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Yield and Profitability of New Wheat Varieties in Madhya Pradesh

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ABSTRACT

High yielding and good quality wheat varieties of the Central Zone were tested in farmers' field to know about productivity and profitability. Wheat frontline demonstrations were conducted by a team of scientists at chosen locations in farmers' fields in various districts of Madhya Pradesh viz. Jhabua, Dewas, Indore, Dhar, Shajapur, Vidisha and Khargone between 2001-02 to 2005-06 using breeder seed. Farmers used own other inputs including machinery, and raised the crop according to recommended technology. They tried to implement these technologies to their maximum according to their resources. Wheat crop raised by farmer in the nearby field on their own was considered as check. Popular varieties like Lok1, WH 147 and Sujata (HI 617) were considered as checks in different demonstrations. On the basis of gross return per rupee invested durum wheat variety HI8627 (Malavkirti) gave best returns (1 : 4) to the farmers followed by (1 : 3.9) aestivum variety HI 1531 (Harshita). Higher yields and better quality earned higher market price leading to better profits in test varieties as compared to checks in all the cases. Higher yields and better quality led to better profits in test varieties as compared to check varieties in both the categories. Cost of cultivation was higher in test varieties due to recommendation of manual labour for weeding and other intercultural operations.

Recent wheat varieties of the Central Zone were tested in farmers' field, to know about productivity and profitability, through "Wheat Frontline Demonstrations" in various districts of M.P.

High yielding & good quality durum varieties viz. HI 8381 & HI 8498., Good varieties for limited irrigation / rain-fed conditions viz. HD4672, HI 8627 for Durum (high quality) and HW 2004, HI 1500 and HI 1531 (high quality and premium price) for aestivum , Suitable high yielding late planting wheat varieties to fit in to popular crop rotations viz. DL 788- 2 and HI 1454, High yielding aestivum wheat varieties with good quality and premium market price viz. HI-1418, HI-1077 and HI-1479.

Land preparation is done immediately after kharif harvest by two criss-cross ploughings, followed by heavy planking.

Seed Keeping seed rate in proportion to 1000 grain-weight (100, 120 and 140 kg/ha for small, medium and bold sized grains respectively) in wheat ensures good plant population, Spacing: 12 inches in early sown, 9 inches in timely sown and 6-7 inches in late sown varieties. Variety is selected on the basis of irrigation availability and farmers need,Early Sown/Limited Irrigation Varieties: HI 1500, HW2004, HI1531 (aestivum) and HD 4672 and HI8627 (durum), Timely Sown/ Assured Irrigation Varieties: HI 1418, HI1479, HI1077 (aestivum) and HI 8381 and HI 8498 (durum), Late Sown/ Assured Irrigation Varieties: HI 1454 and DL 788-2 (aestivum), First irrigation after dry sowing of wheat gives better germination and crop stand. Irrigation by check–basin (making square beds of 15X15 or 15X20 meters) instead of flooding method increases water use efficiency. Insect-pest and weed population is kept well below threshold level by regular manual weeding, every year in field as well as bunds and channels. It helps to check hazards in chemical use and reduces environmental pollution.

Use of balanced fertilizer (NPK in ratio of 4:2:1) by drilling it three inches below the soil, before sowing in wheat, ensures fertilizer use efficiency. N: P: K is

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applied at the rate of 60:30:15 in early sown, 120:60:30 in timely sown and 80:40:20 in late sown varieties. For this mixed fertilizer N:P:K –12:32:16 and Urea-46 per cent are used in equal amounts. For early sown varieties whole amount of fertilizers is drilled in the soil before sowing. In timely sown and late sown varieties full amount of N:P:K mixed fertilizer and half amount of Urea is drilled in soil before sowing and remaining half amount of urea is applied as top dressing before next irrigation. Applying 5-10 tonnes / hectare farmyard manure or 2.5 tonnes / hectare Poultry manure, or green manure at least once in every three years along with recommended fertilizer dose helps to maintain soil health and get sustainable productivity. Wheat Cultivation Technology: Use of high yielding limited irrigation durum wheat varieties viz., HD 4672 and HI 8627, First irrigation after dry sowing in wheat saves one irrigation., Shifting first and second irrigation in limited irrigation wheat varieties to 40 and 75 days respectively after sowing saves one to two irrigations., Irrigation by check–basin instead of flooding increases water use efficiency.

METHODOLOGY

Wheat Frontline demonstrations were conducted by a team of scientists at chosen locations in farmers' fields with above technologies. Farmers were selected after conducting training meetings at various locations. A representative sample having different categories i.e. large, medium and small was selected for demonstrations. Size of demonstration plot was 0.4 hectares in majority of the demonstrations. These demonstrations were conducted in various districts of Madhya Pradesh viz. Jhabua, Dewas, Indore, Dhar, Shajapur, Vidisha and Khargone between 2001-02 to 2005-06 using breeder seed. Breeder seed of the wheat varieties was provided free to farmers under Frontline demonstration programme.

Except seed farmers used own other inputs including machinery, and raised the crop according to recommended technology. They tried to implement these technologies to their maximum according to their resources. Wheat crop raised by farmer in the nearby field on their own was considered as check. Popular varieties like Lok1, WH 147 and Sujata (HI 617) were considered as checks in different demonstrations. The scientists personally supervised all critical crop cultivation operations.

The scientist collected data regarding yield and other parameters during 2002 to 2006 personally from farmers after every crop harvest, through structured interview schedule.

RESULTS AND DISCUSSION

1. Performance of limited irrigation varieties

HI 1500 (Amrita) : This is a highly drought and heat tolerant variety, fetching premium price. Only those farmers were selected for its demonstration who could provide two irrigations. 17 demonstrations were conducted with variety HI 1500 in Jhabua and Dewas. Yields (q/ha) recorded were 21 and 16 for test and Check varieties respectively. Low yields of test variety were recorded, as farmers could not apply even recommended dose of two irrigations in most of the demonstrations. Yield increase was 33 per cent over check in these demonstrations. Cost of Cultivation (Rs/ha) was 6208 and 5799 for test and Check varieties respectively. Gross return per rupee invested was 3.6 for test and 2.3 for the check variety.

HW 2004 (Amar) : It is popular due to its good quality *Chapati* making and thus it fetches premium price in the local market. 12 demonstrations were conducted with variety HW 2004 in Indore, Dhar, Shajapur and Jahabua. Yields (q/Ha) recorded were 25 and 19 for test and check varieties respectively. Yield increase was 35 per cent over check in these demonstrations. Cost of Cultivation (Rs/ha) was 7393 and 6127 for test and check varieties respectively. Gross return per rupee invested was 3.5 for test and 2.7 for the check variety.

HI 1531 (Harshita) : This variety was recently released to overcome the usual problem of lodging during last phase of crop in earlier varietiesof this category. It shows good flexibility for the applied irrigations. Due to its higher yield and better quality, it is fetching premium price in the market. Three demonstrations were conducted with variety HI 1531 in Jhabua and Dewas. Yields (q/ha) recorded were 24 and 16 for test and check varieties respectively. Yield increase was 46 per cent over check in these demonstrations. Cost of cultivation (Rs/ha) was 6989 and 5806 for test and Check varieties respectively. Gross return per rupee invested was 3.9 for test and 2.6 for the check variety.

HD 4672 (Malavratna) : It is a medium tall durum variety with good quality grains and high amount of nutrients. It shows good flexibility for the applied irrigations. 5 demonstrations were conducted with variety HD 4672 in Indore, Dhar, Shajapur and Jhabua. Yields (Q/ha) recorded were 24.5 and 19 for test and check varieties respectively. Yield increase was 39% over check in these demonstrations. Cost of cultivation (Rs/ha) was 6925 and 5229 for test and check varieties respectively.

Gross return per rupee invested was 3.0 for test and 2.6 for the check variety.

HI 8627 (Malavkirti) : It is a highly nutritious, recently released, dual purpose durum variety. It shows good flexibility for the applied irrigations. 14 demonstrations were conducted with variety HI 8627 in Jhabua and Dewas. Yields (q/ha) recorded were 20 and 14 for test and check varieties respectively. Yields were lesser than expectation because most of these demonstrations were conducted on hilly soils in tribal district of Jhabua and irrigations were applied less than recommended. Yield increase was 49 per cent over check in these demonstrations. Cost of cultivation (Rs/ha) was 5510 and 4156 for test and check varieties respectively. Gross return per rupee invested was 4.0 for test and 3.0 for the check variety.

HI 8638 : This is a promising variety in pipeline. 4 demonstrations were conducted with variety HI 8638 in Jhabua and Dewas. Yields (q/ha) recorded were 15 and 10 for test and check varieties respectively. Very poor yields were recorded due to very late sowing (December month) of this variety which is otherwise an early sown (October) variety. Yield increase was 51 per cent over check in these demonstrations. Cost of cultivation (Rs/ha) was 6301 and 4893 for test and check varieties respectively. Gross return per rupee invested was 2.3 for test and 1.9 for the check variety.

Overall

Overall 55 demonstrations of limited irrigation wheat varieties were conducted. Average Yields (q/ha) recorded were 22 and 16 for test and check varieties respectively. In majority of the demonstrations only 2 irrigations were given leading to lesser yields than actual varietal potential. Yield increase was 42 per cent over check in these demonstrations. Cost of cultivation (Rs/Ha) was 6554 and 5335 for test and check varieties respectively. Gross return per rupee invested was 3.4 for the test and 2.5 for the check varieties. On the basis of gross return per rupee invested durum wheat variety HI8627 (Malavkirti) gave best returns (1 : 4) to the farmers followed by (1 : 3.9) aestivum variety HI 1531 (Harshita). Higher yields and better quality earned higher market price leading to better profits in test varieties as compared to checks in all the cases. Details of area, year and number of demonstrations etc. are presented in Table-1.

2. Performance of assured irrigation varieties

HI 1418 (Navin Chandausi) : This is a high yielding and good quality aestivum variety. 17 demonstrations were conducted with variety HI 1418 (Navin Chandausi) in Indore, Shajapur, Dhar, Jhabua and Dewas. Yields (q/ha) recorded were 34 and 22 for test and check varieties respectively. Yield increase was 57 per cent over check in these demonstrations. Cost of cultivation (Rs/ha) was 8850 and 7158 for test and check varieties respectively. Gross return per rupee invested was 3.8 for test and 2.7 for the check variety.

HI1479 (Swarna) : This is early maturing, high yielding and good quality aestivum variety. 26 demonstrations were conducted with variety HI 1479 in Indore, Khargone, Vidisha, Jhabua and Dewas. Yields (q/ha) recorded were 37 and 26 for test and check varieties respectively. Yield increase was 51 per cent over check in these demonstrations. Cost of cultivation (Rs/ha) was 8588 and 7327 for test and check varieties respectively. Gross return per rupee invested was 4.2 for test and 2.7 for the check variety.

HI 8498 (Malavshakti) : This is the most popular, high yielding and good quality durum variety in Central India. Due to high demand of processors it is fetching premium price in M.P. 23 demonstrations were conducted with variety HI 8498 in Indore, Khargone, Dhar, Shajapur, Jhabua and Dewas. Yields (q/ha) recorded were 37 and 22 for test and check varieties respectively. Yield increase was 81 per cent over check in these demonstrations. Cost of cultivation (Rs/ha) was 8566 and 7255 for test and check varieties respectively. Gross return per rupee invested was 3.9 for test and 2.6 for the check variety.

HI8381 (Malavshri) : This is a very high yielding, good quality durum variety suitable for farmers having good irrigation availability. 9 demonstrations were conducted with variety HI8381 Indore, Shajapur, Jhabua and Dewas. Yields (q/ha) recorded were 35.5 and 20 for test and check varieties respectively. Lower yields of test variety were recorded as most of these demonstrations were conducted on hilly soils in tribal district of Jhabua with irrigations less than recommended. Yield increase was 88 per cent over check in these demonstrations. Cost of cultivation (Rs/ha) was 8667 and 7266 for test and check varieties respectively. Gross return per rupee invested was 3.6 for test and 2.2 for the check variety.

MP4010 : It is a high yielding, late sown aestivum variety. 18 demonstrations were conducted with variety MP4010 in Indore, Shajapur and Jhabua. Yields (q/ha) recorded were 38 and 28 for test and check varieties respectively. Yield increase was 39 per cent over check in these demonstrations. Cost of cultivation (Rs/ha) was

9626 and 9079 for test and check varieties respectively. Gross return per rupee invested was 3.5 for test and 2.5 for the check variety.

DL 788-2 (Vidisha) : This is a high yielding late sown aestivum variety, which gives high yields under timely sown conditions also. 9 demonstrations were conducted with variety DL 788-2 in Indore, Shajapur, Jhabua and Khargone. Yields (q/ha) recorded were 31 and 20 for test and check varieties respectively. Yield increase was 57 per cent over check in these demonstrations. Cost of cultivation (Rs/Ha) was 7694 and 5862 for test and check varieties respectively. Gross return per rupee invested was 3.8 for test and 3.0 for the check variety.

HI1454 (Abha) : This is a high yielding, late sown aestivum variety, which can be sown under very late conditions also. 21 demonstrations were conducted with variety HI1454 in Indore, Shajapur and Jhabua. Yields (q/ha) recorded were 33 and 19 for test and check varieties respectively. Yield increase was 74 per cent over check in these demonstrations. Cost of cultivation (Rs/ha) was 7902 and 6175 for test and check varieties respectively. Gross return per rupee invested was 4.1 for test and 2.6 for the check variety.

Table-1 Performance of Limited Irrigation Varieties

Year wise Demons-trations	Total Number of Demons-trations	Location Wise Demons-trations	Variety		Yield (Qtl/Ha)		% Yield Increase	Cost of Cultivation (Rs/Ha)		Gross Return (Rs/Ha)		Gross Return Per Rupee Invested	
			Test	Check	Test	Check		Test	Check	Test	Check	Test	Check
2003-04-13 2004-05-2 2005-06-2	17	Jhabua-3, Dewas-14	HI 1500	Lok1	21	16	33	6208	5799	22894	12955	3.6	2.3
2001-02-5 2002-3-3 2004-05-4	12	Indore-7, Dhar-2, Shajapur-1, Jhabua-2	HW 2004	Lok1	25	19	35	7393	6127	24851	15770	3.5	2.7
2005-06	3	Jhabua-1, Dewas-2	HI 1531	Lok1	24	16	46	6989	5806	27407	14530	3.9	2.6
2001-02-3 2004-05-2	5	Indore-2, Dhar-1, Shajapur-1, Jhabua-1	HD 4672	Lok1, HI 617	24.5	19	39	6925	5229	19927	13188	3.0	2.6
2005-06	14	Jhabua-12, Dewas-2	HI 8627	Lok1, HI 617	20	14	49	5510	4156	19189	11486	4	3
2005-06	4	Jhabua-2, Dewas-2	HI 8638	Lok1	15	10	51	6301	4893	14173	8598	2.3	1.9
Total/ Average	**55**	**5**	**6**	**2**	**22**	**16**	**42**	**6554**	**5335**	**21407**	**12755**	**3.4**	**2.5**

Table-1 Performance of Limited Irrigation Varieties

Year wise Demons-trations	Total Number of Demons-trations	Location Wise Demons-trations	Variety		Yield (Qtl/Ha)		% Yield Increase	Cost of Cultivation (Rs/Ha)		Gross Return (Rs/Ha)		Gross Return Per Rupee Invested	
			Test	Check	Test	Check		Test	Check	Test	Check	Test	Check
2001-02-3 2002-03-4 2004-05-5 2005-06-5	17	Indore-7, Shajapur-1, Dhar-2, Jhabua-6, Dewas-1	HI 1418	Lok1, WH147	34	22	57	8850	7158	33496	18001	3.8	2.7

2001-02-3 2003-04-2 2004-05-5 2005-06-16	26	Indore-4, Khargone-2, Vidisha-1, Jhabua-15, Dewas-4	HI 1479	Lok1, WH147	37	26	51	8588	7327	35686	19489	4.2	2.7
2001-02-4 2002-03-2 2004-05-5 2005-06-12	23	Indore-3, Khargone-1, Dhar-3, Shajapur-2, Jhabua-13, Dewas-1	HI 8498	Lok1, WH147	37	22	81	8566	7255	34139	18571	3.9	2.6
2004-05-7 2005-06-2	9	Indore-2, Shajapur-1, Jhabua-4, Dewas-2	HI8381	Lok1	35.5	20.0	88.0	8667	7266	30963	16478	3.6	2.2
2003-04-3 2004-05-15	18	Indore-6, Shajapur-5, Jhabua-7	MP 4010	Lok1, WH147	38	28	39	9626	9079	33853	21961	3.5	2.5
2002-03-2 2004-05-2 2005-06-5	9	Indore-2, Shajapur-1, Jhabua-5, Khargone-1	DL 788-2	Lok1	31	20	57	7694	5862	29142	17804	3.8	3.0
2002-03-1 2004-05-1 52005-06-5	21	Indore-5, Shajapur-5, Jhabua-11	HI 1454	Lok1	33	19	74	7902	6175	31918	15997	4.1	2.6
Total / Average	**123**	**7**	**7**	**2**	**35**	**22**	**64**	**8556**	**7160**	**32742**	**18329**	**3.8**	**2.6**

Overall

Overall 123 demonstrations of assured irrigation varieties were conducted. Average yields (Q/ha) recorded were 35 and 22 for test and Check varieties respectively. Average number of irrigations was only 3 to 4 (including come-up irrigation) in these demonstrations. Yield increase was 64% over check in these demonstrations. Cost of cultivation (Rs/ha) was 8556 and 7160 for test and check varieties respectively. Average gross return per rupee invested was 3.8 for the test and 2.6 for the check varieties. On the basis of gross return per rupee invested wheat variety HI1479 (Swarna) gave best returns (1: 4.2) to the farmers in assured irrigation category followed by (1 : 4.1) by HI 1454 (Abha). Higher yields and better quality led to better profits in test varieties as compared to check varieties was proved again. Details of area, year and number of demonstrations are presented in Table-2.

CONCLUSION

On the basis of gross return per rupee invested durum wheat variety HI8627 (Malavkirti) gave best returns (1: 4) to the farmers followed by HI 1531 (Harshita) aestivum variety (1: 3.9) in limited irrigation category, and in assured irrigation category variety HI1479 (Swarna) gave best returns (1: 4.2) to the farmers followed by (1: 4.1) by HI 1454 (Abha). Higher yields and better quality led to better profits in test varieties as compared to check varieties in both the categories. Cost of cultivation was higher in test varieties due to recommendation of manual labour for weeding and other intercultural operations.