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Socio-economic analysis of costs and returns of potato var. Pokhraj in Midnapur (West) district of West Bengal, India

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Abstract

Potato (*Solanum tuberosum* L.) is one of the most important vegetable crops in India, and West Bengal has been the leading producer of potatoes in the country in terms of area and production. The present study examines the socio-economic aspects of potato cultivation, particularly focusing on the cost structure, returns, and economic viability of the Kufri Pokhraj variety in the Salboni block of Paschim Medinipur district during the Rabi season of 2022-23. A three-stage random sampling method was used to obtain primary information from 60 potato growers in six high-producing villages selected purposefully by personal interviews, along with secondary sources.

The analysis was done using the standardized cost concepts as recommended by the Commission for Agricultural Costs and Prices (CACP). The results revealed that the average Cost A1 (operational cost, excluding land rent) was ₹ 141,346 per hectare, with the major components being human labor, seed, and manures/fertilizers. There was no leased-in land, and hence Cost A2 was zero. The costs rose progressively with each successive concept: B1 (₹ 142,569), B2 (₹ 161,104), C1 (₹ 154,926), C2 (₹ 173,461), and C3 (₹ 190,807) per hectare, including the value of family labor, value of owned land, and management cost.

The average productivity of Kufri Pokhraj was 339.80 quintals per hectare, which gave a gross return of ₹ 169,900 per hectare. Net returns were highly positive for Cost A1 (₹ 28,554/ha) and B1 (₹ 27,331/ha), and marginally positive for B2 (₹ 8,796/ha), while negative for C2 (–₹ 3,561/ha) and C3 (–₹ 20,907/ha). Family labour income and business income were calculated to be ₹ 8,796 and ₹ 28,554 per hectare, respectively.

The results show that the enterprise is reasonably profitable at the farm level, but it suffers from economic stress when the opportunity cost of family labour and land resources is taken into account. The production technology is still labour-intensive, highly reliant on chemical fertilizers, and not much emphasis is given to the use of organic manures.

Keywords: Kufri Pokhraj, profitability analysis, CACP cost concepts, Paschim Medinipur, West Bengal, farm income, input-output efficiency

1. Introduction

In West Bengal, potato cultivation holds a dominant position in terms of area and production among vegetable growers, making it an important crop in the agricultural landscape of the state. The soil and climatic conditions in West Bengal offer high potential for potato production. West Bengal is a major producer of potato in India, with a significant portion of the state's agricultural land dedicated to potato cultivation. The crop is grown in approximately 4.6 lakh hectares of land in the state.

Potatoes have high nutritive value, with 100 grams of edible potato containing 97 kilocalories, 1.6 grams of protein, a small amount of fat, 10.07 grams of minerals, and a modest

iron content. They consist of 74.7% water and 22.6% carbohydrates, complemented by other essential food components. With their nutritional value, adaptability to diverse climates, and ability to serve as a staple food, potatoes have become an essential component of diets in many countries. People consume potatoes in various forms such as cooked curries, fries, potato crackers, and as flour for making bread, biscuits, chips, and more, both domestically and internationally.

This research paper will explore the economic intricacies surrounding potato production and marketing, investigating factors such as production costs, market structures, trade patterns, and government policies. By examining various

facets of this vital sector, the study aims to contribute to informed decision-making processes, promote sustainable agricultural practices, and enhance the economic viability and efficiency of potato farming systems. The findings will provide a deeper understanding of the industry's dynamics and offer recommendations to foster the growth, efficiency, and resilience of potato farming and distribution systems.

Objectives of the study

To study the cost and returns of the growers of potato var. Pukhraj in the study area.

2. Materials and Methods

This study aims to analyze the costs and returns of potato cultivation and investigate the price spread and marketing issues in the Salboni block of the Paschim Medinipur district in West Bengal. In line with the study's objectives, this chapter focuses on the methodological aspects, including the analytical tools used and the description of terms and concepts considered for data collection, analysis, and interpretation. The following sections discuss these aspects in detail.

1. The study area
2. Nature and collection of data
3. Analytical procedure as under

The analysis of cost of cultivation and their respective profitability from potato production

2.1 Study area

The study is specifically conducted in Paschim Medinipur district of West Bengal, as this area is deliberately chosen due to its significance in terms of area of potato cultivation.

2.2 Sampling techniques

Three staged random sampling technique has been used to select the block, village and potato growers. At first stage, out of 21 blocks of Paschim Medinipur district, one block namely Salboni block was purposively selected for the study where area under potato cultivation was higher in comparison to other blocks. At second stage, list of highly potato producing villages was prepared and then 6 villages of Salboni block, (Chaitya, Krishnanagar, Bhabrigere, Rautara, Debagram, Muchibere) were selected on the basis of maximum coverage of area under potato crop. At the third stage of selection, a complete list of potato growers for all 6 selected villages was prepared from the record of the Assistant Director of Agriculture (Salboni Block) and record of the panchayat office of respective villages and 60 farmers as sample for the study were selected randomly from the list of farmers.

2.3 Nature and source of required data

The data required for the present study were both of primary and secondary in nature. The primary data were collected from the selected sample potato growers and recorded as follows:

1. Area under potato crops
2. Information related to cost of potato cultivation
 - (a) Types of labour engaged for different field operations
 - (b) Material cost involved
 - (c) Returns from different potato crops

(d) Price of different potatoes.

3. Details regarding the disposal of potatoes with particular emphasis on marketing practices were collected.
4. Costs and margins of different marketing channels in potato marketing were also collected.

The secondary data for the background of the study were collected from Basic Agriculture Statistics of West Bengal, District Statistics Hand Book of Paschim Medinipur district, Assistant directorate of agriculture, Salboni block besides the published reports and journals.

2.4 Reference period

The collected data were related to the crop calendar year 2022-23 (Rabi season).

2.5 Method of inquiry

Data for the study were gathered through personal interviews with selected potato growers using pre-tested questionnaires and schedules. These tools were designed to cover various aspects that align with the systematic objectives of the study. The data collection process involved conducting surveys, and multiple visits were made to ensure contact with each selected sample of potato growers.

2.6 Analytical process described

The data gathered from the participants underwent a thorough review to identify any deficiencies or inaccuracies before being analyzed in tabular form. The expenses and profits related to potato cultivation were calculated separately for different categories of potato growers.

2.6.1 Cost concepts

The determination of costs was based on the principles outlined by a designated committee of experts commissioned by the Government of India for estimating costs. The updated cost concepts utilized in this research are outlined as follows:

Cost 'A1'

It includes:

1. Value of hired human labour
2. Value of hired bullock labour
3. Value of owned bullock labour
4. Value of owned machinery labour
5. Hired machinery charges
6. Value of seed (both farm produced and purchased)
7. Value of insecticides and pesticides
8. Value of farm yard manure (owned and purchased)
9. Value of fertilizers
10. Depreciation on farm assets excluding land
11. Irrigation charges
12. Land revenue, cesses and other taxes
13. Interest on working capital
14. Miscellaneous expenses, if any

Cost 'A₂' it includes:

Cost 'A₁' + Rent paid for leased in land.

Cost 'B₁' it includes:

Cost 'A₂' + Interest on value of owned fixed capital assets

(excluding land).

Cost 'B₂' it includes:

Cost 'B₁' + rental value of owned land (net of land revenue) and rent paid for leased-in land

Cost 'C₁' it includes:

Cost 'B₁' + imputed value of family labour

Cost 'C₂' it includes:

Cost 'B₂' + imputed value of family labour

Cost 'C₃' it includes:

Cost 'C₂' + 10% of cost C₂ to account for managerial input of the farmer

2.6.2 Profitability concepts

For the estimation of profitability from potato, the following efficiency measures are used in this study:

1. Gross income,
2. Farm business income,
3. Farm investment income,
4. Net farm income,
5. Family labour income,
6. Input- output ratio,

These are defined as under

1. **Gross income:** It is defined as total value of main product + by product. It represents the total revenue or earnings generated from various sources without taking into account any taxes, operating costs, or other deductions. Gross income provides a snapshot of the overall earning power or revenue generated by a farm.
2. **Farm business income:** This represents the total value of the main agricultural product and any by-products, at the prices received at the time of farm harvest. It is calculated by subtracting the cost 'A₁' from the gross output value.
3. **Farm investment income:** This refers to the total income derived from the farm, including net farm income, interest earned on fixed capital, and the imputed rental value of owned land. It is defined as net farm income + interest on fixed capital + imputed rental value of owned land.
4. **Family labour income:** It denotes the income generated by the farm operation after deducting the cost 'B₂' from the gross income. It specifically accounts for the contribution of family members' labour to the farm.
5. **Net farm income:** This is the income remaining after subtracting the cost 'C₂' from the gross income. It represents the actual profit earned from the farm operation.
6. **Input-output ratio:** The input-output ratio measures the efficiency of the farm operation by comparing the gross income with the cost of cultivation. It is calculated by dividing the gross income by the cost of cultivation.

2.6.3 An evaluation of farm inputs and output

(a) Inputs

- **Human labour:** For casual labour, the evaluation is based on the actual payment made in cash or kind. In the case of family labour, it is assessed according to the prevailing wage rate in the village during a specific reference year.
- **Bullock and machine labour:** Hired bullock or

machine labour is evaluated based on the actual cash or non-cash payment. Owned bullock labour is assessed using the prevailing wage rate in the village during a specific reference year.

- **Value of seed:** The value of seed is determined by the actual price paid for purchasing seed of a particular quality.
- **Value of FYM:** The value of Farm Yard Manure (FYM) is calculated based on its market price.
- **Value of fertilizers:** The value of fertilizers is calculated based on its market price.
- **Value of insecticides and pesticides:** Evaluation is done by considering the market prices paid for insecticides and pesticides during the year or season.
- **Irrigation charges:** This includes the depreciation of irrigation equipment such as pipeline, pump sets, oil engine, pump house, well, etc., as well as working charges. It also incorporates interest on fixed capital, specifically for irrigation structures like wells, pump houses, electric motors, etc. The cost of irrigation water obtained from external sources is based on the prevailing local irrigation charges per unit of area.
- **Revenue and taxes:** Actual land revenue and taxes paid during the agricultural year are considered based on a specific reference year.
- **Depreciation of farm assets:** Depreciation is calculated using various methods, taking into account the nature and lifespan of the assets.
- **Interest on working capital:** It is calculated at 6% per annum.
- **Interest on fixed capital:** Interest is charged at a rate of 6% per annum on the value of implements, machinery, farm buildings, irrigation structures, and draught animals. It does not include interest on land input, as the rental value of owned land is calculated separately.
- **Rental value of owned land:** It is determined based on the prevailing rate in the area.

(b) Output: Gross value is computed by converting the physical products into monetary terms. This is achieved by multiplying the output of the potato crop by the harvest prices (TPP x Py or TVP).

3. Costs and returns structure of potato cultivation

Studying the economics of potato cultivation is crucial for assessing its profitability and making informed decisions regarding cultivation practices, resource allocation, and production scale. Additionally, it provides estimates of the financial requirements associated with cultivating potatoes in different-sized areas and with varying levels of technological adoption. It is widely recognized that the profitability of potato production is influenced by the costs of inputs and field operations, as well as the prices obtained for the harvested potatoes. Therefore, the significance of conducting these analyses cannot be overstated, as they shed light on key aspects of the study related to profitability and economic viability.

3.1 Results and Discussion

The Table. 1 presents that the potato crop on the sampled

holdings exhibited an average productivity of 383.05 quintals per hectare. The gross income per hectare from potato cultivation was determined to be Rs. 268,135. The net return from potato production was calculated based on the CACP cost concept. The data indicated that the average net return over cost A_1 was Rs. 96,948 per hectare. Additionally, the net returns for cost B_1 , cost B_2 , cost C_1 ,

cost C_2 , and cost C_3 were found to be Rs. 95,725, Rs. 77,190, Rs. 83,368, Rs. 64,833, and Rs. 44,503 per farm and per hectare, respectively. Furthermore, other indicators of farm profitability revealed that family labor income amounted to Rs. 877,190 per hectare, followed by a farm business income of Rs. 96,948 per hectare.

Table 1: Estimation of Cost of cultivation of potato (Kufri Pukhraj) on Sampled holding (Rs.)

Sl. No.	Particulars	Per bigha (40 decimal)	Per hectare
1	Hired human labour	5000	30891.25
2	Bullock labour	1200	7413.90
3	Machinery	1400	8649.55
4	Seed	4500	27802.13
5	Manure	1000	6178.25
6	Fertilizers	5500	33980.38
7	Irrigation	1200	7413.90
8	Plant protection chemicals	1500	9267.38
9	Interest on working capital	1278	7895.80
10	Depreciation	300	1853
11	Land revenue	0	0
	Cost A_1	22878	141346
12	Interest on fixed capital	198	1223
	Cost B_1	23076	142569
13	Rental value of own land	3000	18535
	Cost B_2	26076	161104
14	Imputed value of family labour	2000	12357
	Cost C_1	25076	154926
	Cost C_2	28076	173461
15	10% of Cost C_2	2807	17346
	Cost C_3	30883	190807

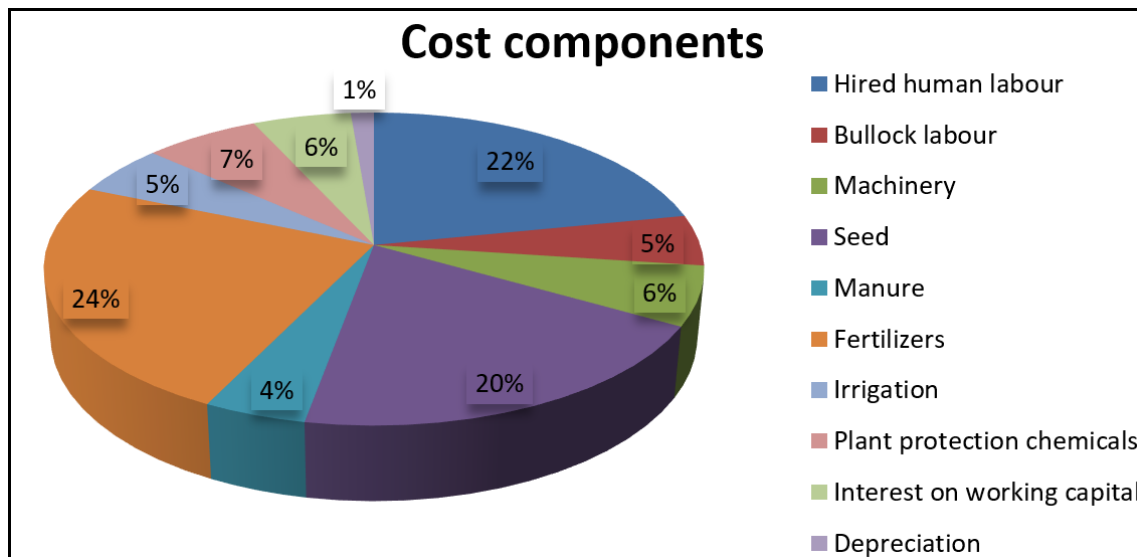


Fig 1: Breakup of cost A_1 for Potato (Kufri Pukhraj) cultivation

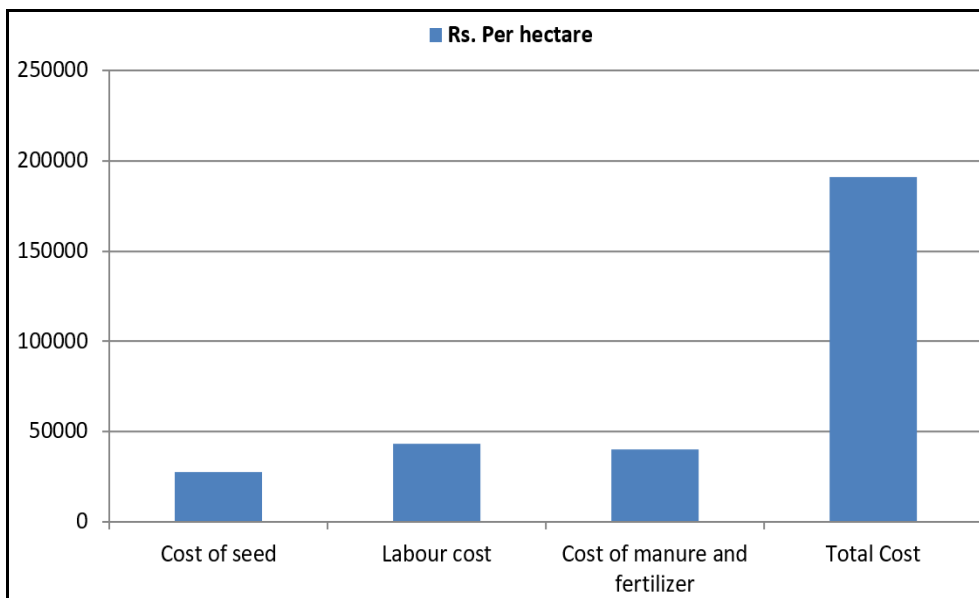
The Table. 1 represents the cost structure of potato cultivation (variety: Kufri Pukhraj) per hectare. On average, the cost of cultivating one hectare of potato crop is found to be Rs. 141,346, referred to as cost A_1 . There is no cost A_2 indicated because farmers used their own land for potato cultivation. Furthermore, the table reveals that the average operational cost, known as cost B_1 , amounts to Rs. 142,569 per hectare for potato cultivation. Similarly, the average cost B_2 is recorded as Rs. 161,104 per hectare for potato

production.

It is noteworthy that the costs C_1 , C_2 , and C_3 are observed to be Rs. 154,926, Rs. 173,461, and Rs. 190,807 per hectare, respectively. Among these components, the investment pattern indicates that the expenditure on plant protection measures and irrigation is relatively lower in terms of variable costs. Conversely, the higher costs incurred per hectare for potato production are attributed to labour, manures and fertilizers, and seed, respectively.

Table 2: Cost involved in cultivation of potato (Kufri Pukhraj) and their breakup on sampled holdings

S. No.	Cost particulars	Rs. per hectore	Percentage to total cost
1	Cost of seed	27802.13	14.57
2	Labour cost	43248.25	22.67
3	Cost of manure and fertilizer	40158.63	21.05
4	Total Cost	190807	100

**Fig 2:** Breakup of major input cost involved in potato (Kufri Pukhraj) cultivation (Rs/ha)**Table 3:** Economics of potato (Kufri Pukhraj) cultivation on the basis of cost concepts on sampled holdings

Sl. No.	Particulars	Per hectare
1	Total yield	339.80 quintal
	Price per quintal (Rs.)	500
2	Gross return (Rs.)	169900
3	Cost of cultivation (Rs.)	
	Cost A ₁	141346
	Cost B ₁	142569
	Cost B ₂	161104
	Cost C ₁	154926
	Cost C ₂	173461
	Cost C ₃	190807
4	Net return (Rs.)	
	Cost A ₁	28554
	Cost B ₁	27331
	Cost B ₂	8796
	Cost C ₁	14974
	Cost C ₂	-3561
	Cost C ₃	-20907
5	Cost of production per quintal	
	Cost A ₁	415.97
	Cost B ₁	419.57
	Cost B ₂	474.11
	Cost C ₁	455.93
	Cost C ₂	510.48
	Cost C ₃	561.53
6	Return per rupee	
	Cost A ₁	1.20
	Cost B ₁	1.19
	Cost B ₂	1.05
	Cost C ₁	1.09
	Cost C ₂	0.98
	Cost C ₃	0.89
7	Family labour income	8796
8	Farm business income	28554

The Table. 3 reveals that the average potato crop productivity on the sampled holdings is 339.80 quintals per hectare. The gross income per hectare from potato cultivation was determined to be Rs. 169,900. The net return from potato production was also calculated based on the cost concept. The data indicates that the average net return over cost A1 was Rs. 28,554 per hectare. The net returns for cost B1, cost B2, cost C1, cost C2, and cost C3 were Rs. 27,331, Rs. 8,796, Rs. 14,974, Rs. -3,561, and Rs. -20,907 per farm and per hectare, respectively. Additionally, the measurement of farm profit showed that the family labor income amounted to Rs. 8,796 per hectare, while the farm business income was found to be Rs. 28,554 per hectare.

4. Summary and Conclusion

1. Potato cultivation accounted for more than 65% of the total cultivated land.
2. Human labour was predominantly utilized in potato cultivation, surpassing the use of machines. Additionally, family labour played a significant role in potato cultivation.
3. The average seed rate was 9-10 quintals per hectare.
4. Only a few farmers in the area applied farmyard manure, resulting in a higher reliance on chemical fertilizers.
5. The cost of cultivating one hectare of potato crop was found to be Rs. 141,346 for the Pukhraj variety as cost A1. There was no cost A2 because farmers used their own land for potato cultivation.
6. The average operational cost (cost B1) was Rs. 142,569 per hectare for Pukhraj varieties. Similarly, for cost B2, the average value was Rs. 161,104 per hectare for Pukhraj potato production.
7. The costs C1, C2, and C3 were found to be Rs. 154,926, Rs. 173,461, and Rs. 190,807 per hectare for Pukhraj.
8. The investment pattern analysis revealed higher investments in manures and fertilizers, seeds, and labour, while comparatively lower investments were made in plant protection measures and irrigation.
9. The average productivity of potato crops per sample holding was 383.05 quintals for Jyoti and 339.80 quintals for Pukhraj per hectare.
10. The gross income per hectare was Rs. 169,900 for Pukhraj potatoes.
11. For the Kufri Pukhraj variety, the average net return over cost A1 was Rs. 28,554 per hectare, followed by Rs. 27,331, Rs. 8,796, Rs. 14,974, Rs. -3,561, and Rs. -20,907 for costs B1, B2, C1, C2, and C3 per hectare, respectively.
12. Family labour income was found to be Rs. 8,796 per hectare, followed by Rs. 28,554 per hectare as farm business income for the Pukhraj variety.

The above research study concluded that at the operational level, the cultivation of the potato variety Kufri Pokhraj in the Salboni block of Paschim Medinipur district shows moderate economic viability, with positive net returns over Cost A1 (₹ 28,554/ha) and Cost B1 (₹ 27,331/ha). However, once imputed family labor, owned land rental value, and managerial costs are fully taken into account, the cultivation becomes marginally profitable. In order to improve input-

use efficiency, lower production costs, and boost overall farm profitability and sustainability in the area, targeted interventions are required. The production system is still very labor-intensive, heavily dependent on chemical fertilizers and high-quality seed, and characterized by limited mechanization and organic manure application.

References

1. Chakraborty S, Dey D. Analysis of potato production and marketing in West Bengal: A case study of Burdwan district. *Journal of Agricultural Science and Technology*. 2018;20(4):809-824.
2. Das S, Ghosh S. Economic analysis of potato production in West Bengal. *Economic Affairs*. 2020;65(4):865-876.
3. Ghosh D, Roy A. An economic analysis of potato marketing in West Bengal: A case study of Hooghly district. *Journal of Economic Policy and Research*. 2019;14(2):89-101.
4. Ghosh PK, Chakraborty S. Economics of potato production in West Bengal: A comparative analysis. *International Journal of Current Microbiology and Applied Sciences*. 2018;7(5):3106-3117.
5. Pal S, Sanyal D. A study on economics of potato cultivation in West Bengal. *Journal of Crop and Weed*. 2019;15(1):54-59.
6. Singh RK, Chauhan A. Economic analysis of potato cultivation in Himachal Pradesh. *Journal of Agricultural Science and Technology*. 2018;20(3):529-539.