

## **COST OF CULTIVATION OF RICE IN KERALA**

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**ABSTRACT:** Rice is Kerala's major food crop, and demand for rice is gradually increasing as the state's population increasing. The paper aimed to assess the cost of cultivation of farmers in Kerala. Both primary and secondary data were used for the study. Primary data were collected from rice farmers. Total of 180 farmers were selected from the Alappuzha, Palakkad and Thrissur district as the major rice-producing districts in Kerala based on simple random sampling. The results were estimated using the cost concepts of Commission for Agricultural Costs and Prices (CACP) viz., Cost A, Cost B and Cost C. The result showed that the major portion of cost A1 or paid out costs ₹33606/ha were spending for hiring human labours by farmers. Total cost A1 is ₹77373/ha paid by the farmers for rice cultivation. The rental value of owned land is another major expense for the farmers in Kerala i.e about ₹43626/ha. The cost of cultivation in Kerala is ₹138786/ha and highest cost is carried out by farmers in the pancha season.

**KEYWORDS:** Cost, Rice Cultivation, Farmer, CACP, Kerala

In 1961-62, the total rice acreage was 7.53 lakh hectares, and in 1975-76, it was 8.76 lakh hectares. Following that, rice cultivation decreased steadily till it reached 2.29 lakh hectares in the 2007-08 crop year. However, the area under rice cultivation climbed to 2.34 lakh hectares in 2008-09. When compared to 1975-76, the area under rice cultivation declined by 76.49 percent in 2018-19. Due to the increased importance of dry land rice agriculture, rice area will be assessed separately starting in 2017-18. The production of rice increased from 5, 21,310 tonnes to 5, 78,256 tonnes over the previous year which was an increase of 11 per cent (Agricultural Statistics, 2018-19). Farmers in Kerala observed that it is often difficult to find workers at the time of transplanting and harvesting, operations for which timely availability of labour is crucial. Further, the wage levels are relatively high, particularly because the boom in construction activity in recent years has generated a large demand for labour (Thomas, 2010).

The cost of cultivation of rice in Kerala was estimated using the cost concepts of Commission for Agricultural Costs and Prices (CACP) viz., Cost A, Cost B and Cost C (CACP Y.K Alagh Committee Report, 2005). Cost A is made up of the cultivators' actual cash and in-kind expenses (paid out charges). Cost B is made up of Cost A added to interest on fixed assets, such as land, whereas Cost C consisted of Cost B plus the imputed value of family labour.

### **STATEMENT OF PROBLEM**

According to the Agriculture Department, the Ockhi cyclone of 2017 and the floods of 2018 and 19 wreaked havoc on rice farming. Rice is primarily grown in the districts of Palakkad, Alappuzha,

Ernakulam, Thrissur, and Malappuram these days. Kerala requires 40 lakh tonnes of rice each year, but only 8 lakh tonnes are produced. Tamil Nadu, Andhra Pradesh, Bihar, and Madhya Pradesh now supply Kerala with rice. Farmers have been increasingly unwilling to cultivate their fields in recent years, either leaving them fallow or shifting them to other uses due to the high expense of cultivation (Sreenivasan, 2012). The decline in the production of rice has been at 2 per cent per annum in the 1980s and at 2.9 per cent per each year due to this cost effect in the cultivation (Jeromi, 2003). In this situation, the cost of cultivation in Kerala needs to examine for the purpose of understanding farmers status.

### **RESEARCH METHODOLOGY**

The study of rice marketing is defined as the market for unmilled rice from rice farmers (excluding registered seed growers and specialty rice growers) till the point of its sale for processing. The study area covered the major rice producing districts in Kerala viz; Palakkad, Alappuzha and Thrissur. From each district, one block having largest area under rice cultivation was selected and from each block, one Panchayath with largest area under rice cultivation was also selected purposively (Based on the Agricultural Statistics Data 2017-18). From the three selected Panchayaths, 60 farmers each were selected using simple random sampling, making a sample of 180 farmers. List of farmers were collected from Krishibhavan and the respondents were selected randomly from the list. Data from farmers were collected by adopting personal interview method using pre tested structured interview schedule.

### **RESULTS AND DISCUSSION**

The costs of cultivation of rice in Kerala were estimated using the cost concepts of Commission for Agricultural Costs and Prices (CACP) viz., Cost A, Cost B and Cost C (Y.K. Alagh Committee Report, 2005). Cost A is made up of the cultivators' actual cash and in-kind expenses (paid out charges). Cost B is made up of Cost A added to interest on fixed assets, such as land, whereas Cost C is made up of Cost B plus the imputed value of family labour. Cost A<sub>1</sub>: Casual labour, Machine labour, Seeds, Manures and fertilisers, land protection chemicals, loading charge, Packing charge, Transportation cost, Miscellaneous, Interest on working capital, Land revenue. Cost A<sub>2</sub>: Cost A<sub>1</sub>+Rent paid for leased in land, Cost B<sub>1</sub>: Cost A<sub>1</sub>+Interest on value of fixed capital assets (excluding land), Cost B<sub>2</sub>: Cost B<sub>1</sub>+rental value of owned land+ Rental value of leased land, Cost C<sub>1</sub>: Cost B<sub>1</sub>+ Imputed value of family labour, Cost C<sub>2</sub>: Cost B<sub>2</sub>+ Imputed value of family labour, Cost C<sub>3</sub>: Cost C<sub>2</sub>+value of management input at 10 percent to

total cost (C<sub>2</sub>). The cost of cultivation of rice in Alappuzha, Palakkad and Thrissur districts were estimated using the cost concepts of Commission for Agricultural Costs and Prices (CACP) viz., Cost A, Cost B and Cost C. Cost A is made up of the cultivators' actual cash and in-kind expenses (paid out charges). Cost B is made up of Cost A added to interest on fixed assets, such as land, whereas Cost C is made up of Cost B plus the imputed value of family labour. In this study, the entire cost of rice crop cultivation is calculated as the sum of material costs, labour costs, and other expenses such as land tax, irrigation costs, and so on. These were worked out for all the sample respondents and in the present study, Cost B<sub>1</sub> constitute a small amount of cost because farmers included in the sample did not use much fixed assets other than land for cultivation. The labourers bring their own implements to the field and the wages paid included the rent for the implements also.

Table-1: Season wise cost of cultivation (₹/ha) in Kerala

| Sl. No | Cost concepts                        | Virippu (₹/ha) |              | Total (₹/ha) | Mundakan(₹/ha) |              | Total (₹/ha) | Puncha( ₹/ha) | Additio<br>nal<br>crop(₹/<br>ha) | Total (Keral<br>a)<br>(₹/ha) |
|--------|--------------------------------------|----------------|--------------|--------------|----------------|--------------|--------------|---------------|----------------------------------|------------------------------|
|        |                                      | Palakk<br>ad   | Thriss<br>ur |              | Palakk<br>ad   | Thriss<br>ur |              | Alappuzha     |                                  |                              |
|        | Cost A <sub>1</sub>                  |                |              |              |                |              |              |               |                                  |                              |
| 1      | Casual labour                        | 23098.67       | 36493.18     | 26342.93     | 29109.66       | 39024.35     | 33337.11     | 42392.49      | 25498.09                         | 33606                        |
| 2      | Machine labour                       | 16083.18       | 16865.99     | 16272.78     | 15950.07       | 18814.08     | 17171.23     | 15227.47      | 19152.67                         | 16475                        |
| 3      | Seeds                                | 1452.98        | 935.07       | 1327.54      | 1527.28        | 1474.53      | 1504.79      | 2548.16       | 885.50                           | 1734.2                       |
| 4      | Manures &fertiliser<br>s             | 7282.33        | 9301.44      | 7771.37      | 7804.87        | 8931.62      | 8285.30      | 10795.78      | 7900.76                          | 8908.3                       |
| 5      | Plant protection chemicals           | 2243.10        | 5373.53      | 3001.32      | 2382.36        | 4184.85      | 3150.91      | 8118.80       | 8305.34                          | 5133                         |
| 6      | Loading charge                       | 2206.47        | 907.71       | 1891.90      | 2641.87        | 1256.51      | 2051.18      | 4379.08       | 5340.17                          | 3030.5                       |
| 7      | Packing charge                       | 791.38         | 595.58       | 743.96       | 797.68         | 631.52       | 726.83       | 2189.54       | 1725.95                          | 1282.7                       |
| 8      | Transport<br>ation cost              | 5127.74        | 514.91       | 4010.48      | 5073.58        | 307.84       | 3041.55      | 84.13         | 1019.47                          | 2195.1                       |
| 9      | Miscellan<br>eous                    | 0.00           | 0.00         | 0.00         | 0.00           | 0.00         | 0.00         | 2089.13       | 823.47                           | 735.2                        |
| 10     | Interest<br>on<br>working<br>capital | 2665.50        | 3212.86      | 2798.08      | 2974.48        | 3391.11      | 3152.12      | 4313.61       | 3592.90                          | 3461.4                       |
| 11     | Land<br>revenue                      | 695.48         | 595.58       | 671.28       | 625.00         | 500.00       | 571.70       | 500.00        | 500.00                           | 570.28                       |
| 12     | Credit                               | 250.78         | 78.46        | 209.05       | 305.10         | 236.61       | 275.90       | 0.00          | 0.00                             | 145.91                       |
| 13     | Irrigation<br>cess                   | 159.87         | 147.12       | 156.78       | 190.24         | 120.72       | 160.60       | 0.00          | 0.00                             | 94.65                        |
|        | Total of<br>cost A <sub>1</sub>      | 62058.74       | 75022.10     | 65197.46     | 69383.18       | 78874.57     | 73429.21     | 92640.09      | 74746.72                         | 77373                        |

|           |  |           |           |           |           |           |           |           |           |               |
|-----------|--|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|---------------|
| <b>14</b> | Rent paid for leased in land                                       | 3291.5    | 0.00      | 2494.3    | 3050.9    | 2655.8    | 2882.5    | 3183.13   | 1221.3    | <b>2727.6</b> |
|           | <b>Cost A<sub>2</sub> (Cost A<sub>1</sub>+14)</b>                  | 65350.28  | 75022.10  | 67691.76  | 72434.15  | 81530.42  | 76311.71  | 95823.22  | 75968.09  | 80100         |
| <b>15</b> | Interest on value of owned capital assets                          | 22.93     | 14.43     | 20.87     | 27.64     | 20.34     | 24.53     | 2.86      | 0.00      | 14.52         |
|           | <b>Cost B<sub>1</sub>(Cost A<sub>1</sub>+15)</b>                   | 62081.67  | 75036.53  | 65218.33  | 69410.82  | 78894.91  | 73453.74  | 92642.95  | 74746.72  | 77387         |
| <b>16</b> | Rental value of owned land   | 47358     | 25000     | 41943     | 46949     | 22585     | 36560     | 51816.8   | 44980     | 43626         |
|           | <b>Cost B<sub>2</sub> (Cost B<sub>1</sub>+14+16)</b>               | 112732.10 | 100036.50 | 109656.05 | 119410.80 | 104136.40 | 112897.11 | 147643.00 | 120949.00 | 123741.53     |
| <b>17</b> | Imputed value of family labour                                     | 947.49    | 409.47    | 817.18    | 812.10    | 732.77    | 778.27    | 3654.40   | 9190.84   | 2427.95       |
|           | <b>Cost C<sub>1</sub> (Cost B<sub>1</sub>+17)</b>                  | 63029.16  | 75446.00  | 66035.51  | 70222.91  | 79627.69  | 74232.02  | 96297.36  | 83937.56  | 79815.51      |
|           | <b>Cost C<sub>2</sub> (Cost B<sub>2</sub>+17)</b>                  | 113679.60 | 100446.00 | 110473.23 | 120222.90 | 104869.10 | 113675.39 | 151297.40 | 130139.80 | 126169.48     |
|           | <b>Cost C<sub>3</sub>(C<sub>2</sub>+10% of Cost C<sub>2</sub>)</b> | 125047.60 | 110490.60 | 121520.55 | 132245.20 | 115356.00 | 125042.92 | 166427.10 | 143153.80 | 138786.43     |

It is presented in Table- 1: hat puncha and additional crop are the two main seasons for rice cultivation in Alappuzha district. Labour cost in the district was about ₹42392/ha in puncha season. It is high productive season so the farmers more invest in fertilising, weeding, and pesticides. Hence it requires more man power than in additional crop season. Farmers were facing shortage of labour in district. An increase of 8.02 percentage of labour cost during 2016-17 from the year 2015-16 were noted in Kerala (Department of Economics, 2019) . So at any rate they are ready to acquire labour for the cultivation. Cost of machine labour ₹15227/ha in puncha and ₹19152/ha in additional crop season is the next highest cost under cost A<sub>1</sub> in both seasons. In the study area machine labour is used for dewatering, ploughing, threshing and harvesting. Dewatering operations in large padasekharams are more economical as per acre pumping expenses can be reduced by using high power electric pump sets. Even though the recommended quantity of seeds needed per acre is 40 kilograms and it is freely provided by Krishibhavan, sample farmers in

the study area, guided by their past experience, use 50 to 60 kilograms of seed per acre in their fields at the rate of ₹40/kg. Rice seeds fall in excess in some areas of the field due to poor sowing quality, while the rate of seed fall in other portions of the field is significantly lower than what is required. It causes an uneven distribution of seedlings, which has a negative impact on agricultural output. As a result, extra seedlings are transported from densely growing areas to sparsely growing areas of the field, a process known as transplanting or nattu. So it was increasing the cost for purchasing additional quantity of seed and also labour cost for transplantation. System of Rice intensification is an improved method of rice cultivation which was developed in 1983 in Madagascar and has now spread to many parts of the world. SRI method of cultivation produces higher yields with less seed, less water, less chemical fertilizers and no pesticides but with the use of more organic manures (Department of Agriculture Development and Farmers welfare, 2016) All of the sample farmers in area use chemical fertilizers in their fields. The average per hectare use of chemical

fertilizers (N + P + K) of 426 kilograms and other chemicals like microfood and vivaye also used. These are extremely expensive fertilisers. Farm yard manures such as cow dung or ash are used by a small percentage of farmers in the area. Agricultural research shows that the use of lime in right quantities is imperative to neutralise the high level of acidity in kayal lands. In additional crop season, the quantity of lime is more used. Comparatively fertiliser cost is more in the district compared to other districts.

Cost of plant protection methods like pesticides and weedicides are the next high cost after fertiliser cost. On an average of ₹8000 were incurred in both seasons. Farmers are charged a loading fee by SUPPLYCO at the time of procurement. Average cost of ₹4379 and ₹5340 per hectare is incurred for farmers in puncha and additional crop respectively. In the area where farmers doing additional crop were paying two times of loading charge because of market centre is at a long distance. Packing charge is carried by farmers based on quantity of rice sold to SUPPLYCO. For a quintal it costs about ₹30 and based on the quantity produced from hectare packing charge is calculated. The puncha season yields more than the additional crop season. As a result, the farmers in the puncha pay a high packaging fee. During the puncha season, farmers do not expressly mention transportation costs. It is covered by the input cost. Farmers were paying for road and water transportation to give over their produce to SUPPLYCO during the additional crop season. During the puncha season, however, millers' vehicles were able to access the majority of the farmer's fields. Miscellaneous expenses included charge for bund protection fee and contract fee for the pumbset used for dewatering. In puncha season average cost of ₹2089 were incurred. In the case of additional crop season it was ₹823 only. Land revenue in the area was ₹500. When calculated interest on capital, it is also high in the puncha season. For cultivating rice by farmer in a hectare, ₹166427/ha is the cost incurred in puncha season and ₹143153/ha in additional crop season.

In Palakkad district Cost A1, the paid out cost actually incurred by the farmer, the major share of the cost component was hired human labour. Average cost of ₹2300/ha were incurred in virippu season and in mundakan season it is a little more i.e ₹29000. In mundakan season, farmers were more preferring transplantation and it needs more man power. In virippu season, an average of 16083 incurred for the machine operations. Farmers opined that, if the government machineries like tractor and winnover, cost of machines can be reduced. The majority of the farmers were using uma variety of seed for the rice cultivation. Krishibhavan is offering seed at a subsidised rate of ₹21/kg up to 100 kg for a total of 2 ha. Compared to Alappuzha farmers, in Palakkad farmers were using less quantity of seeds. Hence, there is no additional purchase of seed required for farmers.

Farmers in this district used manures and fertilisers at a lower rate than in other districts. Common fertilisers such as NPK and lime were utilised, while other chemicals were employed in modest amounts. An average cost of ₹7282 was spent by farmers for fertiliser in puncha season. It is slightly greater in mundakan than in puncha because more fertiliser will be used in case it is washed out of the field by rain. A recent study [39] found that the cost of cultivating high yielding hybrid varieties in Assam was on average 29.43 percent higher than traditional rice. The higher costs plant protection chemicals (85.13 percent), irrigation (63.21 percent) and seed (62.81 percent) were identified (Pham *et.al*, 2014).

Plant protection chemicals were applied by farmers were less in the district. They were using man power to remove weedicides from the rice. Even though insecticides and pesticides were applying, the quantity is less. So the cost of plant protection chemical is comparatively less. In both seasons, an average cost of ₹2243 and ₹2382 were spent by farmer for the pesticides. At the time of procurement, the farmer pays a loading fee for the trade unions for the quantity (quintal) carried over to miller's vehicle. During the mundakan season, production and sale volume per hectare are higher. As a result, the loading charge per hectare is higher at that time about ₹2641/ha. Packing charge of rice per hectare is about ₹790 in both seasons. Millers either provide gunny bags or reimburse farmers for the cost of gunny bags. Transportation cost is also similar in both seasons. Here the farmers mainly pointed the transportation cost is mainly for bring the produce to home. In the district, after drying and cleaning only the produce will be procured by SUPPLYCO. So the farmers bring the produce to home for the drying process. For this purpose, average cost of ₹5000/ha incurred by the farmers in both seasons. The costs of other modes of transportation are factored into the input costs. The area's land revenue was ₹695 and ₹625 per hectare in two seasons. Farmers don't take advantage of the credit option too often. The interest-free loans were only for a period of six months. So it's difficult to repay if they don't get the expected produce from the field. As a result, the credit amount has the least impact on the cost computation. Farmers can use irrigation to use the panchayath's water facility system in rice farming. In the virippu and mundakan seasons, the average cess paid by farmer was ₹159 and ₹190. During the virippu season, irrigation is especially important. A total of 12 dams were being actively utilising for agricultural irrigation.

When finding total cost A1 by adding all these costs, an average cost of ₹62058 in virippu season and ₹69383 in mundakan season incurred for farmers. These cash were directly paid by the farmer throughout the cultivation. An average cost of ₹3291 and ₹3050 rental value of leased land is paid by farmers. Owned capital assets are limited to farmers in the district. So it is not an important component in the

cost calculation. Rental value of owned land is about ₹47000/ha in the study area. The value of land increasing day by day. So it reflect in the cost B2 i.e about ₹112732/ha in virippu and ₹119410 in mundakan season. So finally the total cost C3 showed the cost is more in the mundakan season i.e ₹132245/ha. When the cost of cultivation of rice in Palakkad and Alappuzha is compared, Palakkad is less expensive because to cheaper labour costs, plant protection, and rental costs. Total cost A1 in the Thrissur district showed an average cost of ₹75022 and ₹78874 in virippu and mundakan season respectively. The major portion of this cost is made by hired human labour cost. The average cost of labour was ₹36493 in virippu season and ₹39024 in mundakan as the transplantation and weeding requires more labour in mundakan season. The shortage of labour is observed in the district so the wage determined by labour is high. The next component is machine labour. It is mainly used for land preparation and harvesting. Machine labour cost is normal compared to the machine rates in other districts. The cost may vary depending on how long it takes to complete the field operation. Average cost of ₹16865/ha in virippu season and ₹18814 in mundakan season were showed in table. Seeds were available to farmers through Krishibhavan at a subsidy rate of ₹12/kg upto 200kg for 2 ha. For additional quantity of seeds, they need to pay 38/kg in local market. But the farmers were using standard rate of 30 kg or less in a hectare. Hence, the subsidy rate seed is enough for their land. The seed cost is only ₹935 and ₹1474 in the virippu and mundakan season. It included transportation cost of bring seeds into field. Manures and fertilizer cost paid by farmers in virippu season (₹9301/ha) were more than in mundakan season (₹8931/ha). They were purchasing fertilizers from private traders. Subsidy of ₹4200/ha for fertilizer and seed is reimbursed by Krishibhavan into farmers account. When calculating loading charge per hectare, average cost of ₹907 and ₹1256 were carried by farmers in virippu and mundakan season respectively. Packing charge also incurred around ₹500-600 for farmers per hectare. Interest on working capital is worked out and ₹3212 in virippu season and ₹3391 in mundakan season. By adding all these costs, a farmer need to spend total paid out cost (A1) of ₹75022 in virippu season and ₹78874 in mundakan season. There is no farmer leased in the land for cultivation in virippu season. In mundakan an average cost of rent of leased land ₹2655 occurred. Rental value of owned land in the area was ₹22000-₹25000. So the cost B2 finally showed an amount of ₹100036/ha in virippu season and ₹104136/ha in mundakan season without considering owned labour. The cost of cultivation per hectare was 110490 in virippu season and 115356 in mundakan season. Mechanisation and modernisation of paddy cultivation resulted in reducing the cost of cultivation (Mohammed, 2014).

## CONCLUSION

Cost of cultivation in Kerala consisted of paid out costs, rental value of owned land and leased land, imputed value of family labour and interest on value of owned capital. The major portion of cost A1 or paid out costs ₹33606/ha were spending for hiring human labours by farmers. Labour as an input is very important. It cannot be eliminated from any production process. Even in the most heavily mechanized systems of production, labour cannot be entirely substituted for by machinery. People are still employed to operate the machines. Labour is employed to make sure that all other inputs are applied. That is, labour in fact makes it possible that all activities that need to be performed in the production of the rice are performed. Labour cost is highest in the puncha season. Machine labour and fertiliser cost also very high for the farmers in Kerala. The major portion of paid out cost is constituted by hired human labour, machine labour and fertilisers. Total cost A1 is ₹77373/ha paid by the farmers for rice cultivation. Rental value of owned land is another major expense for the farmers in Kerala i.e about ₹43626/ha. The cost of cultivation in Kerala is ₹138786/ha and highest cost is carried out by farmers in the puncha season.

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