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Socio-economic Impact of "Wheat Seed –Village" in Madhya Pradesh

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ABSTRACT

To improve productivity, availability of quality seed to the farmers must be ensured. Supply of quality seed in large quantity to farmers is only possible through a novel self-sustaining model such as "Seed Village". This concept is bases on principle of quality seed production by the trained farmers in their own fields, for use of the farming community. Kusmania village of Kannaud Block in Dewas District of Madhya Pradesh was selected to demonstrate quality seed production through "Seed Village" by farmer participatory approach. Overall 15 demonstrations were conducted with limited irrigation varieties in 30.2 hectares area. Check variety Sujata was sown in 10 hectares area. Average grain yield (Q/ha) was 32 and 20 in test and check varieties respectively. Yield increase was 56% over check in these demonstrations. Employment generated (man-days per ha.) was 41 and 29 in test and check varieties respectively. Net return (Rs./ha.) was 34595 and 12846 for the test and check varieties respectively. Higher yields and better quality led to better profits in test varieties as compared to check varieties. New varieties have been proved better with respect to productivity, quality, profitability and employment generation. To improve wheat productivity farmers can produce process and sell seeds through cooperative efforts in the form of a seed village. Many qualitative changes were also witnessed due to impact of seed village.

Wheat area in Madhya Pradesh (4.5 million hectares) is approximately 16% of total wheat area in the country contributing approximately 12% to national wheat production annually. Madhya Pradesh wheat is known for its luster, uniformity, boldness, disease free and good quality grain, fetching premium price throughout India. Though productivity is lesser in M.P. (20 qtl. /ha.) than national average (27 quintals per hectare), the quality (due to unique favourable climate for wheat) very well compensates for lower yields due to higher market price.

Improved seed was the major force behind green revolution in India. Seed is the carrier of entire cultivation technology. Recognizing the need for quality seed, farmers' "Cooperative Seed Processing Units" recently evolved in large numbers throughout the state. But due to unavailability of quality seeds in required quantities, they are processing and supplying old and highly rust susceptible wheat varieties. Due to sustained extension efforts farmers are aware of new varieties but unfortunately supply of quality seed in the state is far less than demand. To improve productivity at least 10% area must be replaced by new recommended varieties every year. Thus, scope to increase area under newly released wheat varieties in M.P. is tremendous. Availability of irrigation water, inefficient use of groundwater, imbalanced fertilizer use, deteriorating soil health, and poor adoption of recommended technologies have emerged as major constraints in improving wheat productivity. Advantages of seed village include: quality seed production by farmers and seed agencies at village level, improving profits of wheat farmers, quick replacement of old varieties, ensuring availability of new varieties to all wheat farmers, reducing chemical (pesticide) use in wheat cultivation, improving nutritional status of rural people, providing suitable raw material for seed processing units, improving employment opportunities, reducing social inequalities in rural areas, groundwork to establish international trade, and induce cooperative spirit in rural masses.

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METHODOLOGY

Kusmania village of Kannaud Block in Dewas District of Madhya Pradesh was selected to demonstrate quality seed production through "Seed Village" by farmer participatory approach. The village is located in deep forest area in a valley surrounded by mountains, in the centre of Indore and Bhopal cities of M.P. The soil is black cotton type; having neutral pH, 0.6 Organic Carbon, and open well and tube-well are major sources of irrigation. Farmers were selected on the basis of socio-economic survey of village. Local extension functionaries and selected farmers were involved in the programme right from the planning stage, thereby ensuring their participation and active involvement.

Field Preparation -

Two criss- cross deep ploughings were done immediately after harvest of *Kharif* (soybean) crop. This was followed by planking to pulverize and level the soil. The field was left till sowing time.

Fertilizer Application -

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 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% are used in equal amounts.

Layout and Sowing -

Scientists and technical staff as per suitability of soil, availability of irrigation, crop duration and target for seed production for different wheat varieties did layout. Sowing was done by seed-drill as per recommended time and seed rate (in proportion to 1000 grain weight).

- **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)

Isolation distance of three meter was strictly maintained between every two varieties.

Irrigation -

Irrigation was done by check–basin by laying criss–cross irrigation channels in the sown field making small square wheat beds (15 x 15 or 20 x 20 meters). Number of irrigations were 1+2 (one as come up irrigation and other two at 40 and 75 days of crop age) for limited irrigation, and 1+3 for assured irrigation (one as come up irrigation and other three at 20, 40 and 60 days of crop age) and 1+3 for late sown varieties (one as come up irrigation and other three at 18, 36 and 54 days of crop age).

Weeding and Plant Protection -

Weed population was kept well below threshold level by regular weeding thrice, first by dora (bullock drawn weed scraper)/ hand hoe at 20 days crop age, and subsequent manual weeding by sickle/Khurpi at 50 days and 70 days crop.

Rouging -

Done thrice from 50 days crop stage at an interval of 20 days. It was done by scientists and technical assistants in presence of farmers. It was done to eliminate undesirable genetic characters, based on the morphological characteristics of the variety viz. maturity, plant height, ear head type, waxiness, pubescence and colour of the plant.

Harvesting, Threshing and Storage -

Harvesting was done manually by sickle, at apparent maturity (8% grain moisture). All varieties were threshed separately to prevent mixture. Weighing, bagging and tagging for different varieties were done carefully to prevent mixture at all the stages. The seeds were stored in airtight bins with chemical insecticide to prevent insect attack during storage.

RESULTS AND DISCUSSION

Performance of Limited Irrigation Varieties

HI 1500 (Amrita): This is a highly drought and heat tolerant variety, fetching premium price. Three demonstrations were conducted with variety HI 1500 (Amrita) in 9 hectares area. Check Variety Sujata was sown in 3 hectares area. Grain yield (q/ha) recorded was 29 and 20 in test and check varieties respectively. Yield increase was 46 percent over check in these demonstrations. Detail results are shown in Table 1.

HW 2004 (Amar): It is popular for its quality *Chapati* making and fetches premium price in the local market. 4 demonstrations were conducted with variety HW 2004 (Amar) in 8 hectares area. Check Variety Sujata was sown in 2 hectares area. Grain yield recorded was 30 Q/ ha and 20 Q/ha, in test and check varieties respectively.

Yield increase was 52 percent over check in these demonstrations. Detail results are shown in Table 1.

HI 1531 (Harshita): This variety was recently released to overcome the usual problem of lodging during last phase of crop in earlier varieties of this category. It shows good flexibility for the applied fertilizer and irrigations. Due to its higher yield and better quality, it is fetching premium price in the market. Being latest release only one demonstration was conducted with variety HI 1531 (Harshita) in 3.5 hectares area. Check Variety Sujata was sown in one hectare area. Grain yield (q/ha) recorded was 34 and 20 in test and check varieties respectively. Yield increase was 72 percent over check in these demonstrations. Detail results are shown in Table 1.

HD 4672 (Malavratna): It is a medium tall *durum* variety with good quality grains. It shows good flexibility for the appliedfertilizer and irrigations. 6 demonstrations were conducted with variety HD 4672 (Malavratna) in 7.7 hectares area. Check Variety Sujata was sown in 3 hectares area. Grain yield (Q/ha) recorded was 30 and 19 in test and check varieties respectively. Yield increase was 57% over check in these demonstrations. Detail results are shown in Table 1.

HI 8627 (Malavkirti): It is a highly nutritious, recently released dual purpose durum variety. It shows good flexibility for the applied fertilizer and irrigations. Being latest release only one demonstration was conducted with variety HI 8627 (Malavkirti) in 2 hectares area. Check Variety Sujata was sown in 1 hectare area. Grain yield (Q/ha) recorded was 35 and 23 in test and check varieties respectively. Yield increase was 52 % over check in these demonstrations. Detail results are shown in Table 1.

Overall

Overall 15 demonstrations were conducted with limited irrigation varieties in 30.2 hectares area. Check variety Sujata was sown in 10 hectares area. Average grain yield (q/ha) was 32 and 20 in test and check varieties respectively. Yield increase was 56% over check in these demonstrations. Employment generated (man-days per ha.) was 41 and 29 in test and check varieties respectively. Net return (Rs./ha.) was 34595 and 12846 for the test and check varieties respectively. Cost of production of one quintal grain was Rs.294 and Rs.370 for the test and check varieties respectively. Selling price (Rs./Q) was 1370 and 995 for the test and check varieties respectively. Gross-profit per quintal grain production was Rs.1076 and Rs. 624 for the test and check varieties respectively. Gross return per rupee invested was 4.9 for test and 2.7 for the check variety. On the basis of gross return per rupee invested wheat variety HI 1531 (Harshita) *aestivum* variety (1:5.8) gave the best returns.

Performance of Assured Irrigation Varieties

HI 1418 (Navinchandosi): This is a high yielding and good quality aestivum variety. 8 demonstrations were conducted with variety HI1418 (Navinchandosi) in 16 hectares area. Check Variety Lok 1 was sown in 5 hectares area. Grain yield recorded was 44 Q/ha and 27 Q/ha, in test and check varieties respectively. Yield increase was 67% over check in these demonstrations. Detail results are shown in Table 2.

HI 1077 (Mangla): This is a highly nutritious and high yielding *aestivum* variety. 3 demonstrations were conducted with variety HI 1077 (Mangla) in 1.8 hectares area. Check Variety Lok 1 was sown in 3 hectares area. Grain yield recorded was 45 Q/ha and 27 Q/ha, in test and check varieties respectively. Yield increase was 72% over check in these demonstrations. Detail results are shown in Table 2.

HI1479 (Swarna): This is early maturing, high yielding and good quality *aestivum* variety. **5** demonstrations were conducted with variety HI 1479 (Swarna) in 8 hectares area. Check Variety Lok 1 was sown in 4 hectares area. Yields (Q/ha) recorded were 48 and 26 for test and check varieties respectively. Yield increase was 90% over check in these demonstrations. Detail results are shown in Table 2.

HI 8498 (Malavshakti) : This is 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. 6 demonstrations were conducted with variety HI 8498 (Malavshakti) in 8 hectares area. Check Variety Lok 1 was sown in 3 hectares area. Yields (Q/ha) recorded were 48 and 23 for test and check varieties respectively. Yield increase was 108 % over check in these demonstrations. Detail results are shown in Table 2.

HI8381 (Malavshri): This is a very high yielding, good quality durum variety suitable for farmers having good irrigation availability. 4 demonstrations were conducted with variety HI8381 (Malavshri) in 8 hectares area. Check Variety Lok 1 was sown in 3 hectares area. Yields (Q/ha) recorded were 47 and 23 for test and check varieties respectively. Yield increase was 106 % over check in these demonstrations. Detail results are shown in Table 2.

Table-1: Yield and Profitability in Limited Irrigation Wheat Varieties under "Seed Village"

Year-Wise No. of Dem.	Total No. of Dem	Area (Ha)		Variety		Yield (Qtl/Ha)		% Yield Incr-ease	Employ-ment Generated (Man days)		Cost of Cultiv-ation (Rs/Ha)		Gross Return (Rs/Ha)		Net Return (Rs/Ha)		Gross Return Per Rupee Invested		Cost of Production (Rs/Qtl)		Selling Price (Rs/Qtl)		Gross Profit (Rs/Qtl)	
		Test	Check	Test	Check	Test	Check		Test	Check	Test	Check	Test	Check	Test	Check	Test	Check	Test	Check	Test	Check	Test	Check
2002-03-1																								
2004-05-1	3	9	3	HI1	Sujata	29	20	46	42	32	8417	7827	40333	18553	31917	10727	4.8	2.4	297	402	1400	940	1103	538
2005-06-1				500																				
2002-03-3																								
2005-06-1	4	8	2	HW 2004	Sujata	30	20	52	40	30	8000	7440	41290	19000	33290	11560	5.2	2.6	276	372	1350	950	1074	578
2005-06	1	3.5	1	HI 1531	Sujata	34	20	72	39	27	8300	7000	48020	22000	39720	15000	5.8	3.1	242	350	1400	1100	1158	750
2001-02-2																								
2002-03-3																								
2005-06-1	6	7.7	3	HD 4672	Lok1, Sujata	30	19	57	42	28	8321	7051	39667	16792	31346	9741	4.9	2.4	305	376	1300	883	995	507
2005-06	1	2	1	HI 8627	Sujata	35	23	52	41	29	12300	8100	49000	25300	36700	17200	4.0	3.1	351	352	1400	1100	1049	748
Average	15	30.2	10	4	2	32	20	56	41	29	9068	7484	43662	20329	34595	12846	4.9	2.7	294	370	1370	995	1076	624

Table-2: Yield and Profitability in Assured Irrigation Wheat Varieties under "Seed Village"

Year-Wise No. of Dem.	Total No. of Dem	Area (Ha)		Variety		Yield (Qtl/Ha)		% Yield Incr-ease	Emplo-yment Generated (Man days)		Cost of Cultivation (Rs/Ha)		Gross Return (Rs/Ha)		Net Return (Rs/Ha)		Gross Return Per Rupee Invested		Cost of Production (Rs/Qtl)		Selling Price (Rs/Qtl)		Gross Profit (Rs/Qtl)	
		Test	Check	Test	Check	Test	Check		Test	Check	Test	Check	Test	Check	Test	Check	Test	Check	Test	Check	Test	Check	Test	Check
2001-02-1	8	16	5	HI 1418	Lok1	44	27	67	69	38	14052	9109	60687	24996	46635	15887	4.3	2.8	317	343	1360	394	1043	551
2002-03-3																								
2003-04-2																								
2004-05-1																								
2005-06-1																								
2001-02-1				HI 1077	Lok1																			
2002-03-1																								
2005-06-1	3	1.8	3			45	27	72	53	31	11070	8048	58833	24700	47763	16652	5.3	3.1	247	313	1300	883	1053	571
2001-02-1																								
2002-03-1																								
2003-04-2																								
2004-05-1	5	8	4	HI 1479	Lok1	48	26	90	70	38	13923	9536	64725	21895	50803	12359	4.8	2.3	291	375	1350	843	1059	468
2001-02-1																								
2002-03-3																								
2003-04-2	6	8	3	HI 8498	Lok1	48	23	108	65	36	13077	8915	62722	18767	49646	9852	4.8	2.1	270	388	1300	817	1030	429
2001-02-1																								
2002-03-1																								
2003-04-2	4	8	3	HI 8381	Lok1	47	23	106	69	36	13810	8915	62133	18767	48323	9852	4.4	2.1	292	388	1300	817	1008	429
2001-02-1																								
2002-03-1																								
2004-05-1	3	5	3	DL 788-2	Lok1	40	25	63	64	37	12828	9248	53900	20760	41072	11512	4.4	2.2	316	369	1333	823	1018	455
2001-02-1																								
2002-03-1																								
2004-05-1	3	5	3	HI 1454	Lok1	37	25	51	69	36	13693	9015	49733	20760	36040	11745	3.7	2.3	368	361	1333	823	966	463
Average	32	51.8	24	7	1	44	25	80	66	36	13208	8969	58962	21521	45755	12551	4.4	2.4	300	362	1325	843	1025	481

DL 788-2 (Vidisha): This is a high yielding, late sown *aestivum* variety which gives high yields under timely sown conditions also. 3 demonstrations were conducted with variety DL 788-2 (Vidisha) in 5 hectares area. Check Variety Lok 1 was sown in 3 hectares area. Yields (Q/ha) recorded were 40 and 25 for test and check varieties respectively. Yield increase was 63% over check in these demonstrations. Detail results are shown in Table 2.

HI1454 (Abha): This is a high yielding, late sown *aestivum* variety which can be sown under very late conditions also. 3 demonstrations were conducted with variety HI1454 (Abha) in 5 hectares area. Check Variety Lok 1 was sown in 3 hectares area. Yields (Q/ha) recorded were 37 and 25 for test and check varieties respectively. Yield increase was 51 percent over check in these demonstrations. Detail results are shown in Table 2.

Overall

Overall 32 demonstrations of assured irrigation varieties were conducted in 51.8 hectares area. Check Variety Lok 1 was sown in 24 hectares area. Average yields (Q/ha) recorded were 44 and 25 for test and check varieties respectively. Yield increase was 80 percent over check in these demonstrations. Employment generated (man days per ha.) was 66 and 36 in test and check varieties respectively. Net return (Rs./ha.) was Rs.45755 and Rs. 12551 for the test and check varieties respectively. Cost of production of one quintal grain was Rs.300 and Rs.362 for the test and check varieties respectively. Selling price (Rs./q) was 1325 and 843 for the test and check varieties respectively. Gross-profit per quintal grain production was Rs.1025 and Rs.481 for the test and check varieties respectively. Average gross return per rupee invested was 4.4 for the test and 2.4 for the check varieties. On the basis of gross return per rupee invested wheat variety HI1077 (Mangla) gave best returns (1: 5.3) to the farmers in assured irrigation category. Details of area, year and number of demonstrations are presented in Table-2. Higher yields and better quality led to better profits in test varieties as compared to check varieties. Apparently cost of cultivation was higher in test varieties in comparison to check varieties as test varieties utilized more manual labour than checks.

CONCLUSION

Monetary return from seed produced through “Seed Village” is comparable to most of the high profit crops grown in the zone. Higher cost of production of check varieties was due to lower yields and poor crop management in comparison to test 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 HI 1531 (Harshita) *aestivum* variety (1: 3.9) in limited irrigation category. In assured irrigation category variety HI1479 (Swarna) gave best returns (1 : 4.2) to the farmers followed by (1: 4.1) HI 1454 (Abha). Higher yields and better quality led to better profits in test varieties as compared to check varieties. New varieties have been proved better with respect to productivity, quality, profitability and employment generation. To improve wheat productivity farmers can produce process and sell seeds through cooperative efforts in the form of a seed village.