



An Economic Analysis of Paddy Seed Production in Mau District of Eastern Uttar Pradesh

**Govind Pal^{1*}, K. V. Sripathy¹, Umesh R. Kamble¹, S. P. Jeevan Kumar¹,
Kalyani Kumari¹ and D. K. Agarwal¹**

¹ICAR-Indian Institute of Seed Science, Mau – 275103, Uttar Pradesh, India.

Authors' contributions

This work was carried out in collaboration among all authors. Author GP designed the study, wrote the methodology, performed the statistical analysis and wrote the first draft of the manuscript. Authors KVS, URK, SPJK, KK and DKA managed the analyses of data and information, literature searches and provided support in drafting the manuscript of the study. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JEMT/2020/v26i430247

Editor(s):

(1) Dr. Afsin Sahin, Ankara Haci Bayram Veli University, Turkey.

Reviewers:

(1) Ismail Ukav, Adiyaman University, Turkey.

(2) Paul Benyamin Timotiwu, Lampung University, Indonesia.

(3) Guntamukkala Babu Rao, Assam Agriculture University, India.

Complete Peer review History: <http://www.sdiarticle4.com/review-history/57382>

Original Research Article

Received 08 April 2020

Accepted 14 June 2020

Published 27 June 2020

ABSTRACT

Paddy is an important cereal crop of the country and Uttar Pradesh, which is second largest producer of paddy in the country with 11.99 per cent share. The current study was conducted on primary data collected from 50 farmers from Mau district of Uttar Pradesh during the agricultural year 2017-18. The fixed and variable cost ratio in paddy seed production was 20:80. Human labour was the major cost component (42.21 per cent of total cost) followed by manures and fertilizers (11.85 per cent), bullock & machine labour (11.80 per cent), plant protection chemicals (4.53 per cent), irrigation (3.18 per cent) and seed (1.99 per cent). Total cost incurred in seed production of paddy was Rs. 51882 per hectare, while the net and gross returns were Rs. 28506 and Rs. 80388 per hectare respectively with the BC ratio 1.55. Total cost pertinent to paddy certified seed production was 11.36 per cent higher than grain production. The gross return was 18.92 per cent higher in seed production (Rs. 80388/ha) than grain production (Rs. 67600/ha). Net return from seed production of paddy was 35.66 per cent (Rs. 28506/ha) higher than grain production (Rs. 21012/ha). According to cost C₂, cost of production of paddy grain and seed calculated to Rs. 1096

*Corresponding author: E-mail: drpal1975@gmail.com;

and Rs. 1231 per quintal. The return to the farmers on cost C_2 was 45.07 and 55.0 per cent above cost of production for paddy grain and seed respectively. Similarly, cost of production according to cost A_2 & FL (Family Labour) of paddy grain and seed calculated to Rs. 863 and Rs. 996 per quintal. The return to the farmers on cost A_2 & FL was 84.24 and 91.57 per cent above cost of production for paddy grain and seed respectively. Production of paddy seed showed higher profitability to the farmers with encouraging net returns, which implies that the quality seed production area could be increased for higher income generation.

Keywords: Paddy; seed production economic analysis.

1. INTRODUCTION

Seed is one of the major inputs for agriculture that establish the response of all other inputs viz., fertilizer, irrigation and plant protection chemicals etc. India has registered significant advances in agriculture for the past few decades owing to the substantial role of the seed sector. Sustainable crop production and productivity are dependent on several factors such as development of new variety according to changing climatic conditions, adequate and timely supply of quality seed and major inputs to the farmers. As per an estimate, the quality seed alone directly contributes 15-20 per cent to the total production depending upon the crop and further it can be enhanced up to 40 per cent with proper management of other inputs [1]. A superior quality seed not only helps in producing uniform crops devoid of admixtures but also enhances crop productivity per unit area, which is a key indicator for higher marketability of produce.

India has the 26.99 per cent area in global paddy area while its contribution in global paddy production is only 21.15 per cent. India's contribution in global paddy production is second after China. In India, paddy is an important cereal crop comprising of 43.79 million hectare area, 112.91 million tons of production with average productivity of 25.78 quintal/ha during 2017-18 (4th advance estimates). This implies that the paddy crop production plays an important role in ensuring national food security by virtue of its wider adaptability to grow under diverse ecosystems. Among total food grains production, paddy alone contributes 39.64 per cent of the country [2].

In Uttar Pradesh, paddy is the principal food crop cultivated throughout the state which provides food, fodder and employment for its population, cattle and rural masses, respectively. Shrinkage of area and production

would have significant impact on the state's food security and economy. In Uttar Pradesh paddy is the main food crop grown in 5.81 million hectares with production of 13.27 million tons with an average productivity of 22.83 quintal/ha during 2017-18 (4th advance estimates). Uttar Pradesh is contributing 11.75 per cent (second among all states after West Bengal) of paddy production with 13.28 per cent (highest area among all states under paddy) paddy area at national level [3]. Kharif is the major paddy growing season in Uttar Pradesh and more than 98 per cent paddy is cultivated in this season covering early, medium and long duration varieties. A limited paddy area is in *Zaid* and in boro season is being cultivated (<http://www.rkmp.co.in>).

Quality seed production is a specialized activity, however the stored seed retained for next season cannot be used for quality seed production due to poor genetic vigour and germination [4]. Paddy seed production has important share in expenditure on seed, which indicates that the economics of seed production has impacted both the seed producers and consumers.

Several studies on economics grain production pertinent to paddy have been reported [5-14] but studies on economics of paddy seed production are limited [13,14]. Considering the importance of economic study in paddy seed production, the current study was aimed with the objectives to delineate the economics of certified seed production of paddy in comparison to grain production. The present study has been conducted in Mau district of Uttar Pradesh state through survey of farmers and the methodology adopted is presented below.

2. MATERIALS AND METHODS

The study is based on primary data collected from Mau district of Uttar Pradesh. Data and

information has been collected through survey from certified seed growers under farmers participatory and Revolving fund scheme of ICAR- Indian Institute of Seed Science, Mau to estimate the economics of certified seed production of paddy with comparison to commercial grain production. The list of certified seed growers of paddy under farmers participatory and revolving fund scheme have been obtained from ICAR- IISS, Mau. For comparison study, grain producers of paddy selected randomly from the villages where farmers participatory and revolving fund scheme is in operation. The total number of selected farmers (grain and certified seed producer of paddy) was fifty. The primary data for the study on input used in the grain and seed production of paddy and their costs and returns were collected by personnel interview with the respondents using a well-structured and pre-tested interview schedule for the agricultural year 2017-18. The interview schedule contains details of grain and seed producer, input items and their prices, output items and their prices used in paddy production.

2.1 Cost Concept

The cost of cultivation of paddy (grain and seed) was worked out by using various cost concepts defined below [15,16]:

Cost A_1 = All the variable costs excluding family labour cost and including interest on working capital

Cost A_2 = Cost A_1 + Rent paid for leased in land

Cost B_1 = Cost A_1 + Interest on value of owned fixed capital (other than land)

Cost B_2 = Cost B_1 + Rental value of owned land + Rent paid for leased in land

Cost C_1 = Cost B_1 + Imputed value of family labour

Cost C_2 = Cost B_2 + Imputed value of family labour

3. RESULTS AND DISCUSSION

To determine the viability and profitability of any activity, economic comparison is inevitable. In this study, comparison was made between the economics of grain and seed production to verify the viability of seed production over grain production. Cost of cultivation analysis has been done as per hectare basis individually for paddy grain and seed production. The details cost of cultivation of seed and grain production of paddy has been presented in Table 1. The Table reveals that total cost of cultivation in grain and

seed production of paddy estimated to Rs. 46588 and Rs. 51882 per ha. Human labour occupied the major share (38.64 and 42.21 per cent in grain and seed production respectively) of total cost in production of paddy. The more human labour requirement in seed production was mainly due to activities like rouging, inter-culture operations, gap filling etc. The other items involved in production of paddy seed was bullock and machine labour, cost of seed, manures and fertilizers, plant protection chemicals and seed certification charges. The variable cost was comparatively higher in total cultivation cost of seed production (Rs. 41382.0 per ha) over grain production (Rs. 36088.0 per ha).

Cost of cultivation according to various cost concepts has been depicted in Table 2 which reveals that all the costs were higher in seed production over grain production in paddy. The seed grower should deploy the recommended package of practices to ensure genetic purity as stipulated by the seed certification agency. Besides, seed production plots must be free of weeds and off-type plants that are maintained manually to preserve genetic purity. Unlike in grain production, seed production requires drying, processing, additional labour and certification charges that culminated for higher cost of cultivation as compared to the grain production. The cost C_2 was higher by 11.36 per cent in paddy seed production in comparison to grain production. Seed production results higher returns with higher BC ratio compared to grain production. The gross return was 18.92 per cent higher in seed production than grain production and net return from seed production of paddy was 35.66 per cent higher than grain production. The BC ratio was 1.55 and 1.45 in case of paddy seed and grain production, respectively.

3.1 Economics of Paddy Certified Seed Production

The cost and return of certified seed production of paddy have been provided in Table 3. The share of fixed and variable cost in paddy certified seed production was 20:80. Human labour has the maximum share on inputs applied for seed production in paddy. Its share in total costs was 42.21 per cent. It was followed by manures and fertilizers accounting for 11.85 per cent of the total cost of paddy seed production. The share of seed cost, bullock & machine labour cost, plant protection cost and seed certification cost accounted for 1.99, 11.80, 4.53 and 1.14 per cent of total cost of paddy seed production.

Table 1. Details cost comparison of seed and grain production in paddy (Rs./ha)

Sl.	Items	Grain production	Seed production
1	Seed	560 (1.20)	1030 (1.99)
2	Human labour	18000 (38.64)	21900 (42.21)
3	Bullock and machine labour	8190 (17.58)	6120 (11.80)
4	Manures and fertilizers	5780 (12.41)	6150 (11.85)
5	Plant protection chemicals	2170 (4.66)	2350 (4.53)
6	Irrigation	- (0.00)	1650 (3.18)
7	Seed certification charges	- (0.00)	590 (1.14)
8	Interest on working capital	1388 (2.98)	1592 (3.07)
9	Total variable cost (Rs.)	36088 (77.47)	41382 (79.77)
10	Total fixed cost (Rs.)	10500 (22.53)	10500 (20.23)
11	Total cost	46588 (100.00)	51882 (100.00)

Note: Figures in parentheses indicate per cent to total cost

Table 2. Costs and returns in paddy grain and seed production according to cost concept and income measures (Rs./ha)

Sl.	Items	Grain production	Seed production
Cost concepts			
1	Cost A ₁	25888	31032
2	Cost A ₂	25888	31032
3	Cost B ₁	26788	31932
4	Cost B ₂	35788	40932
5	Cost C ₁	37588	42882
6	Cost C ₂	46588	51882
Income measures			
8	Yield		
a	Seed / Grain	63600	68688
b	Rejected seed	-	7200
c	By-product	4000	4500
9	Gross income	67600	80388
10	Net income	21012	28506
11	Benefit cost ratio	1.45	1.55

Table 3. Cost and return in certified seed production of paddy (Rs./ha)

Sl.	Particulars	Amount (Rs.)	Per cent
1	Human labour	21900	42.21
2	Bullock & Machine labour	6120	11.80
3	Seed	1030	1.99
4	Irrigation	1650	3.18
5	Manures & Fertilizers	6150	11.85
6	Plant protection chemicals	2350	4.53
7	Seed certification charges	590	1.14
8	Interest on working capital	1592	3.07
9	Total variable cost	41382	79.77
10	Total fixed cost	10500	20.23
11	Total cost	51882	100.00
12	Yield		
a	Seed (q)	36.00	
b	Rejected seed (q)	6.00	
c	By-product (q)	25.00	
13	Gross return (Rs.)	80388	
14	Net return (Rs.)	28506	
15	BC ratio	1.55	

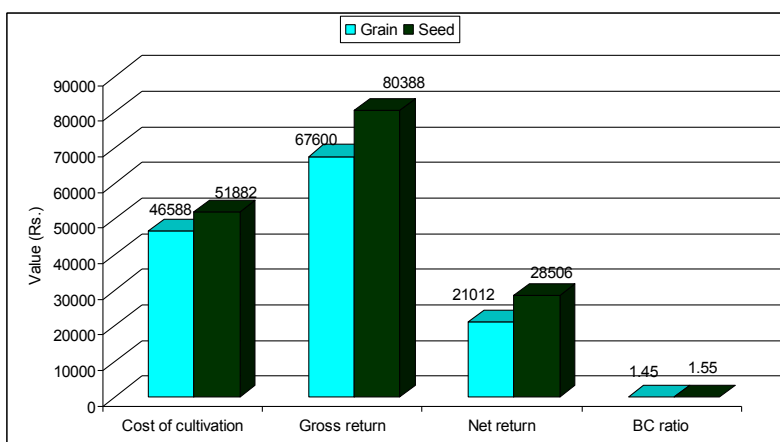


Fig. 1. Cost and return in paddy grain and certified seed production

Table 4. Cost of production and return over cost in paddy cultivation

Crop	Cost of cultivation (Rs./ha)	Cost of production (Rs./q)	Output price (Rs./q)	Percentage return over cost
Cost of cultivation / production (according to cost C₂)				
Paddy grain	46588	1096	1590	45.07
Paddy seed	51882	1231	1908	55.00
Cost of cultivation / production (according to cost A₂ and family labour)				
Paddy grain	36688	863	1590	84.24
Paddy seed	41982	996	1908	91.57

Table 5. Partial budgeting of certified seed production in paddy

Debit	Amount (Rs.)	Credit	Amount (Rs.)
A Increase in cost		Decrease in cost	
i Human labour cost	3900	Bullock/Machine labour	2070
ii Seed	470		
iii Irrigation	1650		
iv Manures & Fertilizers	370		
v Plant protection chemicals	180		
vi Seed certification charges	590		
vii Others	204		
Total	7364		2070
B Decrease in return	0	Increase in return	12788
Total Debit	7364	Total credit	14858
	Profit		7494

The total cost in certified seed production of paddy was Rs. 51882 per hectare. The average yield of paddy quality seed and rejected seed was 36.0 quintal and 6.0 quintal and by-product was 25.0 quintal respectively. The gross return and net return was Rs. 80388 and Rs. 28506 per hectare respectively.

3.2 Comparison in Paddy Grain and Certified Seed Production

The total cost of cultivation in paddy certified seed production was 11.36 per cent higher than grain production while, gross return was 18.92

per cent higher in seed production (Rs. 80388 /ha) than grain production (Rs. 67600/ha). Further, net return from seed production of paddy was 35.66 per cent (Rs. 28506/ha) higher than grain production (Rs. 21012/ha). Therefore, production of certified seed has resulted in win-win situation for the farmers with higher yield and better quality of output. Because of seed production, seed producer fetched higher price than the grain in the marketing of produce. Graphical presentation of cost and return in paddy grain and certified seed production has been presented in Fig. 1.

3.3 Cost of Production and Return over Cost

The cost of cultivation / production according to cost A_2 & FL (Family Labour) and C_2 have been presented in Table 4. According to cost C_2 concept, cost of production of paddy grain and seed estimated to Rs. 1096 and Rs. 1231 per quintal. The return to the farmers on cost C_2 was 45.07 and 55.0 per cent above cost of production for paddy grain and seed respectively. Similarly, cost of production according to cost A_2 & FL concept of paddy grain and seed estimated to Rs. 863 and Rs. 996 per quintal. The return to the farmers on cost A_2 & FL was 84.24 and 91.57 per cent above cost of production for paddy grain and seed respectively.

3.4 Partial Budgeting

The additional costs and returns incurred in the certified seed production of paddy over grain production showed that the increment in profit realized in paddy certified seed production was Rs. 7494.00/ha (Table 5). In case of certified seed production, the main factors responsible for cost increase are irrigation, human labour and seed certification charges etc. On the other hand, added returns pertinent to paddy certified seed production is mainly due to higher productivity of certified seed production and realization of higher price for certified seed over grain. Thus, the partial budgeting analysis implies that the adoption of certified seed production technology could add additional profit to the farmers.

4. CONCLUSION AND IMPLICATIONS

The present study shows that the share of fixed and variable cost in paddy seed production was 20:80. Human labour was the main component of cost (42.21 per cent of total cost). The total cost in seed production of paddy was Rs. 51882 per hectare. The gross return and net return was Rs. 80388 and Rs. 28506 per hectare respectively. The BC ratio was 1.55. The total cost of cultivation in paddy certified seed production was 11.36 per cent higher than grain production while, gross return was 18.92 per cent higher in seed production than grain production. The net return from seed production of paddy was 35.66 per cent higher than grain production. The return to the farmers on cost C_2 was 45.07 and 55.0 per cent above cost of production for paddy grain and seed respectively. Similarly, cost of production according to cost A_2 & FL (Family Labour) of paddy grain and seed estimated to

Rs. 863 and Rs. 996 per quintal. The return to the farmers on cost A_2 & FL was 84.24 and 91.57 per cent above cost of production for paddy grain and seed respectively. Partial budgeting analysis shows that the increment in profit realized in paddy certified seed production was Rs. 7494.00/ha. Production of paddy seed has resulted in higher profitability situation for the farmers. The net return from paddy seed production was encouraging, therefore the area under seed production may be increased for higher profitability to the farmers.

DISCLAIMER

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Anonymous. DSR- Perspective Plan Vision 2025. ICAR- Directorate of Seed Research, Kushmaur, Mau, UP, India; 2007.
2. Anonymous. Pocket book of Agricultural Statistics, Directorate of Economics & Statistics, MoA & FW, Government of India, New Delhi; 2018.
3. Anonymous. Agricultural Statistics at a Glance 2018, Directorate of Economics & Statistics, MoA & FW, Government of India, New Delhi; 2018.
4. Singh, Gurdev, Asokan SR, Asopa VN. Seed industry in India- A management perspective. Oxford & IBH Publishing Co. (Pvt.) Ltd., New Delh; 1990.
5. Agarwal PK, Yadav P, Mondal S. Economic analysis of cost and return structure of paddy cultivation under traditional and SRI Method: A comparative study. International Journal of Agriculture Sciences. 2018;10(80):5890-5893.
6. Churpal D, Koshta AK, Choudhary VK. An economic analysis of rice cultivation and constraint in Dhamtari district of Chhattisgarh, India. Plant Archives. 2015;15(2):651-656.
7. Devi K, Sita, Ponnarasi T. An economic analysis of modern rice production technology and its adoption Behaviour in Tamil Nadu. Agricultural Economics Research Review. 2019;22 (Conference Number):341-347.

8. Kumar A, Singh RKP, Singh KM, Mishra JS. Economics of paddy (*Oryza sativa*) production: A comparative study of Bihar and Punjab. *Indian Journal of Agricultural Sciences*. 2018;88(2): 314–319.
9. Lakra N, Gauraha AK, Banafar KNS. Economic Analysis of Production, Marketing and Constraints of Paddy in Dantewada District of Chhattisgarh, India. *International Journal of Current Microbiology and Applied Sciences*. 2017;4:108-115.
10. Prakash, Satya, Singh, Bhim. Economics and constraints analysis of rice production in Jhansi district of Uttar Pradesh, India. *Plant Archives*. 2013;13(2): 865-869.
11. Pravallika KVSD, Prasanna PA, Lakshmi, Choudhary VK. Economics of paddy cultivation in East Godavari district of Andhra Pradesh. *Journal of Rice Research*. 2018;10(2):89-96.
12. Saravanakumar V, Kiruthika N. Economic analysis of production and marketing of paddy in Tamil Nadu. *International Research Journal of Agricultural Economics and Statistics*. 2015;6(2): 249-255.
13. Kumar V. An economic analysis of seed production of paddy and Chickpea in Mungeli district of Chhattisgarh. (Master's thesis). Indira Gandhi Krishi Vishwavidyalaya, Raipur; 2017. Available:<http://krishikosh.egranth.ac.in/bitstream/1/5810030387/1/AN%20ECONOMIC%20ANALYSIS%20OF%20SEED%20PRODUCTION%20OF%20PADDY%20AND%20CHICKPEA%20IN%20MUNGELI%20DISTRICT%20OF%20CHHATTISGARH.pdf>
14. Sahu K. An economic analysis of seed production of paddy in Raipur district of Chhattisgarh. (Master's thesis). Indira Gandhi Krishi Vishwavidyalaya, Raipur; 2017. Available:<http://krishikosh.egranth.ac.in/bitstream/1/5810039651/1/THESIS.pdf>
15. Sen A, Bhatia MS. Cost of cultivation and farm income, State of the Indian Farmer: A millennium study, Academic foundation, New Delhi. 2004; 14.
16. Anonymous. Manual on cost of cultivation surveys, Ministry of statistics and programme implementation, Government of India, New Delhi; 2008.

© 2020 Pal et al.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:
The peer review history for this paper can be accessed here:
<http://www.sdiarticle4.com/review-history/57382>