at $P=0.05$.

The top 10 highest yielding varieties were newly released ones, which yielded 10 to 36 higher than the widely grown commercial variety Krasnodar-99 (Table 1). The three highest yielding new varieties Buniyodkor, Shams and Yaksart produced significantly higher grain yield than the highest yielding commercial variety Grom. The highest yielding new variety Buniyodkor also had the highest TKW which was significantly higher than TKW of all locally grown commercial varieties. TKW is an important quality related traits of wheat.

Six of these 10 top yielders possess good level of resistance to yellow rust ($\leq 20\%$ disease severity) whereas the remaining four are moderately resistant. The three widely grown local checks Tanya, Krasnodar and Chillaki are highly susceptible to yellow rust.

There was no natural epidemic of yellow rust in 2015, hence all varieties were evaluated under disease free environment. Therefore, yield gains by growing these yellow rust resistant new varieties over the currently grown commercial varieties could be even higher in a crop year with epidemics of yellow rust which is common in Central Asia including Uzbekistan (Ziyaev et al., 2011; Sharma et al., 2013).

All varieties included in the study meet quality standard of the wheat industry in Uzbekistan, without which they couldn't have been registered with the State Variety Testing Commission of the country.

Outcome

The present study provides several options for yellow rust resistant wheat varieties for the farmers in Fergana Valley of Uzbekistan. Based on this study, Buniyodkor, Shams and Yaksart are identified as the most superior varieties for Fergana valley. The wheat growers can greatly benefit by growing these varieties, thus contribute to food security in the country.

References

Sharma, R.C., S. Rajaram, S. Alikulov, Z. Ziyaev, S. Hazratkulova, M. Khodarahami, M. Nazeri, S. Belen, Z. Khalikulov, M. Mosaad, Y. Kaya, M. Keser, Z. Eshonova, A. Kokhmetova, M. G. Ahmadov, M.R. Jalal Kamali, and A. Morgounov. 2013. Improved winter wheat germplasm for Central and West Asia. *Euphytica* 190:19-31.

Ziyaev, Z.M., R.C. Sharma, K. Nazari, A.I. Morgounov, A.A. Amanov, Z.F. Ziyadullaev, Z.I. Khalikulov, S.M. Alikulov. 2011. Improving wheat stripe rust resistance in Central Asia and the Caucasus. *Euphytica* 179:197-207.

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