

Impact of BGREI programme on rice productivity and farmers' income of Odisha

RK Behera^{1*}, SK Mishra², HK Awasthi¹, B Mondal² and Lipi Das²

¹Indira Gandhi Krishi Vishwa Vidyalaya, Raipur, Chhattishgarh, India

²ICAR-National Rice Research Institute, Cuttack, Odisha, India

*Corresponding author e-mail: beherarajeb9@gmail.com

Received : 13 July 2017

Accepted : 13 July 2017

Published : 21 March 2018

ABSTRACT

The present study was conducted during the year 2016-17 in Mayurbhanj and Bargarh districts of Odisha state to assess the impact of Bringing Green Revolution to Eastern India (BGREI) programme on productivity and income of rice growers in Odisha. Two blocks from each district were selected, in such a way that one block in each district had more BGREI implemented villages and another one had less BGREI implemented villages. From each selected block, 02 BGREI-implemented villages and 02 distantly located non-BGREI-implemented villages were selected for investigation. Total 160 farmers (80 beneficiaries+ 80 non-beneficiaries) were selected as respondents for the study. The data were collected with the help of well-structured interview schedule through personal interview. The study revealed that after participation in the BGREI programme, the productivity of rice cultivated by the beneficiaries in the selected districts was increased from 32.47 q/ha to 49.17 q/ha. i.e. an increase of 51.43 per cent in rice productivity. Beneficiaries had 18.66 q higher productivity of rice as compared to the non-beneficiaries. The annual income of beneficiary farmers in the selected districts was also increased from Rs.1,20,514 to Rs.1,86,107 i.e. an increase of 54.43 per cent. Beneficiaries had Rs. 74, 370 higher annual income as compared to the non-beneficiaries. B:C ratio of the beneficiaries increased from 1.51 to 2.68 i.e. an increase of 77.48 per cent. B:C ratio of Rice cultivation done by the beneficiaries was 1.58 times higher than the non-beneficiaries. So, BGREI programme is a farmer friendly programme and it should continue to sustain and improve the livelihood of farmers.

Key words: Impact, BGREI, productivity, income of the farmers

INTRODUCTION

India lives in its villages rings true even today. The major portions of its 1.3 billion people still live in villages and have agriculture as their primary means of livelihood. The agriculture sector occupies centre-stage in our resolve to promote inclusive growth, enhance rural incomes and sustain food security (Shivay and Rahal, 2013). There is a need for a second green revolution as the country will have to increase its agricultural output by more than 340 million tonnes by 2020 in the face of increasing demand by a growing population. It is also important to mention that the first green revolution was limited to five crops with the main focus

on wheat and is only limited to a few areas of the country, mainly Punjab, Haryana and western Uttar Pradesh. Studies have revealed that the cost intensive green revolution helped mainly the rich farmers while the small and marginal farmers did not receive the desired benefits and their conditions showed a decline. Keeping this in view, the Finance Minister launched in 2010-11 the BGREI programme to focus on the 7 eastern states - comprising Assam, Bihar, Chattisgarh, Jharkhand, Eastern UP, West Bengal and Odisha with necessary financial allocations to extend the green revolution. The programme, part of the Rashtriya Krishi Vikas Yojana (RKVY), gained momentum in 2011-12 with an outlay of Rs. 400 crores with a focus on rice

and wheat and strategic interventions relating to crop production, water harvesting, asset building and site-specific activities needed for improving the agronomy. Reports reveal that rice production from the region is estimated at 562.6 lakh tonnes, an increase of 19.8 % over the year 2011 (Mukherjee, 2012). Father of Indian Green Revolution Prof. M.S. Swaminathan called the government approach to the second green revolution "technocratic", with the sole emphasis on hybrid rice and also stress on the other aspects, particularly water management, assured irrigation and soil health management.

The programme of "Bringing Green Revolution to Eastern India (BGREI)" was launched to address the constraints limiting the productivity of "rice-based cropping systems". BGREI comprised of broad categories of interventions such as 1. Block Demonstrations, 2. Asset Building, 3. Site Specific Activities, 4. Marketing support & post-harvest management, 5. Seed production & distribution, 6. Subsidy on Need-based Inputs, 7. Training program on Cropping System Based Demonstrations etc. (Anonymous, 2017).

Since this programme has already completed over 5 years of its implementation since 2010-11, it was planned to study its actual performance, in terms of its impact on the change in productivity of rice and income of beneficiary farmers.

MATERIALS AND METHODS

The study was conducted in two districts namely Bargarh and Mayurbhanj districts of Odisha state during the year 2016-2017. Mayurbhanj and Bargarh districts were purposively selected for research work because BGREI programme has been running in Mayurbhanj and Bargarh districts since its inception. Secondly, both districts are located in two separate agro-ecologies and very widely geographically apart, one *i.e.*, Bargarh is located in the western Odisha, while the other *i.e.*, Mayurbhanj is located in the northern Odisha. Out of total 12 blocks of Bargarh district and 26 blocks of Mayurbhanj district, 2 blocks from each district were selected purposively in consultation with NRI nodal scientists and district agriculture officers, in such a way that one block in each district would have more BGREI implemented villages and the other would have less BGREI implemented villages in order to get a truly

representative sample for the study. From each selected block, 02 distantly located BGREI-implemented villages and 02 distantly located non-BGREI-implemented villages were selected for investigation. Thus, total 16 villages ($4 \times 4 = 16$) were selected for the investigation. Since BGREI block demonstrations were undertaken in a contiguous area of 100 ha as one cluster in all the four selected blocks involving about 100 beneficiary farmers irrespective of the number of farmers of the cluster or villages, a uniform size of samples, *i.e.*, 10 farmers from each village was selected as respondents following stratified random sampling method. Thus, a total of 160 ($16 \times 10 = 160$) farmers were selected as respondents for the study. Out of 160 respondents, 80 were beneficiaries and 80 were non-beneficiaries (Table 1).

The information relevant to the study objectives were collected from farmers. Two pre-tested interview schedules, one for beneficiary farmers and the other for non-beneficiary farmers, consisting of various types of questions related to the objectives of the study were therefore developed. As per the experience gained during pre-testing, the language of some of the questions was suitably worded and made more understandable and clear, and then the schedules were finalized. The data were collected personally during January-February 2017 with the help of pre-tested interview schedules, by personal interview method by contacting the respondents (farmers) at their home and field. The respondents did hesitate to give required information in the beginning. To get the authentic information, the help of local leaders, sarpanches, members of gram panchayat and Assistant Agriculture Officers were sought and the rapport was developed with the respondents. After getting information, the farmers were categorized into four categories on the basis of their size of land holding, *i.e.*, marginal farmers (up to 1 ha), small farmers (1 to 2 ha), medium farmers (2 to 4 ha), and large farmers (above 4 ha) respectively for better interpretation and analysis of data.

RESULTS AND DISCUSSION

Impact of BGREI programme on productivity of rice crop

The impacts of the BGREI programme were adjudged by the change in productivity of rice crop before (Pre-

Table 1. Details about selected study area and number of respondents.

Selected districts	Selected blocks	Type of Respondents	Selected villages	No. of selected respondents	
Bargarh	Paikmal	Beneficiary	Mandosil	10	
			Bhutmunda	10	
		Non-beneficiary	Salepali	10	
			Baidpali	10	
	Barpali	Beneficiary	Remta	10	
			Dhirpur	10	
		Non-beneficiary	Badgan	10	
			Gadgaddala	10	
Mayurbhanj	Baripada	Beneficiary	Badjor	10	
			Gualdihi	10	
		Non-beneficiary	Langal Kanta	10	
			Keshipur	10	
			Balabhadrapur	10	
	Udala	Beneficiary	Sunapal	10	
			Khaladi	10	
		Non-beneficiary	Rangamatia	10	
				10	
				10	
Total	2	4	8	16	160

BGREI) and after (Post-BGREI) the initiation of the programme as well as comparison of present productivity (Post-BGREI) of beneficiaries with the non-beneficiaries. The average productivity of rice of the beneficiaries before and after the initiation of the BGREI programme and productivity of rice of non-beneficiaries during the post-BGREI period has been depicted in Table 2.

The per hectare productivity of rice crop had increased from 25.38 q to 44.93 q among the marginal farmers, while in case of small farmers, there was an increase in productivity from 35.9 q to 48.52 q. Among the medium and large farmers categories also, there was an increase in productivity from 39.45 q to 49.29 q and 54.43 q to 64.88 q respectively. Therefore, there was a net increase in the productivity of rice among the farmers showing some positive impact of the BGREI programme. The average total productivity of rice crop in the selected districts under BGREI had also increased

from 32.47 q/ha to 49.17 q/ha among the farmers.

1. Increase in productivity of rice after implementation of BGREI programme

Percent increase in productivity was maximum *i.e.*, nearly 77.03 per cent in case of marginal farmers, followed by 35.15 per cent increase among small farmers, 24.94 per cent among medium farmers and just 19.20 per cent increase in productivity was observed in case of large farmers. In an average, about 51.43 per cent increase in rice productivity was observed among the selected farmers. Thus, across all type of farmers' categories, there was remarkably high increase in productivity of rice after participation in the BGREI programme.

In case of non-beneficiaries, the per hectare productivity of rice crop was 25.06 q among the marginal farmers, 35.48 q among the small farmers,

Table 2. Impact of BGREI programme on Productivity (in q/ha.) of rice (n=160).

Farmers' Category	Average Productivity of Beneficiary in (n=80)			Average productivity of Non-beneficiary (Current position/ Post-BGREI period) (n=80)	Difference in Average Productivity between beneficiaries and non-beneficiaries (Current position/ Post-BGREI period)
	Pre-position (Pre-BGREI period)	Current position (Post-BGREI period)	% increase in Productivity after implementation of the programme		
Marginal (up to 1 ha)	25.38	44.93	77.03	25.06	19.87
Small (1 to 2 ha)	35.9	48.52	35.15	35.48	13.04
Medium (2 to 4 ha)	39.45	49.29	24.94	31.76	17.53
Large (Above 4 ha)	54.43	64.88	19.20	41.07	23.81
Total	32.47	49.17	51.43	30.51	18.66

Table 3. Comparison of productivity of rice of beneficiaries as compared to Non-beneficiaries during post-BGREI period.

Type of Farmer	Beneficiaries (n=80)	Non-beneficiaries (n=80)	Difference	Z-value
Marginal (up to 1 ha)	44.93	25.06	19.87	7.86**
Small (1 to 2 ha)	48.52	35.48	13.04	
Medium (2 to 4 ha)	49.29	31.76	17.53	
Large (Above 4 ha)	64.88	41.07	23.81	
Total	49.17	30.51	18.66	
z-Test: Two Sample for Means				
		Beneficiaries	Non-beneficiaries	
Mean		49.171875	30.5109375	
Known Variance		263.5361	187.4403	
Observations		80	80	
Hypothesized Mean Difference		0		
Z		7.859619909		
P(Z<=z) two-tail		3.77476E-15		
z Critical two-tail		1.959963985		

**Significant at 0.01 level of probability

31.76 q among medium farmers and 41.07 q in case of large farmers. In overall, the average productivity of rice crop of non-beneficiaries was about 30.51 q. As compared to non-beneficiaries, beneficiaries had 19.87 q higher per hectare productivity in case of the marginal farmers, 13.04 q higher among the small farmers, 17.53 q higher among the medium farmers and 23.81 q higher among the large farmers. In overall, beneficiaries had 18.66 q higher productivity of rice crop over the non-beneficiaries. Thus, beneficiaries had remarkably higher productivity than non-beneficiaries after implementation of BGREI programme.

The z-test analysis on productivity of various categories of beneficiary and non-beneficiary farmers showed that the difference in productivity was highly significant at 0.01 level of probability with z-value of 7.86. This clearly indicates that the beneficiaries had more productivity of rice than non-beneficiaries (Table 3), which might be attributed to the technological interventions and asset building activities under the BGREI programme. Thus, it may be concluded that there was a positive and significant impact of BGREI programme on the productivity of rice crop of beneficiary farmers. Similar findings were mentioned by Chouhan et al. (2015), Sharma et al. (2015) and Manjunatha and Parmod (2015).

2. Impact of BGREI programme on Income of the beneficiary farmers

Effects were also made to adjudge the impact of the BGREI programme in terms of the change in annual

income of the beneficiary farmers before (Pre-BGREI) and after (Post-BGREI) the initiation of the programme and also the comparison of the present annual income of the beneficiaries with the non-beneficiaries (Post-BGREI period).

Annual income of the beneficiary farmers before and after the initiation of the BGREI programme and annual income of the non-beneficiaries during post BGREI period has been depicted in the Table 4.

The table showed that the annual income of the beneficiaries had increased from Rs.35,541 to Rs.53,277 among the marginal farmers, while in case of the small farmers there was an increase in annual income from Rs.60,227 to Rs.1,00,774. In case of medium and large farmers categories also, there was increase in annual income from Rs.1,50,139 to 1,96,6313 and Rs.5,00,577 to 8,11,173 respectively. Therefore, there was a net increase in the annual income of beneficiary farmers showing some positive impact of the BGREI programme. The average annual income of beneficiary farmers in the selected districts under BGREI had also increased from Rs.1,20,514 to Rs.1,86,107.

3. Increase in annual income after implementation of BGREI programme

Percent wise increase in annual income was maximum (67.32%) in case of the small farmers followed by the large farmers (62.05%), marginal farmers (49.90%) and medium farmers (30.75%) respectively. In an

Table 4. Impact of BGREI programme on Income of the beneficiary farmers.

Farm Category	Average annual income of Beneficiary in Rs. (n=80)			Average annual income of Non-beneficiary in Rs. (Current position/ Post-BGREI) (n=80)	Difference in Average annual Income between beneficiaries and non-beneficiaries (Current position/ Post-BGREI)
	Pre-position (Pre-BGREI)	Current position (Post-BGREI)	% increase in Income		
Marginal (up to 1 ha)	35541	53277	49.90	46540	6738
Small (1 to 2 ha)	60227	100774	67.32	110514	9740
Medium (2 to 4 ha)	150139	196313	30.75	124281	72031
Large (Above 4 ha)	500577	811173	62.05	327437	483737
Total	120514	186107	54.43	111737	74370

Table 5. Comparison of Annual income of Beneficiaries as compared to Non-beneficiaries during post-BGREI period.

	Beneficiaries (n=80)	Non-beneficiaries (n=80)	Difference	Z-value
Marginal (up to 1 ha)	53277	46540	6738	2.25*
Small (1 to 2 ha)	100774	110514	9740	
Medium (2 to 4 ha)	196313	124281	72031	
Large (Above 4 ha)	811173	327437	483737	
Total	186107	111737	74370	
z-Test: Two Sample for Means				
Mean		Beneficiaries 186107.1022	Non-beneficiaries 111737.425	
Known Variance		73844873897	13629346927	
Observations		80	80	
Hypothesized Mean Difference		0		
Z		2.249059		
P(Z<=z) two-tail		0.024508743		
z Critical two-tail		1.959963985		

*Significant at 0.05 level of probability.

average, about 54.43 per cent increase in annual income was observed among the beneficiaries. Thus, across all type of farmers' categories, there was a remarkably high increase in annual income of the beneficiaries which could be attributed to their participation in the BGREI programme.

The comparative analysis of post-BGREI annual income revealed that as compared to non-beneficiaries, beneficiaries had Rs.6,738 higher annual income in case of the marginal farmers, Rs.72031 higher in case of the medium farmers and Rs.4,83,737 higher in case of the large farmers. But, among the small farmers, non-beneficiaries had higher annual income over the beneficiaries, because most of the small farmers were devoted towards labour occupation as their main earning source of family income, from which they earn more income than from agricultural occupation. In an average, beneficiaries had Rs.74,370 higher annual income as compared to non-beneficiaries.

This clearly showed that the beneficiaries had remarkably higher income than non-beneficiaries after implementation of BGREI programme.

The z-test analysis also revealed that the difference in annual income was found highly significant at 0.05 level of probability, with z-value of 2.25 *i.e.*, beneficiaries had significantly more annual income than non-beneficiaries (Table 5). Thus, it may be concluded that there was a positive and significant impact of BGREI programme on annual income of beneficiary farmers. So, BGREI programme is a farmer friendly programme and it should continue to sustain and improve the livelihood of farmers. The findings were supported by Sengar et al. (2008) and Kumar et al. (2007).

CONCLUSIONS

From the study, it was found that there was a positive and direct impact of BGREI programme on both productivity of rice as well as income of beneficiary

farmers in Odisha. Across all categories of farmers, there was a remarkably high increase in both productivity of rice and income of beneficiary farmers after participation in the BGREI programme. In an average, about 16.70 q/ha (51.43 %) increase in productivity and Rs. 65,593 (54.43%) increase in annual income were observed among the beneficiary farmers as compared to their Pre-BGREI productivity and income respectively. In comparison to their non-beneficiaries counterparts during Post-BGREI period, the beneficiaries had also an average 18.66 q per hectare higher rice productivity and Rs. 74,370 higher annual income. Though the study signified that there is a tremendous increase in productivity of rice crop and income of rice growers in Odisha due to implementation of BGREI programme, it was seen that there was no much improvement in socio-economic status of the farmers. Many are still under below poverty line and not able to fulfill their daily basic needs. So, there is a need to address problems of farmers at basic levels by the government.

REFERENCES

- Anonymous (2017). Bringing Green Revolution to Eastern India: Operational Guidelines 2016-17. Directorate of Agriculture and Food Production, Odisha
- Chouhan RS, Rathi D, Niranjana HK and Sharma HK (2015). Impact of "Bringing green revolution of eastern India" in Chhattisgarh. *International Journal of Agricultural Extension* 3(2): 101-109
- Kumar A, Chand R, Randhir Singh R and Yadav VK (2007). Impact of TAR-IVLP on Crop Cultivation. *Indian Res. J. Ext. Edu.* 7 (2 & 3): 1-5
- Manjunatha AV and Parmod K (2015). Impact of National Food Security Mission (NFSM) on Input use, Production, Yield and Income in Karnataka. *Agricultural Development and Rural Transformation Centre Institute for Social and Economic Change* pp. 79-81
- Mukherjee D (2012). Second Green Revolution: Eastern States to Lead The Way. *Kurukshetra* April pp. 23-28
- Sharma SM, Barman S, Pathak PK and Pathak K (2015). Assessing effect of technologies showcasing programme on adoption of the demonstrated technologies - A case of Assam. *Indian Res. J. Ext. Edu.* 15(2): 82-86
- Shivay YS and Rahal A (2013). Agriculture gets jump. *Kurukshetra* April, 2013 pp.16
- Sengar RS, Singh BB, Bhardwaj N and Singh AK (2008). Impact of NWDPR on Crop Productivity among Tribals of Chhattisgarh. *Indian Res. J. Ext. Edu.* 8 (1): 54-56