***Supplementary Material***

***Plant Genetic Resources***

**Evaluation of high-yielding wheat (*Triticum aestivum* L.) varieties under water limitation**

Mueen Alam Khan1(🖂) • Hafiz Muhammad Faisal Umer1 • Muhammad Iqbal1 • Abdul Rehman1 • Waqas Shafqat Chattha1

1Department of Plant Breeding & Genetics, Faculty of Agriculture & Environment, The Islamia University of Bahawalpur, Pakistan

(🖂) Address correspondence to mueen.alam@iub.edu.pk; Tel. +92-62-9255539

**Supplementary Table S1.** Salient features of wheat varieties used in the current study

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| --- | --- | --- | --- |
| Sr.No. | Varieties | Year of Approval | Features |
| 1 | Sutlej-86 | 1986 | High yielding cultivar in 1986 with yield potential 5928kg/ha |
| 2 | DWR-97 | 1997 | High yielding cultivar in 1997, short stature and lodging resistance with yield potential 4940 kg/ha  |
| 3 | PND-1 | 2001 | Panjnud variety in which *Triticum durum* genes present with yield potential 6833 kg/ha |
| 4 | Galaxy-2013 | 2013 | It is a high yielding mega variety of Punjab. It is the top first rank variety of Punjab in 2013-17 for yield with yield potential 7904 kg/ha |
| 5 | B.Silver | 1971 | After the Green revolution, it is the first semi-dwarf variety with yield potential 5533 kg/ha |
| 6 | Ghazi-19 | 2019 | High yielding variety, large and better grain size and rust resistance variety with yield potential 6700 kh/ha |
| 7 | Miraj-8 | 2008 | High yielding variety, short duration, and short stature with yield potential 6740 kg/ha |
| 8 | Bahawalpur-2000 | 2000 | The high yielding variety and grain quality better with yield potential 6916kg/ha |
| 9 | Zincol | 2016 | Zinc percentage is in high quantity and it is the first bio-fortified variety with yield potential 6500 kg/ha |
| 10 | Manthar | 2003 | A high yielding cultivar of 2003 with yield potential 6300 kg/ha |
| 11 | Johar-16 | 2016 | It is high yielding mega variety of Punjab, heat and drought tolerance with yield potential 7600 kg/ha |
| 12 | Bahawalpur-97 | 1997 | High yielding variety of 1997 with tolerance to diseases with yield potential 7200 kg/ha |
| 13 | Ujala | 2016 | The high yielding variety and rust resistance with yield potential 6718 kg/ha |
| 14 | Faisalabad-8 | 2008 | It is included in 1st three mega varieties; its rank for high yielding is first in Punjab in 2019 and many time in top 1st rank with yield potential 6718 kg/ha.  |

**Supplementary Table S2.** Mean comparison for various morphological traits under normal and drought stress conditions in wheat (*Triticum aestivum* L.)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Trait/Varieties | Environment | Sutlej-86 | DWR-97 | PND-1 | Galaxy-2013 | B.silver | Ghazi-19 | Miraj-8 | Bahawalpur-2000 | Zincol | Manthar | Johar-16 | Bahawalpur-97 | Ujala | Faisalabad-8 |
| Plant Height (cm) | Normal | 62.63d | 59.09e | 69.08b | 54.76g | 62.89d | 59.69e | 56.97f | 66.29c | 64.16d | 69.41b | 73.81a | 65.93c | 52.98h | 63.24d |
| Drought | 21.59r | 25.14q | 35q | 29.79p | 31.9o | 36.98m | 34.99 lm | 34.18n | 39.44kl | 35.052n | 41.8ij | 42.82i | 32.48jk | 41.98ij |
| Number of fertile tillers/plant | Normal | 6.66bcde | 5.66defgh | 6.33degf | 8.66a | 6defg | 5.33fghi | 4.66ghi | 5.44hi | 8.33ab | 8abc | 5.66defgh | 6ghi | 6.33edef | 7.33abcd |
| Drought | 6cdef | 4hi | 6cdef | 3.66i | 4.66fghi | 4.66efghi | 4.33fghi | 4efghi | 5.33efghi | 4hi | 4.66fghi | 5.75defg | 4.33ghi | 5.33efghi |
| Spike length (cm) | Normal | 13.28a | 13.46a | 12.85a | 8.78fhi | 8.71ghi | 9.72def | 8.53jklm | 10.05cd | 10.9bc | 10.05cd | 8.96efgh | 9.2hijk | 11.43b | 9.9de |
| Drought | 7.18lms | 8.45ghij | 9.9de | 7.11lmn | 7.44klmn | 8.89ghi | 7.69ghij | 7.01lmn | 6.68n | 7.95ijkl | 6.85mn | 7.62klmn | 9.39defg | 8.28hijk |
| Number of spikelets /spike | Normal | 12.66a | 11.44b | 9defg | 10.3c | 10c | 10.11c | 8.44fghi | 7.77hijkl | 11.33b | 7.66ijkl | 8.88drfg | 9.11mn | 8.85efgh | 11.22b |
| Drought | 7.65fghij | 9.33cde | 7.33klm | 8.11def | 8.33fghij | 8n | 8hijk | 7.33klm | 7.33jklm | 7.11klm | 8.22ghij | 8.9def | 8.28defg | 9.44cd |
| Spike weight (g) | Normal | 0.91efg | 1.07klm | 0.76b | 0.84def | 0.73ghi | 0.88de | 1.01efg | 1.1bcd | 0.89bc | 0.76a | 0.96ijk | 0.97jkl | 1.13efg | 1.04efgh |
| Drought | 0.48jkl | 0.59lm | 0.46klm | 0.47efgh | 0.56jklm | 0.6jkl | 0.59hij | 0.61cde | 0.45lm | 0.46lm | 0.45klm | 0.75fghi | 0.51m | 0.59def |
| Number of grains/ spike | Normal | 27d | 29cd | 22.66ef | 24e | 20.33f | 24e | 28.66cd | 30bc | 28cd | 21.66ef | 26.33bc | 27d | 34.33a | 29ab |
| Drought | 15.66gh | 16.66j | 16gh | 15j | 16gh | 17.66ij | 18.33ij | 16.33gh | 14.33ij | 15.6g | 13.66ij | 21.5hi | 17.33g | 18gh |
| 1000 Grain weight (g) | Normal | 32.13n | 34.56fgh | 31jk | 33.2n | 33efg | 34.66ab | 33.43lm | 35.33a | 30.33kl | 32.33fgh | 34.66ab | 34.26gij | 31.86o | 34.03lm |
| Drought | 28ghi | 32.33ab | 30.43kl | 28defg | 31.06ijk | 30.8jk | 29.66cdef | 34.46abc | 28.5mn | 30.13ijk | 29.66lm | 33.66abcd | 27.66jk | 29.44bcde |
| Grain yield/spike (g) | Normal | 0.87cd | 1.02hij | 0.71b | 0.8de | 0.67fghi | 0.83cd | 0.96ef | 1.05c | 0.85a | 0.7ijkl | 0.92kjm | 0.93klm | 1.09de | 0.99efg |
| Drought  | 0.44lmn | 0.54no | 0.49mno | 0.42fgh | 0.49jkl | 0.54jkl | 0.54jkl | 0.56cd | 0.41no | 0.29klm | 0.41ghij | 0.72ghi | 0.46o | 0.53df |
| Total biomass  (g) | Normal | 14.49abc | 14.43cdef | 11.24abc | 17.32ab | 10.05bcd | 11.06dfge | 11.18efghi | 14.28defgh | 17.70a | 14.00abcd | 13.02ghi | 13.95bcdef | 17.25i | 18.14abc |
| Drought | 6.96cde | 5.40fghi | 7.35bcde | 3.84fghi | 5.71def | 6.29bcdef | 5.85fghi | 5.60bcdef | 3.90fgh | 5.30hi | 4.78bcd | 10.30ab | 4.98kl | 7.06bcde |
| Flag leaf area (cm2) | Normal | 32.33e | 33.46d | 36.23b | 34.53hij | 29.96a | 37.23cd | 34.16cd | 33.76fg | 31d | 33.73hijk | 29.9ab | 36.5kl | 30.03hijkl | 36.9ab |
| Drought | 30.46fgh | 27.43mn | 28.1m | 29.63ijkl | 26.8no | 30.33ghij | 30.3f | 31.23jkl | 29.53o | 26.3hij | 29.8l | 28.96hij | 29.06jkl | 31fg |

Means sharing similar letters are statistically non-significant at *P* ≤ 0.05.

**Supplementary Table S3.** Trait-wise best performance and worst performance of wheat varieties

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| --- | --- | --- |
| Traits | Best performer varieties/Drought tolerant | Worst performer varieties/Drought susceptible |
| Plant height (cm) | Faisalabad-8 followed by Bahawalpur-97 and Ghazi-19 | Sutlej-86 followed by DWR-97 and Manthar |
| Number of fertile tillers/plants | Bahawalpur-97 followed by PND-1 and Miraj-8 | Galaxy-2013 followed by Manthar and Zincol |
| Spike length (cm) | Ghazi-19 followed by Miraj-8 and B.silver  | Sutlej-86 followed by Zincol and DWR-97 |
| Number of spikelets/spike | Bahawalpur-97 followed by Miraj-8 and Bahawalpur-2000  | Sutlej-86 followed by Zincol and Galaxy-2013 |
| Spike weight (g) | Bahawalpur-97 followed by B.silver and Ghazi-19 | Ujala followed by Johar-16 and Zincol |
| Number of grains/spike | Bahawalpur-97 followed by B.silver and Ghazi-19 | Ujala followed by Zincol and Johar-16  |
| 1000 Grain weight (g) | Bahawalpur-97 followed by PND-1 and Bahawalpur-2000  | Galaxy-2013 followed by Johar-16 and Faisalabad-8 |
| Grain yield/spike (g) | Bahawalpur-97 followed by B.silver and PND-1 | Manthar followed by Ujala and Johar-16 |
| Total biomass (g) | Bahawalpur-97 followed by PND-1 and Ghazi-19 | Manthar followed by Galaxy-2013 and Ujala |
| Flag leaf area (cm2) | Johar-16 followed by Ujala and Zincol | DWR-97 followed by Manthar and PND-1  |