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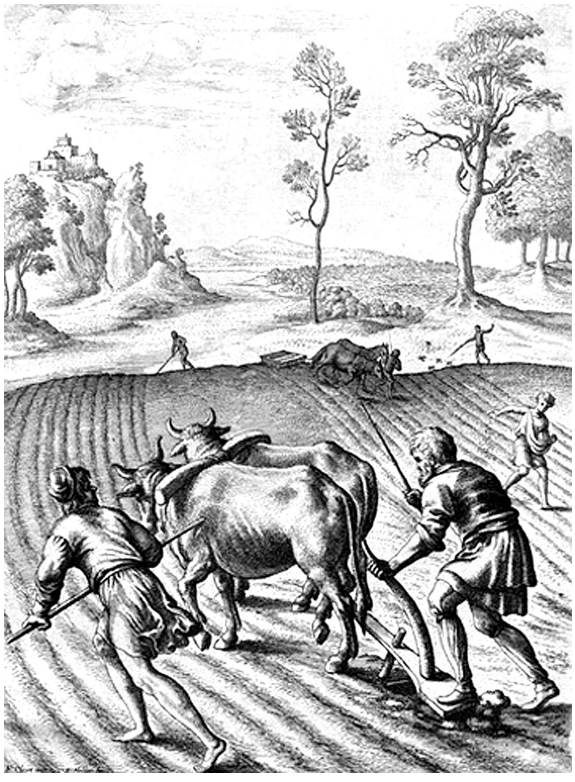

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Evaluation of Wheat Varieties under the Agro-climatic Condition of Barani Agricultural Research Station, Kohat

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Abstract: To select drought tolerant and well adapted wheat varieties for barani condition of Kohat a study was carried out on wheat varieties to test their yield potential, yield stability and better adaptability to the rainfed agro-climatic conditions of kohat division. Overall yield performance in both the years was given by FD-91002 and Suliman-96. In 1997-98 FD-91002 and Inqilab-91 gave good performance according to earliness, bhoosa yield and grain yield kg ha^{-1} i.e. 6175 and 5759 kg ha^{-1} bhoosa and 4645 and 4242 kg ha^{-1} grain, respectively which was due to frequent and timely rainfall. While in 1998-99, rainfall was less and in that moisture stress conditions among the same test varieties Suliman-96 and FD-91019 gave highest grain yield of 2311 and 2233 kg ha^{-1}.

Key words: Design, laid out, lines, staple, improved, rainfed

Introduction

Wheat is mostly the staple food crop of the world as well as Pakistan. It is rightly called as "king of cereal". It is cultivated both under irrigated and rainfed condition (Pervez and Qazi, 1992).

In Pakistan, about 80% wheat cultivation is confined to irrigated condition and only 20% is in rainfed areas. About 36% of the total cropped area is devoted for wheat sowing. Area, production and yield grew at the average annual rate of 1.6, 6.2 and 3.5%, respectively. Pervez and Qazi (1992) reported that wheat is the basal ingredient and production needs to be improved further. In NWFP, it is cultivated on about 8,33,300 ha land that counts 10% of the total country wheat area. About 60% of the area is rainfed. There exist about 80% yield gap between farmers and experimental yields due to cultivation of traditional low yielding local cultivars by primitive production practices (Pervez and Qazi, 1992).

The improvement of 35-50% in wheat yield has been achieved by the introduction of newly high yielding cultivars in the country (MINFAL Islamabad). It is the genetic make-up of a variety that is made and expressed by the favourable environment. The knowledge of genetic variability for different parameters in different varieties contributing to yield is important in yield improvement programme of any crop.

The present study was therefore carried out to screen wheat varieties showing better adaptability to the prevailing climatic conditions.

Materials and Methods

Eleven wheat varieties (Pirsabak-91, Inqilab-91, Bakhtawar-92, Tatara-96, Suliman-96, Barani-83, Rawal-87, Chakwal-86, FD-91002, FD-91019 and FD-91169) were tested under the agro-climatic condition of Kohat. Soil preparation, fertilizer application and other cultural practices were equally applied in the two planting seasons. Composite soil samples were taken, analysed and data recorded. Rainfall data was regularly recorded. The design was used randomized complete block design (RCBD) with four replications. Plot size of 5 × 1.8 m was maintained. Experiment was planted on 6-11-97 and repeated on 15-11-98. Data from central three rows was taken on days to 50% heading, plant height (cm), days to maturity, 1000 grain weight, Bhoosa yield and grain yield kg ha^{-1} were recorded and statistically analysed.

A composite soil sample was taken from the block and analysed. The soil analysis showed its texture Silty clay loam, Organic matter 0.60%, $CaCO_3$ 15.80%, pH 8.20, Electrical conductivity 0.20 $m.mho^{-1}$, Available (P) 10 ppm, Available (K) 170 ppm and Total Nitrogen 0.030%. The experiment was repeated in the following year on the same soil. The rainfall data in Table 1 shows variation in the two growing seasons.

Results and Discussion

Days to 50% heading

Data regarding days to 50% heading is shown in Table 2 and 3 and indicated that days to 50% heading were significantly affected by different cultivars. Mean values of the data revealed that Rawal-87 took maximum days 141 to 50% heading followed by Chakwal-86 (136) and Pirsabak-91 (136) during 1997-98 while during 1998-99 Rawal-87 and Chakwal-86 took maximum days 129 to 50% heading followed by Pirsabak-91 (126) days. Similarly in 1997-98, FD-91002 and Suliman-96 took minimum days (126) to 50% heading which was at par with Tatara-96 (127 days) and in 1998-99 Suliman-96 took minimum days (121) to 50% heading which are at par with Inqilab-91 (122 days) and Tatara-96 (123 days). Genetic variability of the varieties could be the possible reason. The variation in the same varieties, during the two years, may be due to the moisture stress because in 1998-99 there was no rainfall during November and December while in 1997-98 sufficient rainfall occurred during growth of the crop.

Plant height

Statistical analysis of the data regarding plant height shown in Table 2 and 3 depicted that plant height of Suliman-96 (119 cm) is significantly more than other varieties followed by Rawal-87 (116 cm) during 1997-98 while during 1998-99 Suliman-96 got (108 cm) height followed by Barani-83 and Rawal-87 (101 and 100 cm, respectively). This is again the inbuilt character of the variety.

Table 1: Rainfall during Rabi 1997-98 and 1998-99

Month	1997-98 (mm)	1998-99 (mm)
October	116.80	17.50
November	32.20	--
December	34.10	--
January	12.50	95.00
February	109.80	49.60
March	53.60	87.60
April	54.20	02.50
May	21.00	39.70

Days to maturity

Statistical analysis of the data indicated that the most late maturing variety in both the years i.e. 1997-98 and 1998-99 was Rawal-87 which took 178 and 170 days, respectively while Pirsabak-91 (176 and 168 days) was at par with the Rawal-87 Table 2 and 3. The probable reason is that of the variety's own genetic capability.

1000 Grains weight

Statistical analysis of the data proved that 1000 grains weight was significantly affected by different varieties. Mean values of the data showed that Rawal-87 and FD-91019 (39 g) is significantly higher than other varieties during 1997-98 followed by FD-91002 while during 1998-99 Suliman-96 had significantly higher weight of 1000 grains (42 g) followed by Tatara-96, Barani-83 and Rawal-87 (41, 40 and 39 g), respectively which are at par with each other. The reason of grain weight change in the same variety is the rainfall while difference between the varieties is due to their potential.

Bhoosa yield

The most significant high yield was recorded for Chakwal-86 and FD-91002 i.e. 6100 and 6175 kg ha^{-1} closely followed by Inqilab-91 and Pirsabak-91 i.e. 5759 and 5634 kg ha^{-1}, respectively during 1997-98. While during (1998-99) FD-91002 gave significantly more bhoosa yield of 3992 kg ha^{-1} which was at par with Suliman-96 (3614 kg ha^{-1}). Minimum bhoosa yield was recorded in Tatara-96 i.e. 2359 kg ha^{-1} in 1998-99 (Table 3). The reason for low and high yield of bhoosa is directly affected by plant height and rainfall which shows that variety's genetic potential and climatic conditions are interdependent. The results obtained from these studies are similar to that of Hassan ***et al.*** (2001) where they tested five improved varieties under rainfed conditions at five locations. Pirsabak-91 and Inqilab-91 produced more grain yield, bhoosa and harvest index as compared to other varieties.

Table 2: Performance of different wheat varieties under the agroclimatic conditions of BARS Kohat (1997-98)

Variety	Days to 50% heading	Plant height (cm)	Days to maturity	1000 Gr. weight (g)	Bhoosa yield (kg ha^{-1})	Grain yield (kg ha^{-1})
Pirsabak-91	136b	104e	176b	34c-e	5634ab	3608b-e
Inqilab-91	129d	105de	172d	39a	5759ab	4242ab
Bakhtawar-92	128de	97f	172d	33d-f	4358b	3975a-c
Tatara-96	127ef	109c-e	172d	34cd	5325ab	3842a-c
Suliman-96	126f	119a	171e	34cd	4975ab	3358b-e
Barani-83	128de	116a-c	172de	33d-f	4258b	2892de
Rawal-87	141a	116ab	178a	39a	4774ab	3309c-e
Chakwal-86	136b	111b-d	174c	34cd	6100a	2817e
FD.91002	126f	108de	172de	36bc	6175a	4645a
FD.91019	133c	110bc-e	174c	39a	5241ab	3758a-d
FD.91169	132c	110cde	175b	33d-f	5358ab	3725a-e
LSD	1.318	6.725	0.876	2.651	1556	929.4

Table 3: Performance of wheat varieties under the agroclimatic condition of BARS Kohat (1998-99)

Variety	Days to 50% heading	Plant height (cm)	Days to maturity	1000 Gr. weight (g)	Bhoosa yield (kg ha^{-1})	Grain yield (kg ha^{-1})
Pirsabak-91	126b	85ef	168ab	37b-d	2762d-f	1778b
Inqilab-91	122d-f	88d-f	165c-e	37b-d	2944de	2178ab
Bakhtawar-92	123d	81f	160de	32e	2373f	2189ab
Tatara-96	123de	91c-e	163e	41ab	2359f	1678bc
Suliman-96	121f	108a	164de	42a	3614ab	2311a
Barani-83	125c	101b	166b-d	40ab	2583ef	1711b
Rawal-87	129a	100b	170a	39a-c	2778d-f	1900b
Chakwal-86	129a	96bc	167bc	35c-e	3507bc	1856b
FD-91002	125c	94b-d	168ab	34de	3992a	1878b
FD-91019	125bc	96bc	165b-d	35de	3084cd	2233a
FD-91169	129a	97bc	167bc	35de	2861de	1978b
LSD	1.203	7.361	2.291	4.386	447.10	209.18

Means followed by similar letters do not differ significantly from each other at 5% level according to LSD test

Grain yield

During 1997-98 highest grain yield was recorded for FD-91002 (4645 kg ha^{-1}) followed by Inqilab-91 (4242 kg ha^{-1}) while during 1998-99 maximum yield was recorded for Suliman-96 (2311 kg ha^{-1}) and FD-91019 (2233 kg ha^{-1}) followed by Bakhtawar-92 (2189 kg ha^{-1}) and Inqilab-91 (2178 kg ha^{-1}). Minimum yield was recorded for Chakwal-86 (2817 kg ha^{-1}) during 1997-98 and Tatara-96 (1678 kg ha^{-1}) during 1998-99(Table 2 and 3). The most probable cause is variability in rainfall during the two seasons which directly affected yields. Wagorie ***et al.*** (1995) and Hassan ***et al.*** (2001) reported similar results.

The information presented leads to the conclusion that in barani and moisture stress conditions as experienced during 1998-99 Suliman-96 was the best variety while in frequent rainfall and readily available moisture as it was during 1997-98, FD-91002 was the best followed by Inqilab-91, FD-91019 and Pirsabak-91. Overall performance in terms of bhoosa and grain yield was given by FD-91002 and Suliman-96. The same statement is reported by Wigorie ***et al.*** (1995). According to him nine varieties of wheat were tested at 17 locations and VW-103 yielded poorly, in poor environment but responded to good environment while VW-11 and VW-36 yielded relatively well in poor environment but did not respond strongly to good environment. In short, appropriate moisture conditions for successful wheat growth and maturity are extremely important.

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