Sustainability of Hybrid Rice Technology vis a vis Inbred Rice in Uttar Pradesh

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ABSTRACT

Hybrid rice is one of the most promising technology to ensure food security. The yield advantages of more than a ton is well established across different parts of the country. India is first among the countries outside China to develop and commercialize hybrid rice technology. It has been estimated that hybrid rice technology has proved to be a viable option to increase rice productivity over the current level . Adoption pattern of Hybrid rice technology in Uttar Pradesh was studied with the objective to assess the adoption level of hybrid rice production technology as compared to inbred rice technology. The present study was conducted in Central Plain Zone of Uttar Pradesh. District Kanpur Nagar and Fatehpur from Central Planin Zone of Uttar Pradesh. Two blocks were randomly selected i.e. Chaubepur and shivrajpur from district Kanpur Nagar and Hanswa and Malwan from district Fatehpur. Thereafter, eight villages, two from each block were selected on random basis. 50 hybrid rice growers and 30 inbred rice growers were included as respondents from each district.

Key words : Hybrid rice technology; Commercialize hybrid rice technology;

Yield levels of semi-dwarf varieties of the green revolution era have plateaued. More and more rice has to be produced on less land with less inputs. Demand for rice is rapidly increasing with increase in population , specially in less developed countries. Hybrid rice varieties have shown 15-20% higher yield potential than the inbred rice varieties under farmer's conditions and also have shown their ability to perform better under adverse conditions of drought and salinity.

India is first among the countries outside China to develop and commercialize hybrid rice technology. It has been estimated that hybrid rice technology has proved to be a viable option to increase rice productivity over the current level. In the long run, hybrid rice technology would help in increasing the productivity and production of rice in the country and thus, help in mitigating the hunger and poverty of the Indian masses. At present, hybrid rice is reported to be grown in 0.2 million ha in the country mostly in the states like Andhra Pradesh, Tamil Nadu, Maharashtra, Uttar Pradesh, Orissa and West Bengal.

Hybrid rice is being perceived as a practically feasible and readily adoptable genetic option to increase the rice production, as has been amply demonstrated in farmers' fields. Thus, having convinced of the potential of the hybrid rice technology in enhancing the production and productivity of rice, transfer of hybrid rice technology from the research farms to the farmer's field is a important task. Agencies have to play a greater role in creating much needed awareness among farmers about the advantages of cultivating hybrid rice by various innovative approaches. Keeping facts in view, the present study entitled " Adoption pattern of Hybrid rice technology in Uttar Pradesh" was undertaken with the objective to assess the adoption level of hybrid rice production technology as compared to inbred rice technology.

METHODOLOGY

The study was planned and purposively conducted in the state of Uttar Pradesh. Uttar Pradesh is a vast state divided into 9 agro-climatic zones. The present study was conducted in Central Plain Zone of Uttar Pradesh. District Kanpur Nagar and Fatehpur from Central Planin Zone of Uttar Pradesh were purposively selected keeping in view the dominance of rice cultivation in these districts. District wise list of the blocks was prepared and two blocks were randomly selected i.e. Chaubepur and shivrajpur from district Kanpur Nagar and Hanswa and Malwan from district Fatehpur.

Thereafter, eight villages, two from each block were selected on random basis. 50 hybrid rice growers and 30 inbred rice growers were included as respondents from each district. Thus, 160 respondents in total were selected for the final interview. The data were analysed using simple statistical techniques like percentage, average, mean score and correlation coefficient.

RESULTS AND DISCUSSION

Adoption of hybrid nursery management technology: Adoption of the technologies recommended for raising nursery of hybrid rice have been fully adopted by the farmers. However, some of the recommendations like seed rate and sowing time have not been adopted to the desired level. It reflects that the farmers need to be made fully aware about such technologies.

Table 1. Adoption of nursery management practices of hybrid rice. (N=100)

Practices	Level of Adoption			
	Partial adoption	Full adoption	Over adoption	No adoption
1. Varieties	25 (25.00)	65 (65.00)	-	10 (10.00)
2. Seed Rate				
Fine	22 (22.00)	60 (60.00)	10 (10.00)	8 (8.00)
Medium	20 (20.00)	70 (70.00)	10 (10.00)	-
Coarse	35 (35.00)	20 (20.00)	15 (15.00)	30 (30.00)
3. Seed Treatment	-	100 (100.00)	-	-
4. Sowing Time				
Early varieties	20 (20.00)	55 (55.00)	5 (5.00)	20 (20.00)
Mid Varieties	18 (18.00)	70 (70.00)	7 (7.00)	5 (5.00)
Late Varieties	35 (35.00)	30 (30.00)	10 (10.00)	25 (25.00)
5. Required seed bed	25 (25.00)	60 (60.00)	15 (15.00)	-
6. Fertilizer quantity	15 (15.00)	70 (70.00)	10 (10.00)	5 (5.00)
7. Irrigation	13 (13.00)	80 (80.00)	5 (5.00)	2 (2.00)
8. Plant Production	25 (25.00)	60 (60.00)	5 (5.00)	10 (10.00
9. Weed management	-	100 (100.00)	-	-

The farmers were found not using recommendations fully as they were not educated appropriately about such aspects. Similar findings were reported by *Hari Om (1996)* and *Subhai et al. (1998)*.

Adoption of recommendation for main crop of hybrid rice : Most of the farmers were found fully adopting the recommended hybrid rice production technologies. However, 15-20% farmers did not adopt the technologies fully particularly in case of spacing, fertilizer application, time of fertilizer use, irrigation, etc.

Therefore, the operations need to be specifically stressed while promoting hybrid rice cultivation. Similar finding was reported by *Hari Om (1997)*.

Table 2. Adoption of practices for field crop of hybrid rice. (N=100)

Practices	Level of Adoption			
	Partial adoption	Full adoption	Over adoption	No adoption
1. Field Preparation	-	100 (100.00)	-	-
2. Age of Seedlings	10 (10.00)	80 (80.00)	10 (10.00)	-
3. Transplanting spacing	20 (20.00)	75 (75.00)	5 (5.00)	-
4. Fertilizer application	25 (25.00)	60 (60.00)	10 (10.00)	5 (5.00)
5. Time of fertilizer application	20 (20.00)	80 (80.00)	-	-
6. Irrigation	20 (20.00)	75 (75.00)	5 (5.00)	-
7. Weed management	-	10 (10.00)	-	-
8. Plant Protection	15 (15.00)	70 (70.00)	10 (10.00)	5 (5.00)
9. Harvesting and threshing	10 (10.00)	90 (90.00)	-	-

Adoption of practices for inbred rice nursery : Level of adoption has been quite varying for different crop operations. It is revealed that full adoption has been realized only in weed management. There are number of operations in which adoption level is around 50 per cent viz. seed rate, seed treatment, sowing time and weed management.

Table 3. Adoption of practices for nursery management of inbred rice (N=60)

Practices	Level of Adoption			
	Partial adoption	Full adoption	Over adoption	No adoption
1. Varieties	20 (33.33)	30 (50.00)	5 (8.33)	5 (8.33)
2. Seed Rate				
Fine	15 (25.00)	35 (58.33)	3 (5.00)	7 (11.67)
Medium	10 (16.67)	45 (75.00)	5 (8.33)	-
Coarse	18 (30.00)	25 (41.67)	2 (3.33)	15 (25.00)
3. Seed Treatment	10 (16.67)	20 (33.33)	-	30 (50.00)
4. Sowing Time				
Early varieties	20 (33.33)	20 (33.33)	10 (16.67)	10 (16.67)
Mid Varieties	10 (16.67)	45 (75.00)	5 (8.33)	
Late Varieties	40 (66.67)	15 (25.00)	-	5 (8.33)
5. Required seed bed	15 (25.00)	40 (66.67)	5 (8.33)	-
6. Fertilizer quantity	11 (18.33)	45 (75.00)	4 (6.67)	-
7. Irrigation	13 (21.67)	42 (70.00)	5 (8.33)	-
8. Plant Production	5 (8.33)	50 (83.33)	2 (3.33)	3 (5.00)
9. Weed management	-	60 (100.00)	-	-

The gaps are quite prominent in case of nursery raising for inbred rice which need to be addressed for raising the productivity per unit area.

Adoption of practices for main crop of inbred rice : The findings indicate that full adoption has been realized by majority of the farmers. However, the gap is significant in operations like spacing, fertilizer application and plant protection.

Table 4. Adoption of practices for main crop of inbred rice (N=60)

Practices	Level of Adoption		
	Partial adoption	Full adoption	Over adoption
1. Field Preparation	-	60(100.00)	-
2. Age of Seedlings	10 (16.67)	45 (75.00)	5 (8.33)
3. Transplanting spacing	13 (21.67)	39 (65.00)	8 (13.33)
4. Recommended Fertilizer application	12 (20.00)	45 (75.00)	3 (5.00)
5. Time of fertilizer application	5 (8.33)	52 (86.67)	3 (5.00)
6. Irrigation	7 (11.67)	48 80.00)	5 (8.33)
7. Weed management	5 (8.33)	55 (91.67)	-
8. Plant Protection	15 (25.00)	40 (64.67)	5 (8.33)
9. Harvesting and	5 (8.33)	50 (83.33)	5 (8.33)

The findings suggest that there are operations viz., plant spacing, fertilizer application and plant protection where the farmers need to be motivated for full adoption. Similar findings were reported by *Sharda and Khurana (1993), Singh et al. (1997)* and *Singh (1985).*

Table 5. Trends in area and productivity of hybrid rice N=100

Years	Area under hybrid rice (ha)	Average yield of hybrid rice (q/ha)
2002-03	72.50	65.50
2003-04	75.00	70.00
2004-05	80.50	75.50
2005-06	85.00	78.00
2006-07	88.00	80.00

Table 6. Area production and productivity of inbred rice. N=60

Years	Area under inbred rice (ha)	Average yield of inbred rice (q/ha)
2002-03	45.00	56.00
2003-04	42.50	55.00
2004-05	38.00	52.50
2005-06	32.50	50.00
2006-07	25.00	48.00

Table 7. Sustainability yield index of hybrid rice and inbred rice N=160

Years	Yield of HR (q/ha)	Yield of IR (q/ha)
2002-03	60	40
2003-04	65	42
2004-05	68	45
2005-06	70	48
2006-07	75	50
SYI	0.83	0.82

Trends in area and production of hybrid rice & inbred rice : The study of selected villages indicates a rising trend in area & productivity of hybrid rice whereas it

was declining in case of inbred rice. Though area increase was not that significant but increase in productivity of HR over the years was phenomenon i.e. from 65.5 q/ha in 2002-03 to 80.0 q/ha in 2006-07, showing an increase of 18.13%.

Table 8. Correlation coefficient (r) between different variables and technological gap of hybrid rice crop in central plain zone. (N=100)

Sl. No.	Variables	Correlation coefficient (r)
1	Age	0.0718
2	Education	-0.1332
3	Caste	-0.0428
4	Type of family	0.0631
5	Size of family	0.1177
6	Size of land holding	-0.1936**
7	Occupation	-0.0772
8	Annual income	0.1319

In case of inbred rice, it was negative trend both in case of area & productivity.

The area was reduced by 44.44 per cent and productivity by 14.29 per cent.

Sustainability yield index does not show much variation but it appears better for hybrid rice as compared to inbred rice.

The positive correlation of technological gap with size of family and annual income are indicative of the fact that the technology is more labour intensive and input intensive and the growers with higher annual income and more number of family labour to support its cultivation, are able to adopt the technology in better way than the others.

CONCLUSION

The findings indicate that the adoption gaps are more prominent in case of inbred rice as compared to hybrid rice. However, the gaps related to adoption of recommendations for nursery and main crop of hybrid rice are quite significant and if addressed adequately the productivity of the crop may be raised even higher as compared to 60.0 q/ha obtained in the study. There has been rising trend in area and productivity of hybrid rice in the study area. Correlation coefficient (r) is also significant between different variables and technological gap of hybrid rice crop in Central Plain Zone.

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