Original Research Article

Economics of Paddy Cultivation under Different Sowing Techniques in Raipur District of Chhattisgarh

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ABSTRACT

The present study was conducted during 2017-18 in Raipur district of Chhattisgarh, with the objective to compare the cost & return and identifying constraints in paddy cultivation under different sowing techniques (SRI, Transplanting, Broadcasting and Line sowing). The study was conducted with the help of questionnaire, interviewed over 100 farmers. The cost of preparatory tillage was 7, 35 & 45 per cent more than line sowing. The material cost was found to be 9, 31 & 34 per cent more than broadcasting. However the yield was found to be 39, 46 & 83 per cent more in case of line sowing, transplanting and SRI over broadcasting. Total cost occurred in cultivation of paddy in SRI is Rs. 60809, in transplanting Rs. 49587, line sowing it is Rs. 43346 and broadcasting Rs. 42574. Per hectare return of SRI was Rs. 122000, transplanting Rs. 96111, line sowing Rs. 91600 and broadcasting Rs. 66140. The return per rupees was around Rs. 2.11 in line sowing, Rs. 2 in SRI, Rs 1.94 in transplanting and Rs. 1.55 in broadcasting. Major constraints in paddy cultivation were found to be unawareness of technologies and more labour requirement in SRI and transplanting and costly input cost.

Introduction

Rice acknowledges as a supreme commodity to mankind, in light of the fact that rice is really an existence, culture, custom and method for business to millions. In India, there is a growing demand for rice due to ever burgeoning population. India’s having highest area under rice and stand in second place for production. Rice cultivation takes place in all States of India, but West Bengal, Uttar Pradesh, Punjab, Tamil Nadu, Andhra Pradesh and Bihar are the major rice producing states. Nowadays, rice is being cultivated by different methods of sowing in the world the most important methods are SRI (System of Rice Intensification), transplanting and direct seeded (broadcasting and line sowing).
Presently, direct seeded rice is followed in America, Western Europe such as Italy and France, Russia, Japan, Cuba, India, Korea, Philippines and also in some parts of Iran, due to high technology, high labour cost and shortage of skilled labour thereby shifting trend from transplanting method of cultivation (Akhgari, 2004). SRI is environment friendly. Reduced demand for water frees up water for other uses and soil that is not kept saturated has greater biodiversity. Un-flooded paddy fields do not produce methane, one of the major “greenhouse gases” that are contributing towards global warming. The method uniqueness includes use of less seed, less water, less chemicals etc. (Reddy et al., 2005).

Materials and Methods

The present study was undertaken in Raipur district of Chhattisgarh. Raipur district consist of four blocks Dharsiwa, Abhanpur, Tilda, Arang out of which Dharsiwa block was selected purposively as in this block all the four sowing techniques of paddy cultivation i.e. SRI, Transplanting, Broadcasting and line sowing were found to be practiced.

From Dharsiwa block three villages were selected namely Saragaon, Nilja and Pauni based on the area under each type of sowing techniques i.e. SRI, transplanting, broadcasting and line sowing.

The selection of farmers was done according to the per cent proportionate method, the total number of farmers in the three villages was found to be 554, out of which 38, 230, 201 and 85 was found to be practiced SRI, transplanting, broadcasting and line sowing. From all four sowing techniques approx. 18 per cent farmers were selected i.e. 7 from SRI, 42 from transplanting, 36 from broadcasting and 15 from line sowing constituting the total sample size of 100 respondents.

Cost concept

The cost concepts i.e., Cost A1, Cost A2, Cost B and Cost C, which are generally followed in farm management studies and CACP (Commission for Agriculture Cost and Prices), were adopted for the present study.

Farm business analysis

Besides the cost concepts, farm business analysis has been undertaken to test the efficiency of the farm. It includes the items like net income, family labour income, farm business income and farm investment income.

Garrett ranking

To find out the most significant factor which influences the respondent, Garrett’s ranking technique will be used.

Results and Discussion

The results obtained from the present study as well as discussions have been summarized under following heads:

Socio economic characteristics of respondents

The average age of respondents using SRI, transplanting, broadcasting and line sowing was found to be 51, 50, 54 and 49 with average family size of 4, 4, 4 and 3. The male and female population was found to be 2:2, in SRI, transplanting, broadcasting and 2:1 in line sowing.

Maximum farmers was found to be literate up to high school (40%) followed by higher secondary (39%) across all respondents. Male members are involved in farming activities while female was found to be house wife, children’s were found to be student or in service across all respondents. The average
size of land holding was found to be 1.14, 2.09, 1.68 and 2.04 ha in SRI, transplanting, broadcasting and in line sowing (Table 1).

**Cost and return of paddy cultivation under different sowing techniques**

**Cost of cultivation**

The total cost of cultivation of paddy under different sowing techniques was shown in the Table 2, total cost occurred in cultivation of paddy in SRI is Rs. 60809, in transplanting Rs. 49587, line sowing it is Rs. 43346 and broadcasting Rs. 42574. The similar findings were reported by Makaida et al., (2014), Shelke et al., (2017) (Table 3).

**Yield**

The main yield quintal per hectare was found to be more in SRI i.e. 70 as compare to transplanting (55.62), line sowing (53) and broadcasting (38.2).

SRI was found to be best sowing techniques because the planting design of SRI is such that every plant gets sufficient light, water and air which leads to profuse tillering which helps in getting higher productivity per unit area. Makaida et al., (2014), Bhatt (2015), Kirar et al., (2017), Agrawal et al., (2018) (Table 5).

**Net return**

The net return obtained in SRI was found to be maximum in case of SRI (Rs 61190.61), line sowing (Rs. 48253.7), transplanting (Rs. 46523.2) and broadcasting (Rs. 23565.14). which indicated that SRI is not only superior over the other sowing technique techniques in physical terms as it giver higher productivity but at the same time but at the same time it is giving better monitoring returns than other sowing techniques. Makaida et al., (2014), Agrawal et al., (2018), Mithra and Bhaskaran (2018) reported similar findings in their study (Table 6).

| Parameters | SRI (7) | Transplanting (42) | Broadcasting (36) | Line sowing (15) |
|------------|--------|--------------------|------------------|-----------------|
| Age (years) | 51     | 50                 | 54               | 49              |
| Family size (no) | 4 | 4                  | 4                | 3               |
| Male | 1     | 1                  | 1                | 1               |
| Female | 1 | 1                  | 1                | 1               |
| Children | 2   | 2                  | 2                | 1               |
| Education status |        |                    |                  |                 |
| Illiterate | 0 | 1                  | 0                | 1               |
| Primary | 2 (28.57) | 8 (19.04) | 9 (25) | 3 (20) |
| High school | 3 (42.85) | 17 (40.47) | 15 (41.66) | 10 (66.66) |
| Higher sec. | 2 (28.57) | 13 (30.95) | 10 (27.77) | 1 (6.66) |
| Graduate | 0     | 3                  | 2                | 0               |
| Total | 7 (100) | 42 (100)           | 36 (100)         | 15 (100)        |
| Land holding(ha) | 1.14 | 2.09               | 1.68             | 2.04            |

Note – figures in parenthesis shows the percentage to total respondents
Table 2: Cost of cultivation of different sowing techniques (Rs/ha)

| Particular                        | SRI     | Transplanting | Broadcasting | Line Sowing |
|----------------------------------|---------|---------------|--------------|-------------|
| **VARIABLES COST**               |         |               |              |             |
| human labour                     | 14580   | 10056         | 7256         | 5396        |
| bullock labour                   | 257     | 173           | 180          | 66          |
| machine labour                   | 2456    | 2365          | 2538         | 3851        |
| Seed                             | 932     | 1350          | 1607         | 1373        |
| Manure                           | 800     | 809           | 305          | 248         |
| Fertilizer                       | 5626    | 4562          | 4096         | 5013        |
| Irrigation                       | 838     | 939           | 247          | 107         |
| Plant protection chemicals       | 254     | 565           | 41           | 117         |
| **Total variable cost**          | 25745   | 20822         | 16273        | 16175       |
| Interest on working capital      | 1287    | 1041          | 813          | 808         |
| **SUBTOTAL**                      | 27033   | 21863         | 17087        | 16984       |
| **FIXED COST**                   |         |               |              |             |
| Land revenue                     | 69      | 69            | 58           | 63          |
| Depreciation                     | 6500    | 6023          | 11506        | 6023        |
| Rental value                     | 20333   | 16018         | 9023         | 15266       |
| **Total fixed cost**             | 26902   | 22110         | 20588        | 21353       |
| Interest on fixed capital        | 1345    | 1105          | 1029         | 1067        |
| **SUBTOTAL**                      | 28248   | 23216         | 21617        | 22421       |
| **TOTAL COST**                   | 55281   | 45079         | 38704        | 39405       |
| 10% as managerial cost           | 5528    | 4507          | 3870         | 3940        |
| **TOTAL COST OF CULTIVATION**    | 60809   | 49587         | 42574        | 43346       |

Table 3: Cost of cultivation under different cost concepts (Rs/ha)

| Particulars          | SRI    | Transplanting | Broadcasting | Line sowing |
|----------------------|--------|---------------|--------------|-------------|
| COST A1              | 33352  | 27690         | 28453        | 22860       |
| COST A2              | 33352  | 27690         | 28453        | 22860       |
| COST A2 + FL         | 33602  | 27955         | 28651        | 23071       |
| COST B1              | 34697  | 28796         | 29483        | 23928       |
| COST B2              | 55031  | 44814         | 38506        | 39194       |
| COST C1              | 34947  | 29061         | 29681        | 24139       |
| COST C2              | 55281  | 45079         | 38704        | 39405       |
| COST C3              | 60809  | 49587         | 42574        | 43346       |
Table 4 Cost of production under different cost concepts (Rs/qt)

| Particulars     | SRI  | Transplanting | Broadcasting | Line sowing |
|-----------------|------|---------------|--------------|-------------|
| COST A1         | 474  | 495           | 742          | 429         |
| COST A2         | 474  | 495           | 742          | 429         |
| COST A2 +FL     | 477  | 500           | 748          | 433         |
| COST B1         | 493  | 515           | 769          | 449         |
| COST B2         | 784  | 803           | 1006         | 737         |
| COST C1         | 497  | 520           | 774          | 453         |
| COST C2         | 787  | 808           | 1011         | 741         |
| COST C3         | 866  | 889           | 1112         | 815         |

Table 5 Yield and gross income of different sowing techniques

| Particulars                  | SRI  | Transplanting | Broadcasting | Line sowing |
|-----------------------------|------|---------------|--------------|-------------|
| MAIN YIELD (qt/ha)          | 70   | 55.62         | 38.2         | 53          |
| PRICE (Rs/qt)               | 1550 | 1550          | 1550         | 1550        |
| BY PRODUCT (qt/ha)          | 150  | 110           | 77           | 105         |
| PRICE (Rs/qt)               | 90   | 90            | 90           | 90          |
| Gross income                | 122000 | 96111       | 66140        | 91600       |

Table 6 Return obtained across various sowing techniques (Rs/ha)

| Particulars                  | SRI  | Transplanting | Broadcasting | Line sowing |
|-----------------------------|------|---------------|--------------|-------------|
| COST C3                     | 60809| 49587         | 42574        | 43346       |
| GI                          | 122000 | 96111       | 66140        | 91600       |
| NET RETURN                  | 61190| 46523         | 23565        | 48253       |
| Net return over cost A2 + FL| 88397| 68155         | 37488        | 68528       |
| B:C RATIO                   | 2    | 1.94          | 1.55         | 2.11        |

Table 7 Constraints in paddy cultivation

| Particulars                                                                 | Rank |
|-----------------------------------------------------------------------------|------|
| Unavailability of good quality seed                                        | 8    |
| Financial constraints                                                      | 2    |
| Constraints in availability of fertilizer on time and inadequate quantity  | 5    |
| Costly pesticide, ineffective weedicide                                     | 4    |
| Lack of mechanization                                                      | 7    |
| Unawareness of technologies                                                | 1    |
| Non availability of labour for transplanting                               | 3    |
| High rent charges of agricultural machinery                                | 6    |
Benefit cost ratio

The return per rupees was found to be more (Rs 2.11) in line sowing, (Rs 2) in SRI, (Rs. 1.93) in transplanting and (Rs. 1.53) in broadcasting. Anon. (2015), Nirmala and Waris (2016), Mahala et al., (2016), Manohar et al., (2017) reported similar finding in their study (Table 4).

Constraints in paddy cultivation

Constraints in paddy cultivation includes labour problem, unawareness of technologies timely available of fertilizer, costly input cost.

The finding is in line with the findings of Churpal et al., (2015), Dhruw et al., (2017), Lakra et al., (2017) (Table 7).

The paddy yield is high in SRI method as compared to the yields in transplanting, broadcasting and line sowing method of paddy cultivation. Although the B: C ratio was found to be high in line sowing but yield, production and income can be increased using SRI method as it gave highest productivity and net return across various sowing techniques in the area under study, farmer can adopt method according to its requirement (resource restrictions/financial constraints).

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