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DEVELOPMENT OF HIGH YIELDING MILLET VARIETY "SARGODHA BAJRA-2011" RELEASED FOR GENERAL CULTIVATION IN PUNJAB PROVINCE OF PAKISTAN

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Development of superior crop cultivars is ultimate goal of plant breeders. New variety of pearl millet "Sargodha Bajra-2011" was evolved at Fodder Research Institute Sargodha. After obtaining a uniform type of plants, the new variety was evaluated. On the basis of its high green fodder yield, the new variety was tested in Station Yield Trials (SYT) during 2003, 2004 and 2005. Simultaneously: it was also evaluated in different ecological zones throughout the Punjab during the years 2005. It was evaluated in Notational Uniform Fodder Yield Trials (NUFYT) during the years 2004, 2005 and 2006. In SYT, it produced fodder yield of 35.09-66.82 t ha^{-1} and out yielded the check i.e. 18-BY. In zonal testing, the data reflected that this variety out yielded all the lines/varieties and the standard check variety "18-BY" producing an average green fodder yield of 60.67 t ha^{-1} against 52.66 t ha^{-1} produced by the check variety 18- BY. On the basis of weighted average of three years, Sargodha Bajra-2011 yielded 43.7-51.3 t ha^{-1} green fodder yields against the check variety which yielded 39.9-47.8 t ha^{-1}. Plant height of the new variety is 260 cm; number of leaves per main tiller are 14; leaf color is green; leaf area is 334.3 cm^2 and stem thickness is 1.4 cm. It has an erect growth habit. It has better palatability and digestibility. The fodder contains 5.67% crude protein, 38.98% dry matter, 27.07 crude fibre and 3.3% ether extract. Its agronomic studies were done during 2005-09. Its DUS study was conducted in 2008-2009. This variety gives best yield when planted on 15th July at 30 cm apart rows supplied with 80-60 kg NP ha^{-1} and irrigation applied at 14 days interval.

Keywords: Fodder yield, green variety, *Pennisetum americanum***,** quality traits

INTRODUCTION

Pearl millet (*Pennisetum americanum* L.) having 2n = 14 belongs to family Poaceae. Pearl millet locally known as *bajra* is a very important and useful dual-purpose summer crop grown for both fodder and grain. It is adapted to both irrigated and barani areas. Several types and varieties of millet have been grown for centuries in Indo-Pak Sub-continent, China, Africa and other parts of the world. Long and taller varieties are cultivated for fodder while dwarf varieties are grown for grain purposes. It is a nutritious course grain cereal. Pearl millet is one of the oldest cultivated foods known to humans. It is the staple source of nutrition for millions of people. It is also grown and used for hay, pasture, silage, seed crops, food, building material and fuel. It was grown on an area of 548 thousand hectare with a production of 346 thousand tones during 2010-11 with an increase of 18% over the year 2009-10 (Anonymous, 2011). It is an indispensable source of fodder in many countries of the world. It has a high nutritional value as feed for poultry and livestock. Millet is the third important cereal in livestock feed in Pakistan. It is a major contributor in the feeding of rural cattle and poultry. In Pakistan, millet is the most popular bird seed commodity fed to pet birds (Chughtai *et al.*, 2004). It is also used in cattle feed but the data are not available.

No diseases and insect pests attack pearl millet. It is highly tolerant to drought. It can successfully be grown on all types of soils under dry and hot climatic conditions in rain fed areas and also where irrigation is available by canals, wells, tube wells or by dams. Generally, farmers grow single cut type desi bajra having short vegetative period under rain fed condition, while under irrigated conditions, there is more scope for the cultivation of improved varieties.

At present, there is no single cut type of approved variety of bajra available for cultivation by the farmers. Keeping in view the importance of the crop, need was felt to develop new high fodder yielding bajra variety. As a result of evaluation of germplasm, the selection from exotic line AF-POP of African origin was made and new variety was developed which is high yielding, carries a wide range for adaptability and possesses resistance to diseases and tolerance to drought. This single cut variety will enable the fodder growers to replace their local varieties with the approved variety, which will increase their fodder and grain yields of bajra.

The new variety Sargodha Bajra-2011 is an early maturing variety with better yield, quality and pest/disease tolerance and was approved for general cultivation among the farmers. This paper describes its development history.

MATERIAL AND METHODS

The selection from exotic line AF-POP of African origin was made at Fodder Research Institute, Sargodha during the year 1999. To obtain a uniform plant type, the progeny of single plants was grown in isolation and selection program continued. To avoid inbreeding depression, the line was maintained by crossing of plants within the plant progeny row. After obtaining a uniform type, the candidate variety was tested in station yield trials during Kharif 2003, 2004 and 2005. Simultaneously, it was also evaluated in different ecological zones throughout the Punjab during Kharif 2004, 2005 and 2006. It was evaluated in Notational Uniform Fodder Yield Trials (NUFYT) during the years 2004, 2005 and 2006 at 14, 10 and 8 different locations, respectively, throughout the country under irrigated and rain fed conditions. The said line was also screened against diseases and insect pests.

Its agronomic requirements were ascertained during 2005-2009. Its plant characteristics were studied by Federal Seed Certification and Registration Department, Islamabad during 2008-10. Spot examination was conducted during 2011. The quality traits were determined by the Agronomist, Forage Production, Faisalabad. The yield data were subjected to ANOVA by computer using MSTATC statistical package and the means were compared using DMR test (Steel and Torrie, 1980). Various steps involved in the development of new variety are given in Table 1.

RESULTS AND DISCUSSION

***Yield performance trials*:** The new pearl millet variety Sargodha Bajra-2011 was compared with different promising lines along with standard check variety 18 BY in preliminary yield trial during 2003 and results of green fodder yield are illustrated in Table 2 which indicate that the new variety Sargodha Bajra-2011 produced significantly higher green fodder yield of 66.82 t ha^{-1} and out-yielded both the check varieties 18-BY (64.58 t ha^{-1}) and MB-87 (51.33 t ha^{-1}).

The data on green fodder yield recorded in regular yield trial conducted during 2004 are presented in Table 3 which shows that green fodder yield of Sargodha Bajra-2011 was higher (35.09 t ha^{-1}) than the check variety 18-BY (30.8 t ha^{-1}). Statistical analysis of the data recorded revealed highly significant differences among the means values of various varieties.

Table 1. Various steps involved in development of new variety

Years	Steps involved in variety development
1999	Single plant selection from exotic line AF-POP of African origin
2001	Purification and seed multiplication
2002	Row to progeny block and plant to progeny seed production
2003	Preliminary fodder yield trial
2004-05	Regular fodder yield trials and Advance fodder yield trials
2004-05	Zonal fodder yield trial
2005-07	National Uniform Fodder Yield Trial (NUFYT)
2005-09	Fertilizer, Irrigation, Seed rate, row spacing and sowing date trials
2008-10	DUS testing and seed multiplication
2011	Spot examination by the Expert sub-Committee
2011	Approved as cultivar in the name of **Sargodha Bajra-2011** for general cultivation by the Punjab Seed Council, Lahore

Table 2. Performance of pearl millet variety Sargodha Bajra-2011 in preliminary yield trial during 2003

Lines/varieties	Green Fodder Yield (t ha^{-1})
BS-2000	67.56
Sargodha Bajra-2011	**66.82**
BS-99	66.64
18-BY (check)	64.58
MB-87 (check)	51.33
Ghana White	64.94
RCBK 948	57.86
Gahi	54.85
Cd1	9.18

Table 3. Green fodder yield performance of pearl millet variety Sargodha Bajra-2011 in regular yield trial during 2004

Lines/varieties	Green Fodder Yield (t ha^{-1})
Sargodha Bajra-2011	**35.09**
Ghana White	34.34
BS-2000	33.22
RCBK-948	32.84
Gahi	32.66
DP-Pak	32.10
Sen Pop	30.80
18-BY (check)	30.80
N-6	29.30
BS-99	28.93
Cd1	3.45

The performance of the new variety Sargodha Bajra-2011 was evaluated in advance yield trial during 2005. The results of green fodder yield presented in Table 4 revealed that the new variety gave higher yield (52.64 t ha^{-1}) than the check variety 18-BY (51.89 t ha^{-1}).

Table 4. Performance of pearl millet line Sargodha Bajra-2011 in advance green fodder yield trial during 2005

Lines/varieties	Green Fodder Yield (t ha^{-1})
Sargodha Bajra-2011	**52.64**
Gahi	52.26
18-BY (check)	51.89
BS-2000	51.52
Ghana White	50.83
N-6	50.83
RCBK-948	50.40
DP-Pak	50.40
Sen Pop	49.46
BS-99	46.50

The new variety Sargodha Bajra-2011 was evaluated in Macro Yield Trials during Kharif 2005. Data on green fodder yield was compared with check variety 18-BY and 4 other promising lines of millet. The new variety gave 64.79 t ha^{-1} green fodder yield in comparison with the check variety 18-BY which yielded 57.97 t ha^{-1} (Table 5).

Table 5. Performance of pearl millet line Sargodha Bajra-2011 in macro green fodder yield trial during 2004-05

Lines/varieties	Green Fodder Yield (t ha^{-1})
Sargodha Bajra-2011	**64.79**
BS-2000	63.24
Gahi	59.83
18-BY (check)	57.97
G. White	57.35
Sen Pop	56.11

Sargodha Bajra-2011 was also evaluated in Adaptability/Zonal Fodder Yield Trials during Kharif 2004-06 for green fodder yield. The performance of the variety in comparison with the check and other promising lines is summarized in table 6. The green fodder yield data show that Sargodha Bajra-2011 was the leading variety compared with all varieties including the check. On an average of three years data, it gave 15.4 % higher green fodder yield (60.77 t ha^{-1}) over the check variety 18-BY (52.66 t ha^{-1}).

The performance of Sargodha Bajra-2011 was also tested in the National Uniform Fodder Yield Trials by National Coordinator Fodder, NARC, Islamabad during Kharif 2004-06 at 14, 10 and 8 locations throughout Pakistan. The fodder yield data of Sargodha Bajra-2011 in comparison with other lines and check at various locations is presented in tables 7-9. The results indicate that on an average of 14 locations, the variety Sargodha Bajra-2011 out yielded the check variety MB-87 by producing 43.70 t ha^{-1} against 39.99 t ha^{-1} by check variety MB-87. On an average of 10 locations during 2005 the new cultivar Sargodha Bajra-2011 produced 45.50 t ha^{-1} against 44.25 t ha^{-1} by MB-87 and out yielded by 3.11 %. Data revealed that on an average of 8 locations during 2006 the new cultivar Sargodha Bajra-2011 produced 51.30 t ha^{-1} against 47.76 t ha^{-1} by check variety MB-87. Several earlier workers like Ahmad *et al*. (2005), Bakhsh *et al*. (2005) and Hussain *et al*. (2010a,b,c) reported higher yield potential in new wheat and chickpea varieties than the checks.

***Agronomic studies*:** Supply of fodder mainly depends on the time of sowing. The recommended sowing season for forage millet in Punjab is from April to August. However, variations in sowing dates reflect many factors: the particular needs of the farmers for their livestock; size and composition of herd; size of land holding; time of expected rainfall; availability of fallow land; and irrigation water supply. In order to assess a suitable sowing date for maximizing forage yields and optimizing time of forage availability, sowing date trials on high fodder yielding bajra cv. Sargodha Bajra-2011 were conducted at Fodder Research Institute, Sargodha. The results obtained are presented in Table 10. From the data, it is observed that the crop sown on 15th July produced significantly higher fodder yield than crop sown before or after that date during both the years but it can be successfully grown from 15th April to 30th August.

The row spacing trial was conducted at Fodder Research Institute, Sargodha to find out the optimum spacing for the newly developed variety for irrigated conditions. The green fodder yield data are presented in the table 11 which indicate that the variety Sargodha Bajra-2011 gave maximum yield of 50.6 t ha^{-1} when planted at the distance of 30 cm apart followed by 15 cm row spacing (49.6 t ha^{-1}).

Table 6. Performance of Sargodha Bajra-2011 in zonal/adaptability trials during 2004-2006

Lines/varieties	Green Fodder Yield (t ha^{-1})			Average
	2004	2005	2006	
Sargodha Bajra-2011	63.64	50.66	68.02	60.77
18-BY (Check)	50.56	45.88	61.54	52.66

Table 7. Performance of Sargodha Bajra-2011 in national uniform fodder yield trial during Kharif-2004

Lines/ varieties	LOCATIONS														Mean
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
	Green Fodder Yield (t ha^{-1})														
Sargodha Bajra-2011	**42.9**	**50.9**	**75.0**	**33.5**	**53.1**	**6.3**	**49.4**	**42.3**	**52.0**	**27.2**	**49.4**	**29.9**	**42.6**	**7.3**	**43.70**
Composite	42.9	45.6	80.6	36.5	51.4	33.7	51.8	41.9	47.7	29.0	49.4	18.2	47.8	9.3	41.85
BS-99	42.6	45.1	68.8	23.5	47.2	51.0	50.6	43.1	48.5	34.0	48.0	27.5	35.8	7.7	40.95
Local T. Jam	36.0	44.7	63.0	31.2	0.9	61.0	45.1	38.6	54.0	22.7	45.4	22.8	45.4	8.4	40.68
Local R/Pindi	36.7	41.6	58.0	34.9	52.7	64.0	54.8	34.2	52.6	27.3	37.5	17.6	42.3	7.9	40.15
MB-87 (check)	36.4	39.8	59.3	36.1	48.1	59.7	49.2	40.0	48.8	28.5	45.7	19.8	43.2	5.4	39.99
Peshawar Local	32.0	45.1	62.0	30.9	48.1	59.3	42.3	43.1	46.1	23.9	39.1	23.1	48.2	6.5	39.26
BS-2000	29.9	42.9	60.2	34.6	45.9	54.9	49.5	40.3	44.1	24.7	47.2	22.5	42.6	5.1	38.84
Local Quetta	24.1	31.5	46.3	35.5	43.7	54.3	46.0	29.4	55.7	24.4	35.1	15.7	31.5	3.9	34.02

1. NARC. Islamabad, 2. FRI, Sargodha, 3. AARI, Faisalabad, 4. LRDF, Surezai, Peshawar, 5. ARI, D.I Khan 6. ARI, Sariab, Quetta, 7. ARI Tandojam, 8. BARI, Chakwal, 9. RARI, B/Pur, 10. Kot NANA, 11. Karina, Gilgat, 12. BLPRI, Kheri Morat, 13. AZRI, Bhakkar, 14. BARS, Koha

Table 8. Performance of Sargodha Bajra-2011 in national uniform fodder yield trial during Kharif-2005

Lines/ varieties	Institute	Locations										Av.
		1	2	3	4	5	6	7	8	9	10	
		Green Fodder Yield (t ha^{-1})										
Composite-1	RARI B/Pur	59.6	52.0	76.9	53.3	32.0	29.3	31.3	57.2	25.5	47.9	46.59
F-786	FRI, Sargodha	61.8	52.0	80.1	45.0	31.7	26.6	35.0	52.2	25.5	46.6	45.6
Sargodha Bajra-2011	**FRI,Sargodha**	**63.6**	**47.7**	**66.2**	**54.3**	**32.7**	**31.8**	**31.9**	**50.0**	**26.5**	**50.3**	**45.5**
MB-87	FRI,Sargodha	59.1	50.0	76.4	51.7	24.0	25.3	35.2	49.7	23.1	47.9	44.3
BS-2	FRI, Sargodha	60.0	49.3	71.3	45.3	25.3	26.2	32.9	50.8	28.2	51.9	44.1
Composite DK-200	ARI,D.I.Khan	50.2	47.7	75.5	48.0	26.7	24.7	32.9	52.2	29.6	48.2	43.6
MS-2	NARC Isd	61.3	48.3	72.2	47.7	28.3	27.2	20.5	54.4	25.9	44.9	43.1
Local T. Jam	ARI, T.Jam	54.2	51.7	64.8	42.0	23.7	27.8	28.2	50.0	21.3	47.2	41.1

1. NARC. Islamabad, 2. FRI, Sargodha ,3. AARI, Faisalabad, 4. LRDF, Surezai, Peshawar, 5. ARi, D.I Khan 6.ARI, Sariab, Quetta, 7.ARI Tandojam, 8. BARI, Chakwal, 9. ARF, Kot NANA, 10. BARS, F. Jang

Table 9. Performance of Sargodha Bajra-2011 in national uniform fodder yield trial during Kharif-2006

Lines/varieties	Institute	Location								Mean
		1	2	3	4	5	6	7	8	
		Green Fodder Yield (t ha^{-1})								
Comy-1	RARI, Bahawalpur	48.1	57.7	67.6	78.3	33.6	65.7	52.9	24.7	53.6
Sargodha Bajra-2011	**FRI, Sargodha**	**40.7**	**59.6**	**65.4**	**69.7**	**38.7**	**68.5**	**43.7**	**26.1**	**51.3**
F-786	AARI, Faisalabad	47.7	58.6	62.9	71.3	29.2	62.5	48.9	25.8	50.9
BS-2000	FRI, Sargodha	41.2	58.6	59.7	69.1	37.5	64.8	43.9	27.8	50.4
PL-101	Yousaf Seed Co.	47.7	52.2	64.8	37.8	63.9	51.4	51.4	29.2	49.8
MB-87 (check)	**FRI, Sargodha**	**42.1**	**61.4**	**64.4**	**55.6**	**40.7**	**50.9**	**44.1**	**22.8**	**47.8**
Graze Mill	BARI, Traders	34.7	55.6	56.5	41.6	43.5	61.1	28.8	23.0	43.1
Local	LRDE Peshawar	17.6	54.6	38.4	43.4	32.4	60.2	29.2	25.3	37.6
Local	ARI,Tandojam	43.9	53.7	60.7	45.9	45.8	56.0	57.3	25.4	48.6

1. NARC. Islamabad, 2. FRI, Sargodha, 3. AARI, Faisalabad, 4. LRDF, Surezai, Peshawar, 5. ARi, D.I Khan , 6. ARI, Sariab, Quetta, 7. ARI Tandojam, 8. BARI, Chakwal

Table 10. Effects of different sowing dates on the green fodder yield of Sargodha Bajra-2011 during Kharif 2004-2005

Sowing dates	Green Fodder Yield (t ha^{-1})		Average
	Kharif-2004	Kharif-2005	
15th April	43.74	41.60	42.50
30th April	45.05	44.50	44.77
15 th May	40.70	39.12	39.91
30th May	41.00	40.00	40.50
15th June	38.67	37.90	38.28
30th June	39.68	39.00	39.34
15 th July	**52.30**	**51.19**	**51.74**
30th July	49.32	48.61	48.96
15 th August	43.65	44.00	43.82
30th August	37.95	36.17	37.06

Table 11. Effects of different row spacing on the green fodder yield of Sargodha Bajra-2011

Row Spacing	Green Fodder Yield (t ha^{-1})
15 cm	49.6
30 cm	**50.6**
45 cm	46.6
60 cm	41.3
Broadcast	48.6
Cd1	6.3

To determine the optimum seed rate for the new variety Sargodha Bajra-2011, a trial was conducted during Kharif 2005 and 2006 with seed rate varying from 7.5 to 17.5 kg ha^{-1} and the results are given in Table 12.

Table 12. Effects of different row spacing on the green fodder yield of Sargodha Bajra-2011

Seed Rate (kg ha^{-1})	Green Fodder Yield (t ha^{-1})
07.5	42.3
10.0	50.0
12.5	51.3
15.0	**51.6**
17.5	50.0
Cd1	7.13

Significant differences were observed amongst various seed rates. The variety Sargodha Bajra-2011 produced maximum green fodder yield of 51.6 t ha^{-1} at the seed rate of 15 kg ha^{-1} followed by seed rate of 12.5 kg ha^{-1} (51.3 t ha^{-1}). Seed rate trial was also conducted for grain yield. The new variety Sargodha Bajra-2011 produced 1245 kg ha^{-1} grain yield as compared to 1200 kg ha^{-1} of the check variety 18 YB (Table 13).

The new variety was tested for its response to various irrigation regimes i.e. irrigation at an interval of 7, 14, 21 and 28 days. The results summarized in Table 14 revealed that the new variety Sargodha Bajra-2011 gave highest green fodder yield of 55.4 t ha^{-1} when irrigation was applied at an interval of 14 days. Increasing or decreasing the interval of irrigations resulted in reduced green fodder yield.

Table 13. Performance of Sargodha Bajra-2011 in grain yield trial

Lines/varieties	Grain Yield (kg ha^{-1})
Sargodha Bajra-2011	**1245**
BS-2000	1225
18-BY (check)	1200
N-6	1045
Gahi	980
RCBK948	847
Cd1	48

Table 14. Effects of different row spacing on the green fodder yield of Sargodha Bajra-2011

Irrigation interval	Green Fodder Yield (t ha^{-1})
7 days	50.95
14 days	55.40
21 days	46.53
28 days	36.50

Two trials were conducted to determine the fertilizer requirements of the new millet variety Sargodha Bajra-2011 with different fertilizer doses applied at the time of sowing. The maximum mean green fodder yield of 64.1 t ha^{-1} was recorded (Table 15) with 80-60 kg NP ha^{-1} closely and non-significantly followed by the treatment of 80-80 kg NP ha^{-1} (61.7 t ha^{-1}). Similar results were earlier reported by Ahmad *et al*. (2005) and Hussain *et al*. (2010a,b,c). Rashid *et al.* (2007) concluded that P fertilizers application is necessary for fodder crop along with recommended NK fertilizers. It improves fodder yield and quality, hence the palatability and digestibility of fodder crops is increased which resultantly increases milk yield of milch animals, gain in live weight of ewes and control of diseases.

***Insect and disease reaction*:** The insect attack in pearl millet is negligible. No significant disease problems were noted in pearl millet. Rust occasionally appears on late planted pearl millet. New rust resistant varieties are being developed.

Resistance to leaf diseases is important in most environments. Major diseases are rust and powdery mildew. The disease reaction of new millet variety and that of check variety was studied during Kharif 2006 and 2007 and the data are presented in table 16. The rust disease incidence was recorded to be 3-4% in check variety 18 BY that was greater than the variety Sargodha Bajra-2011 (1-2%). Sargodha Bajra-2011 was also found to be free of powdery mildew while 18 BY had 1% reaction during 2006.

Table 15. Effects of different sowing dates on the green fodder yield of Sargodha Bajra-2011

Nutrient levels (kg ha^{-1})		Green Fodder Yield (t ha^{-1})
N	**P**	
0	0	39.7
60	60	46.7
60	80	52.0
80	60	64.1
80	80	61.7
100	60	58.6
100	80	57.5

***Plant characteristics*:** The plant characteristics of the new variety Sargodha Bajra-2011 were studied by Federal Seed Certification and Registration Department, Islamabad and are presented in table 17. A perusal of the data revealed that plant height of the new variety is 260 cm; number of leaves per main tiller are 14; leaf color is green; leaf area is 334.3 cm^2 and stem thickness is 1.4 cm. It has an erect growth habit. It has better palatability and digestibility. The fodder contains 5.67% crude protein, 38.98% dry matter, 27.07 crude fibre and 3.3% ether extract. New plant has better tolerance against salinity as it produced 314% higher yield at 8.62 EC. It has more height and better tillering. It has good palatability and digestibility (Table 18). It has more protein and dry matter than the check varieties.

***Quality studies*:** The ideal fodder should be high in crude protein and digestibility, and low in crude fibre. Fodder yield and quality is greatly influenced by plant age, crude protein content and in vitro dry matter digestibility, which falls as the forage crop matures; dry matter yield increases with advancing maturity.

Bajra is a good feed of all animals because it is high in total digestible nutrients (TDN), protein, fat, vitamin B1 and minerals such as phosphorus and iron. Quality of fodder crops in Pakistan is too poor to meet the animal's nutritional requirement (Khan *et al*., 2003). Fodders are the most valuable and cheapest source of food for livestock having rich source of energy, nutrient elements, carbohydrates and protein. With quality nutritional fodder, milk production can be increased up to 100% (Maurice *et al*., 1985).

The dry matter (%), crude protein (%), crude fibre (%) and ash (%) were determined and are presented in table 19. The new variety Sargodha Bajra-2011 showed it superiority over the check variety 18 BY. It is evident from the data that the new variety Sargodha Bajra-2011 had higher contents of above mentioned nutrients as compared to 18 YB. Mustafa *et al*. (2005 & 2007) reported similar results for new wheat varieties. The new wheat varieties possessed better quality characteristics as compared to the then existing varieties.

Table 16. Response of Sargodha Bajra-2011 to rust and powdery mildew

Lines/varieties	Disease Reaction (% age)			
	Kharif 2006		Kharif 2007	
	Rust	Powdery mildew	Rust	Powdery mildew
Sargodha Bajra-2011	**2**	**-**	**1**	**-**
18 BY(check)	3	1	4	
MB-87	1	-	--	-
BS-99	2	-	4	-
Y-84	1	1	5	-
BS-2000	2	2	2	-

Table 17. Green fodder yield contributing parameters of Sargodha Bajra-2011

Lines/Varieties	Plant height (cm)	Leaves/main tiller	Stem thickness (cm)	Leaf area (cm^2)	Tillers/plant
Sargodha Bajra-2011	260	14	1.4	334.3	5.5
Bs-2000	250	13	1.5	320.2	5.0
18 BY (check)	205	11	1.2	303.3	5.5
N-6	187	10	1.3	311.1	4.0
Local Quetta	210	10	1.1	301.4	3.4

Table 18. Digestibility /palatability studies

Line/Varieties	Dry matter (%)	Sugar contents (%)	Daily Feed Intake (kg day^{-1})	Palatability (%)
Sargodha Bajra-2011	28.40	5.11	61.20	Good
MB-87 (check)	28.93	5.13	61.40	Good

Table 19. Quality traits of Sargodha Bajra-2011

Lines/Varieties	DM%	CP%	EE%	CF%	Ash%
Sargodha Bajra-2011	38.98	5.67	3.30	27.07	7.40
18-BY (check)	36.63	5.47	3.19	25.17	7.45

***Conclusion*:** Development of superior crop cultivars is the ultimate goal of the plant breeders. The new variety of pearl millet "Sargodha Bajra-2011" was developed at Fodder Research Institute, Sargodha. On the basis of its better quality and yield performance, new variety was approved in the name of Sargodha Bajra-2011 by the Punjab Seed Council, Lahore during its 40th meeting held under the Chairmanship of Minster for Agriculture, Punjab during the year 2011 for general cultivation in Punjab with the following remarks: "The new fodder variety Sargodha Bajra-2011 was unanimously approved by the Punjab Seed Council, Lahore for general cultivation in Punjab". On the basis of its ability to produce higher fodder yields, it is hoped that it will replace the existing millet varieties and will play a vital role in the development of dairy industry by ensuring the fodder supply and ultimately increasing the milk and meat production of the country.

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