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A Research Article on Importance of Hybrid Rice Cultivation in West Bengal

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Abstract: Agriculture is the primary source of human food and sources of industrial raw material. Among all the agricultural crops, paddy is the main food grain of West Bengal. Rice is the staple food of most West Bengalis. Rice has been cultivated in West Bengal since ancient times. Earlier, the residents had to import rice from abroad through West Bengal to meet their daily rice need. Gradually West Bengal became self-reliant in rice production. Multi-crop farming, use of modern agricultural machinery, use of high yielding seeds improved irrigation systems etc. have increased the yield of rice in West Bengal. However, the significant event in the history of rice cultivation in West Bengal is the cultivation of hybrid rice. A small amount of hybrid rice seed can be planted in a small area to produce more crops. Hybrid rice cultivation is possible at low labour cost and less pesticide application. Farmer's profits increase greatly. This research paper is based on secondary data. Hybrid rice (Boro) of West Bengal was discovered in 1995 by Chunchura Rice Research Centre. Then hybrid rice cultivation increased significantly. In this study paper we see that hybrid paddy cultivation is mainly done as summer rice (Boro). Hybrid rice cultivation has increased rice production per hectare, gradually the area under hybrid rice cultivation has increased. But at present 10% of the total rice cultivation in West Bengal is under hybrid rice cultivation. It is insignificant compared to the need.

Keywords: Hybrid rice cultivation, history of hybrid rice cultivation, cultivation methods, importance; merits and demerits, prospects.

INTRODUCTION

Before clothing and shelter, another basic human need is the need for food. The main goal of every country and state is to ensure the food security of its citizens. West Bengal has a population density of 1029/ sq.km and population growth rate is .71% (Census 2011). Providing food, clothing and shelter to a large population is a challenging issue. Hybrid rice cultivation has emerged as a solution when increasing rice production per hectare has become an important issue. Cultivation of hybrid rice has increased rice production per hectare in West Bengal. Farmers have benefited more than before due to reduced cost of production. The study paper is developed with the help of secondary data. More hybrid rice being cultivated in fertile khadar region along the river banks of West Cultivation of Boro Hybrid rice cultivation has started in West Bengal from 1995. At present many varieties of hybrid rice are being cultivated in West Bengal.

Purpose of the Study

- To discuss the effectiveness of hybrid rice cultivation in West Bengal.
- Explain the improvement in rice yield in West Bengal by cultivating hybrid rice.
- Show the impact of hybrid rice cultivation on the natural environment and social life of West Bengal.
- To examine how much change is required in Hybrid rice cultivation practices in West Bengal.

A Geographical Profile of Study Area

The state West Bengal is located in the Eastern region of India and is situated between 21° 38' and 27°10' North latitude and between 85°30' and 89°53' East longitude. The tropic of Cancer passes through near about middle of the state.

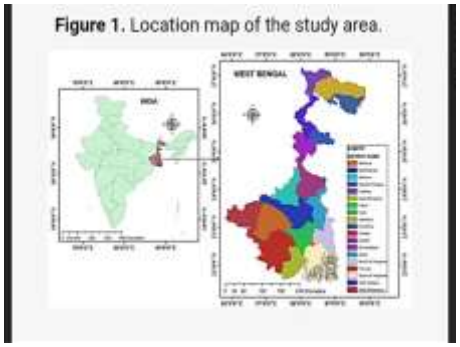

Figure 1. Location map of the study area.

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West Bengal shares three international boundaries: One with Bangladesh in South- East, the second one with Bhutan in the North, and the last one with Nepal in North West. West Bengal also shares interstate boundaries with Bihar and Jharkhand in the West, Odisha in the South, Assam in the North East, and Sikkim in the North.

Considering the area, the position of West Bengal is 14th among the Indian states. It covers an area of around 88,752 sq.km. Which is 2.67% in respect to the total land area of India. n 2011 West Bengal had a literacy rate 76.26% and sex ratio 950 females per 1000 males. Population of this state had 9.13 crore and population growth rate 13.84%. Rural population of West Bengal was 68.13.

DATABASE AND METHODOLOGY

History of hybrid rice cultivation in West Bengal: Hybrid rice is the first offspring produced by cross-pollination of two species of rice. Research on hybrid rice began in 1964 under the leadership of Chinese scientist Juan Long Ping. In 1973 three practical rice of different groups discovered by Scientists were printed in golden letters in the database of rice science, A, B, and R line. Hybrid rice was first discovered in China in 1974 by the association of A B and R line.

Research on hybrid rice began in 1989 with the financial support of FAO and UNDP under the umbrella of Research Council of India. After that Rice Research Authority of Hyderabad came in to the role of Co-ordinating this research. The country's first Kharif hybrid rice was invented at the Mara Tera centre under the Andhra Pradesh Agricultural University in 1994 and Rabi hybrid rice was discovered in 1995 at the Chunchura Rice Research Centre in West Bengal. After that hybrid rice cultivation started in West Bengal on a large scale.

Hybrid rice cultivation system of West Bengal: In West Bengal, paddy is grown in the following manner -

- **Prepare Seed Bed:** First it is necessary to prepare the seed bed. The fertile alluvial soil along the river banks of West Bengal is ideal for growing this rice. In West Bengal, Kharif paddy is sown in June and Rabi crops are sown in November. The seed bed is made one metre wide and as long as required and 25-30 cm drain is kept between two bed. Two kg.organic fertilizers per sq.m. of seed bed and one kg.of nitrogen,.5 kg.of phosphorus,.5 kg potash should be applied per 100 sq.m. of land during land preparation to keep the seedlings healthy and strong. Seed bed is never allowed to be dry. About 15-20 kg. of paddy seed bed is prepared per hectare.
- **Cultivation Land Preparation and Planting:** Fertile land along the river banks of West Bengal with drainage systems and irrigation facilities are selected for plantation. First the land is watered and then levelled with a ladder using a tractor.50% nitrogen, 75% Potash, Phosphorus should be added when the soil is soft.25-30 days old rice seedlings are planted. One or two healthy seedlings are planted once per cluster in lightly watered soil between the 2nd to 4th December. In hybrid rice plant, the desease of majara poka, Gandhi poka, leaf rot, fruit rot, blast desease are active. Therefore pesticides are applied regularly. When 80% of the rice paddy field is ripe, the paddy has to be harvested and stored.

List and characteristics of hybrid rice cultivated in WB

Sl. No.	Name	Discovery	Parentage	Salient features
01.	CNRH-3	Chinsura,WB,1995	IR-62829-A and Ajaya	• Plant height:80-85cm. • Duration:120-125 days • Medium slender grains with high amylose (28%) and low ASV (3.0),high milling (70%),HRR(52%) • Yield:7.49 tonnes/hectare
02.	PA-6444	Bayar Bio Science, Hyderabad,2001	6 co-2 and 6 MO-5	• Plant height:110cm • Duration:135-140 days • Medium fine grain, alkaline spreading value - 4.5,high milling (74%),HRR(64%) • Yield:6.11tonnes/hectare
03.	DRRH-2	PRR, Hyderabad,2005	IR-68897A and DR 714-1-2R	• Plant height:85-90cm • Duration:112-116 days • Large fine grain, amylose (25%), alkaline spreading value (63%),high milling (73%),and HRR(63%) • Yield:5.35 tonnes/hectare
04.	JKRH-401	JK Agrigenetics Ltd.	RV-2A, and	• Plant height:115 cm

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		Hyderabad,2006	RV-44R	• Duration:140 days • Large bold grain, amylose (24.5%), alkaline spreading value -5.2, milling (74%), HRR(59%) • Yield:6.22 tonnes/hectare
05.	PA-6201	Bayer Bio Science, Hyderabad 2006	6 CO-2 and 6 MO-1	• Plant height:115 cm • Duration:125-130 days • Large fine grain, amylose (24%),ASV-2.0,milling(68%),HRR(61%) • Yield:6.2 tonnes/hectare
06.	KRH-2	VC Farm, Mandya,UAS, Bangalore,1996	IR-58025A and KGTR-2R	• Largefinegrain.ii.Duration: 130-135days.iii.Amylose 23%,ASV-6,millin70%,HRR-56%Yield:7.40 ton/hec

Source: Chinsurah, Rice Research Station, Directorate of Agriculture, West Bengal.

Except above this are the new hybrid rice recommended for West Bengal by the Indian government -DRH-775(2009),US-312(2010), VNR-2355 plus (2011), US-314(2013),PNPH-924-1(2012), CO-4(2013), Sahyadri -4(2008), CNRH-102(2018), JKRH-3333(2017), IET 21395(2017) etc.

Hybrid rice production in West Bengal: West Bengal got ranked first in the list of rice producing states with 15.3 m.t. rice production (2020-21). This state share 13.95% of the countries rice.

Table 1. Trend and Composition of rice in West Bengal

	Autumn Rice			**Winter Rice**			**Summer Rice**			**Total Rice**		
Year	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield
1984-85-1993-94	592.77 (10.72)	813.71 (8.04)	1378.81	4187.15 (75.58)	7031.05 (67.71)	1675.79	766.82 (13.73)	2280.11 (23.15)	2948.26	5546 (100)	10124.87 (100)	6002.86
1994-95-2003-04	428.76 (7.31)	783 (5.88)	1843.96	4135.24 (70.45)	8584.92 (65.14)	2076.11	1304.45 (22.25)	4012.93 (30.38)	3068.01	5868.45 (100)	13380.85 (100)	6988.08
2004-05-2009-10	280.15(4.85)	578.6 (3.93)	2070.43	4033.43(73.4)	9730.43 (66.15)	2411.95	1442.93(25.05)	4397.47(28.13)	3049.45	5756.51(100)	14706.5 (100)	7531.83

Note: Figures in the parentheses indicates % of total rice.
Source: Economic review of WB

Area-In thousand hectre, Production -In thousand tonnes, Yield -In kg./hectare.

In table 01 we can see that between Aus(Autumn rice),Aman (Winter rice), and Boro (Summer rice) paddy Aman paddy is more produced and the total allotted land is more.The area and total production of Aus paddy are decreasing and simultaneously the area and production of Boro (Summer rice)is increasing.HYV and hybrid seeds are used in Boro rice cultivation. Boro paddy is located in areas where irrigation facilities and advance technology are available.Its production capacity per hectare is very high (3049.45 kg/hectare).

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Table 2. Trend of Rice (especially Summer Rice) Production in West Bengal

Crops	2011-12 Area ('000 hectare)	2011-12 Production ('000 tonnes)	2012-13 Area ('000 hectare)	2012-13 Production ('000 tonnes)
Autumn rice	213	471.30	205.08	471.15
Winter rice	3996.60	10259.40	4010.97	10410.53
Summer rice	1221.10	3857.10	1228.26	4142.00
Total	5433.70	19605.80	5444.32	15023.68

Source: Economic review WB

We observe that the area and production of Autumn rice is decreasing and the area (1221.10, '000 hectare to1228.26, '000 hectare) and production (3857.10, '000 tonnes to 4142.00,'0 00tonnes) of Summer rice (HYV and hybrid) is increasing.

Table 3. Trend of Hybrid Rice Yield of West Bengal

	2019-20			2020-21		
Crops	**Area**	**Yield**	**Production**	**Area**	**Yield**	**Production**
Kharif (Aus+Aman) Rice	4,219.20	2,817	11,886.19	4,300.08	2,846	12,237.33
Boro Rice	1,271.77	3,630	4,616.84	1,285.55	3,632	4,669.14
Total Rice	5,490.98	3,005	16,503.02	5,585.63	3,027	16,906.48

Area in '000 hec., Yield in kg/hec. Production in '000 MT. Source: Dept. of Agriculture, Govt. of WB

RESULT AND DISCUSSION

In table 03 we can see that the yield per hectare has increased significantly in case of Boro rice.In1984-85 to 1993-94 the yield rate was (Summer Rice) 2948.26kg/hectare.It increased 3632 kg/hectare in 2020-21.It can be concluded that this has been possible due to the increase in Hybrid Rice cultivation.

Importance of Hybrid Rice Production in West Bengal:

- **Merit-Enhancing Food Security:** There was a time when West Bengal had to import rice from neighbouring states and countries to meet the daily food needs of the local residents. But improved technology, landuse change, hybrid rice cultivation led to unprecedented improvement in total rice production. Simultaneously, food security has increased. Currently West Bengal is a rice exporting state.
- **Reduction in Production Costs:** A very small amount of hybrid rice can be planted to produce a large crop. Besides, the total cost of production is much lower due to less use of labour and pesticides.
- **Healthy Crop Production:** Most hybrid rice is desease resistant. So pesticides doesn't have to be applied a higher rates. So the rice is healthy for humans.
- **Short term:** Most hybrid rice take much less time to produce a crop.
- **Increase Production:** Cultivation of hybrid rice increases the production per hectare, thus the farmer gets more profit.
- **Demerits-a. Small and Fragmented Agricultural Holdings:** West Bengal has a very high population density. Most of the land is inherited by farmers. So land is small and fragmented. In this proper planning and use of large agricultural machinery is not possible.
- **Lack of educated farmers:** Educated youths are not interested in agriculture. Farmers cultivate without training in agriculture. So maximum yield is not achieved.
- **Reluctance to buy seeds:** Hybrid rice cannot be produced at home. So the farmer has to buy the seeds from the market in every case. So farmers are reluctant to buy seeds every year.

Evaluation

Despite the above problems, hybrid rice yields are more suitable for providing food security to a large population in a state with a peculiar population density like West Bengal. Although hybrid rice cultivation has started in many areas of West Bengal. At present, 10% of the total rice cultivation in West Bengal is cultivated with hybrid rice, where in China this rate is 50%. Therefore, it is important to adopt these measures by the government:

- Provide proper training to farmers.
- Changing farming practices.
- Providing suitable credit to farmers.
- Strengthening of water irrigation infrastructure.
- Creating a suitable market for credit at the Block and Panchayat level.

But to get consistent good yield it is important to adopt crop rotation system. It will maintain the natural fertility of the land. Determining the right type of rice by testing the soil is also an important issue. Along with chemical fertilizers the use of organic fertilizers is an important step. Just as China has

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succeeded in cultivating hybrid rice, so will West Bengal and India one day.

REFERENCE

1. Economic Review. (2009-10). *Statistical appendix, Government of West Bengal*. Published by Bureau of Applied Economics and Statistics, Development & Planning Department.
2. Economic Review (2021-22). Department of Planning and Statistics, Government of West Bengal.
3. Sarkar, D., & Ghosh, J. K. (2013). Spread of new varieties of hybrid rice and their impact on the overall production and productivity in West Bengal. *Visva-Bharti, Shantiniketan*.
4. Adhikari, B., Bag, M. K., Bhowmick, M. K., & Kundu, C. (2011). Status paper on rice in West Bengal. *Hyderabad (India): Rice Knowledge Management Portal, Directorate of Rice Research, India*. Available from URL: http://www. rkmp. co. in/sites/default/files/ris/rice-state-wise/Status% 20Paper% 20on% 20Rice% 20in% 20West% 20Bengal. pdf.[Accessed April 28, 2018]..
5. Verma, R.L., Katara, J.L., Sarkar, S., Reshmiraj, K.R., Parameswaran, C., Devanna, D., Jena, D., Rout, D., Singh, V., Mohapatra, S.D., Mukherjee, A.K., Samantaray, S., Patra, B.C., & Nayak, A.K. (2021). Hybrid Rice Technology: a profitable venture for improving livelihood of rice farming in India (Pp. 44). NRRI Research Bulletin No. 31, ICAR-National Rice Research Institute, Cuttack 753006, Odisha, India.

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