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**An Enquiry to the Extent of Agricultural Diversification and Economics
of Winter Paddy Cultivation in the University of Burdwan, West Bengal**

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Abstract

In India the contribution of agriculture sector to GDP has been declined though about 49 percent of Indian workforces directly engage in this sector. The great challenges to Indian agriculture in the recent decades are both institutional and technological failure. Absence of timely creditdelivery mechanism, lack of infrastructure in agriculture, constant cropping pattern, limited value addition of agricultural commodities, lack of market integration etc., are the major causes of backwardness of Indian agriculture. In such circumstances the leading educational institutions are too responsible to correct the adverse situation of agriculture by developing some relevant models of agriculture development through research and development. The University of Burdwan has been commencing some applied strategies in the field of agriculture to provide some impulsion to this sector since 1965 by establishing Crop Research and Seed Multiplication Farm (CRSMF). By keeping in view the active participation of the university towards agricultural development this paper tries to examine two objectives. Firstly, to examine the extent of agricultural diversification. Secondly, to investigate the economics of Winter Paddy cultivation in the university. The major impression of this paper that The University of Burdwan has undertaken agricultural activities in a scientific way and generates huge amount of employment opportunities directly and most of the rural destinations are assumed to be highly benefitted by CRSMF by use of HYV seeds as well as by participating different training programmes. It also contributes huge amount of revenues to the university. However, it requires some modifications in the area of extension activities, organic farming, community participation etc.

Keywords: 1.Agricultural diversification, 2.Winter Paddy, 3.Revenue, 4.Community participation.

1. Introduction

Agriculture is one of the prominent sectors in Indian Economy. It contributes about 18 percent to GDP and provides employment opportunities about 49 percent of Indian workforce (CSO). However,

the contribution of this sector to GDP has been declining over the years. The growth rate of agriculture sector is only 2.1 percent in 2017-18 (CSO). Some of the prominent causes of declining contribution of agriculture to GDP and low growth rate of this sector are constant cropping pattern, low cropping intensity, slow mechanisation in agriculture, lack of value addition of the agricultural commodities, less emphasis on non-crop enterprises, institutional failure, low agricultural diversification etc.

In this context the higher educational institutions of the countries like IIT's, Universities, Agro-research Centres/Institutions etc., also have the responsibilities to correct the present positions of agriculture. The University of Burdwan has been commencing some applied strategies in the field of agriculture to provide some impulsion to this sector since 1965. The Crop Research and Seed Multiplication Farm (CRSMF) of Burdwan University is sprawling Crop Research Farm covering 10 hectares of cultivated land situated in Tarabag Campus of the University established by famous geneticist and plant breeder Professor ParamNathBhaduri in the year 1965. By keeping in view the active participation of the university towards agricultural development this paper tries to examine two objectives.

2. Objectives

2.1. To examine the extent of agricultural diversification.

2.2. To investigate the economics of WinterPaddy cultivation in the university.

3. Methodology

3.1. Data

To fulfil the objectives of this paper, both secondary data and primary data have been used. To provide a brief summary and trends of agricultural activities (Production trend and revenue trend) under CRSMF secondary data have been used. The secondary data have collected from Information Booklet of CRSMF. The primary data have been collected through a structured questionnaire from the CRSMF. As the data limited to only winter paddy regarding paddy cultivation, therefore, this study is confined to only winter paddy.

3.2. Index for measuring Agricultural Diversification

Different studies have attempted to measure diversification, both crop and agricultural, using aggregated and disaggregated data with different indices. Most widely used amongst them are Herfindahl Index (HI), Simpson's Index (SI), Entropy Index (EI), Modified Entropy Index (MEI) (De, 2000; Malik & Singh, 2002; De, 2010; Mandal, 2010). Besides, combinations of two or more indices are also prominent in literature (Mandal, 2011; Raj, 2010). In this study to measure agricultural diversification Simpson's Index has been used.

The Simpson Index is calculated by using the following formula-

$$SID = 1 - \sum_{i=1}^n p_i^2$$

Where, SID is the Simpson Index of Diversity, and P_i is the proportionate area or value of i^{th} crop/livestock/fishery activity in the gross cropped area or total value of agricultural output. The index ranges between 0 and 1. If there exists complete specialization, the index moves towards 0.

4. Glimpse of Agricultural Activities under CRSMF

4.1. Paddy Seeds Production and Conservation

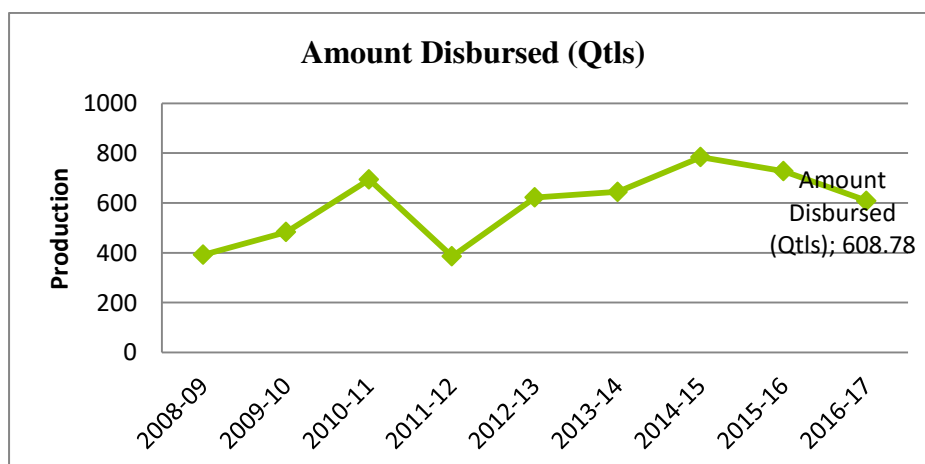
The CRSMF promotes high yielding varieties of paddy to cater the economic need of the farmers and started conservation, multiplication and promotion programme of traditional and

aromatic varieties in view of the soil quality, soil health and eco-friendly farming system (Information Booklet, CRSMF). The trend of paddy seeds production and disbursed in last eight years in the farm are shown in table-1.

Year	Amount Disbursed (Qtls)
2008-09	392.40
2009-10	483.50
2010-11	694.10
2011-12	385.87
2012-13	622.01
2013-14	644.40
2014-15	783.79
2015-16	727.52
2016-17	608.78

Source: Information Booklet, CRSMF, 2017

Graphical Representation of trend of production of paddy seeds from 2008-09 to 2016-17



The table-1 and figure shows that the production of paddy seeds have fluctuated over the years.

4.2.

Seed Multiplication

Potato

CRSMF has started producing foundation seeds of potato of the Variety of **KufriJyoti** since 2014. The trends of production of foundation seeds of **KufriJyoti** is shown in table-2.

Year	Amount Disbursed (Qtls)
2014-15	55.50
2015-16	108.82
2016-17	225.50

Source: Information Booklet, CRSMF, 2017

The table-2 shows a positive trend of production of foundation seeds of KufriJyotifrom 2014-15 to 2016-17.

4.3. Germplasm Conservation

Mango

The CRSMF of the university has established a germplasm conservatory of Mango. In the mango conservatory the farm has already introduced about 50 varieties of mango covering an area of about 3.5 bighas of land.

4.4. Horticulture and Floriculture

The CRSMF has a very good collection of ornamental and garden plants that includes palms, roses, tuberose, chrysanthemum, liliium and gladiolus. The orchard of the farm contains huge collection of fruits plants that are well maintained for the academic and research purpose and used to disburse to different departments including local academic institutions.

5. Income and Expenditure of CRSMF

CRSMF has been contributing a significant amount of fund to the university and generates huge amount of employment opportunities both casual and permanent to the local communities. Thus, the university fulfils the goal community participation in its academic and research activities. The trend of income and expenditure of the CRSMF is shown in table-3.

Financial Year	Expenditure (Rs.)	Income (Rs.)	Net Income (Rs.)
2009-10	8,14,161	9,82,725	1,68,564
2010-11	8,39,970	12,35,484	3,95,514
2011-12	11,49,139	16,67,901	5,18,762
2012-13	13,85,763	16,77,111	2,91,348
2013-14	11,33,465	19,31,131	7,97,666
2014-15	15,00,236	20,16,637	5,16,401
2015-16	22,75,874	31,68,059	8,9,2185
2016-17	22,05,195	39,05,243	17,14,548

Source: Information Booklet, CRSMF, 2017

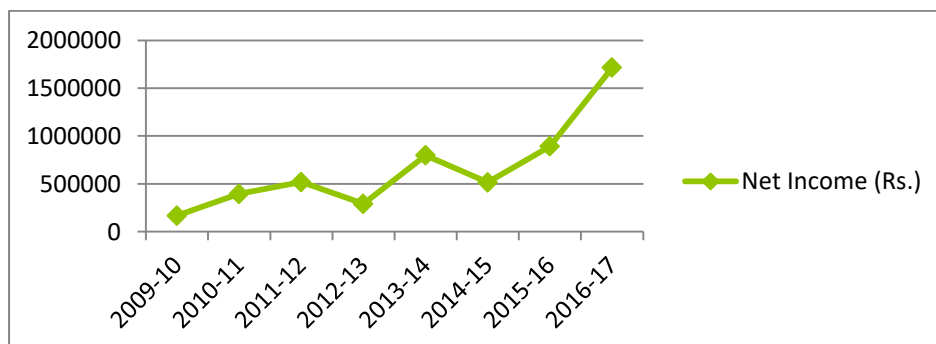


Table-1 and the figure show that CRSMF have contributed a significant amount of revenue to the university. Though there is some fluctuation in the trend of contribution of revenue, but it has been increasing at a continuous rate over the years. The self-revenue generation activities in CRSMF will definitely help the institution to achieve the objective of self-reliance. This practice of self-revenue generation will reduce the general tendency of dependency syndrome of fund from other agency to implement some productive works inside the campus.

6. Finding and discussions

6.1. Extent of Agricultural Diversification

Agricultural diversification¹ may take place either by a change in acreage distribution of total cropped area or a change in value-wise contribution of each crop to total agricultural production. In this paper to measure agricultural diversification value contribution of each portfolio of agriculture (paddy, horticulture, vegetables, pulses etc.) are taken into consideration. Table-4 shows the extent of agricultural diversification as well as diversification in paddy cultivation, vegetables and horticulture.

Table-4 Extent of Agricultural Diversification in CRSMF		Status of Diversification
Agricultural Diversification	.65	High Medium
Paddy Diversification	.42	Medium
Vegetable Diversification	.08	Low
Horticulture Diversification	.03	Very Low
Source: Field Survey, 12 th September, 2018		

From table-4 it has been observed that the extent of agricultural diversification in CRSMF is quite good though there is less diversity in vegetable and horticulture. The diversity within the paddy sector is medium though it concentrates in the production of about 102 varieties of paddy. This is because; the highest area covered by M.T.U-7029 variety of paddy and it contributes highest to total income from paddy. The CRSMF concentrates very less in the diversity of vegetables and horticulture.

6.2. Economics of Winter Paddy Cultivation

On the basis of the collected data from the CRSMF, this section of this paper tries to calculate the cost and revenue of paddy cultivation for the year 2017-18. To calculate the cost of paddy cultivation, cost of labourers, cost of tilling and use of chemical fertilizers have been included. To measure the cost of labourers sowing, harvesting, weeding, fencing, spraying etc. are taken into consideration. Table-5 and 6 shows the economics of paddy cultivation for the year 2017-18.

6.2.1. Components of Cost and respective Expenditure in the production of per bigha of Winter Paddy

Table-5 : Components of Cost and respective Expenditure in the production of per bigha of

¹Agricultural diversification can be viewed, narrowly, as a larger mix of activities within agriculture involving crop substitution. Diversification can also involve a shift of resources from one crop (or livestock) to a larger mix of crops and livestock, keeping in view the varying nature of risks and expected returns from each crop/livestock activity, and adjusting in such a way that it leads to optimum portfolio of income (Joshi, *et.al.*, 2003)

Winter Paddy					
Components		Quantity	Respective Expenditure (Rs)	Remarks	
Tilling		-	1000	2 times by Rotavator	
Use of Labour in Sowing and tilling		4	1336	wage @334	
Use of Labour in Weeding		4	1,336	wage @334	
Use of Labour in Harvesting		4	1,336	wage @334	
Use of Labour in Fertilizer Spraying		2	668	wage @334	
Chemical Fertilizer	Urea	12 kg	84	Urea @7	Including transportation
	DAP	5 kg	200	DAP@40	
Pesticides		-	100	Rough Estimate	
Others		-	500	Approximate	
Total Cost			5,224		
Source: Field Survey, 12 th September, 2018					

6.2.2. Cost and Revenue of Winter Paddy

The cost per bigha of winter paddy has been calculated in table-6. The revenue per bigha and net revenue per bigha of winter paddy will be calculated by the following formula-
Revenue per Bigha= Production X Current Seeds Price of CRSMF

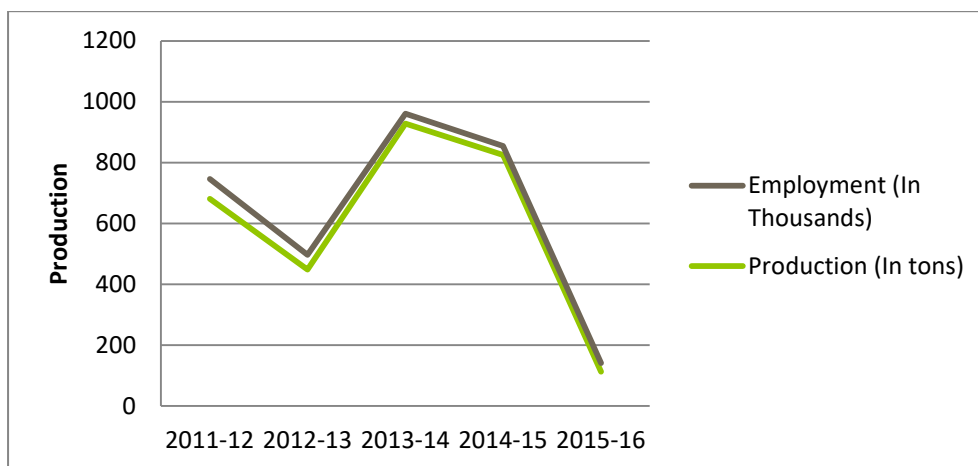
Table-6: Economics of paddy cultivation for the year 2017-18			
Economics of Paddy Cultivation	Cost Per Bigha (Rs)	Revenue per Bigha (Rs)	Net Revenue (Rs)
	5,224	30,000	24,776
	Cost as a whole (Rs)	Gross Revenue as a whole (Rs)	Net Revenue as a whole (Rs)
3,65,680	21,00,000	17,34,320	
Remarks	To estimate the economics of winter paddy, questionnaire data have been used. Standard official documents are not used to calculate the same. Therefore, some variations may occur from the official estimates. But a huge variation of net revenue will not be expected from the author side.		
Source: Field Survey, 12 th September, 2018			

Production per bigha = 6 Quintals of seeds, Current Seeds Price = Rs. 50 per kg

Net Revenue per Bigha= Revenue per Bigha- Cost per Bigha

7. Prospects of Fishery in the Campus of The University of Burdwan

Fishery plays vital role in strengthening the economy of a state. The demands for fish and fish products have been increasing at a faster rate over the years. Therefore, fishery becomes a viable economic sector of an economy. In West Bengal, as per Hands Books of Fisheries Statistics, 2015-16 the growth rate of fishery in the year 2015-16 was 3.41 and it contributed about 2.35 percent of total agricultural contribution to state domestic product. The production and employment generation trend of fishery in Burdwan district is shown in the following figure-



The figure shows that up to 2013-14 the production and employment was increasing but after that some fluctuations have been observed. The cause behind this fluctuation may be due to shifting of occupation from this sector to other non-farm activities. However, fishery plays vital role in generation of employment opportunities.

In the campus of Burdwan University, it has been observed that the economic potentialities of fishery are high and this sector can contribute a huge amount of revenue to the university. An approximate estimate of probable revenue generation capacity of the fishery sector within the campus is shown in

Table-7: Probable revenue generation capacity of the fishery sector within the campus in a year

Areas (in bigha)	standard fish production(Qntls)	Average market price (Rs)	Total Revenue (Rs)
10	66.8	15000 per quintal and it is an approximate value.	10,02,000
20	133.6		20,04,000
30	200.4		30,06,000
40	267.2		40,80,000
50	334		50,10,000
60	400.8		60,12,000

Note: To Calculate the production of fish, Hands Books of Fisheries Statistics, 2015-16 is used and as per this book in Burdwan one hectare (7.49 bigha) of fishery produces 5 tons of fish annually. The market price of fish is an approximate estimation and it may vary subject to category of fish.

table-7.

Thus, table-7 shows that if the fisheries within the campus are used optimally than it can generate a significant amount of revenues for the university. But the fisheries of the campus have not been used at its optimum capacity. In addition to this, the university can introduce the concept of Eco-hatchery in its campus for academic, research and commercial purpose.

8. Employment generation under CRSMF:

CRSMF generates a significant amount of direct employment opportunities both in casual and permanent nature to its local people. Yearly employment generation of CRSMF in Winter Paddy Cultivation and female participation in agricultural activities are shown in table-8.

Table-8:Employment generation under CRSMF

	Labour requirement in one bigha of winter paddy		Total Employment		Remarks
	Male	Female	Male	Female	
	6	8	420	560	
Percentage	42.86	57.14	42.86	57.14	The male and female labour is calculated by the nature of works in the paddy fields.

Thus, table-8 shows that CRSMF generates 980 numbers of employment opportunities yearly and the participation of women is significant.

9. Conclusions and Policy measures

The first impression of this study is that The University of Burdwan has undertaken agricultural activities in a scientific way and generates huge amount of employment opportunities directly and most of the rural destinations are assumed to be highly benefitted by CRSMF by use of HYV seeds as well as by participating different training programmes. Secondly, direct involvement of academic institutions in some applied activities like agriculture is limited and it is a unique practice by the institutions. Thirdly, it provides a huge amount of revenue to the university to perform different developmental activities. Fourthly, it will help in the research and development of paddy and other crops extensively. However, some modification needs to be implemented for the benefit of the students, researchers, teachers, local communities and the society as a whole. Firstly, the agricultural activities in CRSMF are very mechanised and modernised and this is a good practice. But at the same time the goal of sustainable agriculture cannot be denied. Therefore, the concept of organic farming or eco-friendly methods of cultivation need to be implemented. Secondly, the CRSMF can introduce some applied courses like rural development, rural management, diary development project, pisciculture etc., for the greater benefit of the society. Thirdly, to increase community participation frequent training should be organised by the CRSMF. Fourthly, Eco-Hatchery needs to be projected in the coming days for academics, research and business purpose.

References:

1. De, U.K. and Chattopadhyay, M. (2010). Crop Diversification by Poor Peasants and Role of Infrastructure: Evidence from West Bengal. *Journal of Development and Agricultural Economics*, Vol. 2, No. 10, pp. 340-350.
2. De, U.K. (2000). Diversification of Crop in West Bengal: A SpatioTemporal Analysis. *ArthaVijnana*, XLII (2), pp. 170-182.
3. Malik, D.P. and I.J. Singh (2002). Crop diversification an economic analysis. *Indian J. Agric. Resource.*, 36(1), pp. 61-64.
4. Mandal, Raju (2010). Cropping Patterns and Risk Management in the Flood Plains of Assam. *Economic and Political Weekly*, August 14, 2010, No. 33, pp. 78-81.
5. Mandal, Raju (2011). Cropping Pattern Diversification across Assam: Variations and Causes. *IUP Journal of Agricultural Economics*, Vol. VIII, Issue 1, pp. 7-17.
6. Singh, Surendra and Bimal Sharma, (2007). Changing Pattern of Agricultural Productivity in. *Brahmaputra Valley. Ind. Jn. of Agri. Econ.*Vol. 62, No.1.
7. Raj Tilak (2010). Diversification of Small and Marginal Farms in Himachal Pradesh. *IUP Journal of Agricultural Economics*, October, 2010, Vol-07 Issue-04, pp7-14.