An Economic Analysis of Production of *Isabgol* and Constraints Faced by Farmers in Rajasthan

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ABSTRACT

The study was carried out in Barmer district of Rajasthan to analyze economics of *Isabgol* production and constraints faced by farmers. The primary data were collected from total sample of 80 farmer’s respondents. The study reveals that total cost of cultivation was higher ₹ 38407.69 per hectare on large farm, followed by ₹ 34132.15 on medium and ₹ 31281.96 on small farm and ₹ 34607.27 per hectare on overall farm. The cost of cultivation increases as farm size increase. It is observed from the result of F test p value is .001 which shows that there is statistically significant difference in cost of cultivation of *Isabgol* on different farm size category. The different cost on the basis of cost concept (Cost A1, A2, B1, B2, C1, C2 and C3) of *Isabgol* cultivation per hectare was calculated. The cost of production was found lower on large farm it was found to be ₹ 5053.64 per quintal followed by ₹ 5094.35 per quintal on medium farm, ₹ 5128.19 per quintal for small size farm which was found highest and ₹ 5092.06 per quintal for overall farm size. Farm business income, family labor income and farm investment income of *Isabgol* cultivation was found highest on large farm. The benefit cost ratio was found at 1.63 for overall farm size and was found to be 1.68 for large farm, 1.64 for medium farm and 1.63 for small farm. Crop damage by pest and diseases are the most important constraints faced by farmers in Isabgol production.

Highlights

- The total cost of cultivation was found higher on large farm and is increases as farm size increase.
- The cost of production was lower on large farm and highest on small farm.
- Gross return and Net returns was higher on large farm compare to medium and small farm. Input-output ratio was higher on large farm.

Keywords: *Isabgol*, cost of cultivation, farm business income, benefit cost ratio

*Isabgol* is an important Medicinal crop of India. *Isabgol* is also known as Ispaghula or *psyllium*, *psyllium* seeds husks are portion of the seeds of the plant *Isabgol*. *Isabgol* (*Plantago ovata* Forsk) belongs to family Plantaginaceae. *Isabgol* is mainly grown for its seeds. India is top producer of these seeds and husk. *Isabgol* is short stem medicinal annual herb and commercially an important *Rabi* season medicinal crop grown in India. The seed coat is also known as husk which has medicinal value. It is also being used in food industry especially in ice-cream, biscuits and candies. The mucilage content in *Isabgol* seed cultivated in India is higher. Colloidal mucilage is valuable for medicinal application (Pagaria & Kantwa, 2014). This crop is commercially cultivated mainly in the states of Rajasthan, Gujarat and Madhya Pradesh. India is the world’s largest producer and exporter of *Isabgol* in the world. In India, Rajasthan has largest area under *Isabgol* cultivation. Area and production of *Isabgol* in India is presented in Table 1.
In India, *Isabgol* is predominately cultivated in Rajasthan and Gujarat states. In Rajasthan, the major area under *Isabgol* cultivation is in Barmer, Jalore, Nagaur, Jodhpur, Jaisalmer, and Chittor districts. Presently its cultivation is becoming more popular in western part of Rajasthan because of poor soil fertility and low water availability in the area (Sharma & Ratnoo, 2013). The important high yielding varieties of *Isabgol* cultivation in India are Gujarat *Isabgol* 3 (GI3), Gujarat *Isabgol* 2 Gujarat *Isabgol*1 (GI2, GI1), Jawaharlal *Isabgol* 4, Haryana *Isabgol* 5, Niharika etc. The medicinal plant market in India is rapidly increasing over the years due to increasing consumer demand for herbal and natural products. A part from these medicinal uses, it has a place in dyeing, calico printing, in the ice-cream in as a stabilizer also in confectionery and cosmetic industries (Meena, et al. 2015)

### Objectives Data Sources and Methodology

The objectives of the study was to estimate cost and return of *Isabgol* cultivation and to identify the constraints faced by farmers in production of this important medicinal crop. Primary data were collected by personal interaction and interviewed method during the year 2019. The secondary data were collected from government agriculture department of Rajasthan and various published sources. Rajasthan occupied highest area under cultivation of the *Isabgol* crops. The Barmer district has highest area under *Isabgol* cultivation. Barmer district were selected purposively for the study. Two *tehsils* from each district Dhorimana and Sedwa for *Isabgol* were selected having highest area under cultivation of the crop. A list of *Isabgol* cultivation villages and farmers prepared. Four village from each *tehsils* were also selected to make the total sample size of 80 growers/farmers. The farmers’ were categorized in to 3 groups small, medium and large, below 2 hectare (small) 2-10 hectare (medium) and more than 10 hectare (large).

### Analytical Tools

The cost of cultivation of Isabgol was work out by using various cost concepts.

- Cost A1 include all real expenditures in production by the farmer.
- Cost A2 = Cost A1+ rental value of leased in land
- Cost B1 = Cost A1+ interest on fixed capital +rental value of land
- Cost B2 = Cost B1 + rent paid for leased in land + rental value of owned land
- Cost C1 = Cost A1+ value of family labor
- Cost C2 = Cost B1 + value of family labor
- Cost C3 = Cost C2 + 10 per cent of cost C2 as managerial cost

Net income measure: It is surplus after subtracting all the cost.

Net return = Gross return – Total cost

The Benefit Cost Ratio (BCR) measures the returns or benefits per unit cost of investment.

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BC \text{ Ratio} = \frac{\text{Total Cash inflows}}{\text{Total Cash outflow}}
\]

Cost of Production = Cost of cultivation per ha/Production per hectare

### Income Measures

For the calculation of profitability of *Isabgol* cultivation in the study area following income measures were workout:

- **(a) Farm Business income** = Gross income – Cost A1/A2
- **(b) Family labor income** = Gross income – Cost B2

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**Table 1:** State-wise area, production and yield of *Isabgol* in India

| State       | Year    | Area (ha) | Production (MT) | Yield (MT) |
|-------------|---------|-----------|----------------|------------|
| Karnataka   | 2009-10 | 21        | 42             | 2.00       |
| Gujarat     | 2014-15 | 9400      | 11647          | 1.24       |
| Haryana     | 2015-16 | 153       | 256            | 1.67       |
| Rajasthan   | 2016-17 | 355320    | 317863         | 0.89       |

*Source: www.Indiastat.com, accessed as on 1 Jan 2018.*
(c) **Farm investment income** = Farm business income - value of family labor OR net income + rental value of land + interest on fixed capital

**Operational cost ratio** = Variable cost/Gross income

**Fixed cost ratio** = Fixed cost/Gross income

**Gross cost ratio** = Gross cost/Gross income

**Input-output ratio** = Gross income/Gross cost

Henry Garrett Technique was used to analyze the constraint faced by the farmers. The respondents were asked to rank the constraints and these were converted into scores.

Percent position = \(100\times (R_{ij} - 0.5)/N_j\)

Where,

- \(R_{ij}\) = Rank given for \(i^{th}\) factor by \(j^{th}\) individual
- \(N_j\) = Number of factors ranked by \(j^{th}\) individual

**RESULTS AND DISCUSSION**

**Economics of Isabgol Production**

It is clear from the table 2 total cost of cultivation was found highest at Rs 38407.69 on large farm, followed by Rs 34132.15 on medium and Rs 31281.96 on small farm and Rs 34607.27 on overall farm. It is clear from the table 2 the cost of cultivation increases as farm size increases. The rental value of land share was highest percentage to total cost (12.88) on small, (11.88) on medium, (10.55) on large and (11.69) on overall farm in overhead cost. The machinery charge accounted highest in operational cost item to total cost. The cost of depreciation accounted to 7.25 per cent to total cost on small, 7.47 per cent on medium and 7.37 per cent on large to total cost items in the study area.

The test of significance, F test was applied using SPSS for testing the significance difference in cost of Isabgol on small, medium and large farm. The Table 3 shows the result of F test.

It can be observed from the result of F test p value is .001 which shows that there is statistically significant difference in cost of cultivation of Isabgol on small, medium and large farm. The item wise break-up of cost of cultivation in per cent to total cost on overall farmers depicted in the Fig. 1.

**Cost of cultivation of Isabgol on the basis of different cost concepts**

The different cost groups was calculated with the help of different cost concepts. Use of these cost concepts helps in calculation of the different cost and these cost helps in measuring the different farm incomes like farm business income, family labor income and farm investment income. The different cost (Cost A1, A2, B1, B2, C1, C2 and C3) of Isabgol cultivation per hectare was calculated.

| Table 2: Cost of cultivation of Isabgol of small, medium and large land holding |
|---------------------------------|--------|--------|--------|--------|--------|--------|
| **Particular**                  | **Small** | **%** | **Medium** | **%** | **Large** | **%** | **Overall** | **%** |
| 1. **Operational cost**         |         |       |         |       |         |       |            |       |
| Machinery                       | 4881.81 | 15.61 | 5081.81 | 14.89 | 5289.28 | 13.77 | 5084.30    | 14.69 |
| Hired labor                     | 2687.25 | 8.59  | 4613.85 | 13.52 | 5490.83 | 14.30 | 4263.97    | 12.32 |
| Family labor                    | 3335.98 | 10.66 | 3003.69 | 8.80  | 2975.0  | 7.75  | 3104.89    | 8.97  |
| Manure (FYM)                    | 3124.31 | 9.99  | 3245.59 | 9.51  | 3849.11 | 10.02 | 3406.33    | 9.84  |
| Seed                            | 1180.05 | 3.77  | 1379.64 | 4.04  | 1762.24 | 4.59  | 1440.64    | 4.16  |
| Total Fertilizer                | 2351.13 | 7.52  | 2414.76 | 7.07  | 3324.99 | 8.66  | 2696.96    | 7.79  |
| Plant protection                | 1781.81 | 5.70  | 1918.18 | 5.62  | 2271.42 | 5.91  | 1990.47    | 5.75  |
| Irrigation charge               | 2066.81 | 6.61  | 2229.5  | 6.53  | 2809.69 | 7.32  | 2368.66    | 6.84  |
| Miscellaneous                   | 522.72  | 1.67  | 563.63  | 1.65  | 757.14  | 1.97  | 614.49     | 1.78  |
| Interest on working capital     | 1483.58 | 4.74  | 1501.25 | 4.40  | 1501.33 | 3.91  | 1495.38    | 4.32  |
| 2. **Overhead cost**            |         |       |         |       |         |       |            |       |
| Land revenue                    | 50.0    | 0.16  | 50.0    | 0.15  | 50.0    | 0.13  | 50.0       | 0.14  |
| Depreciation                    | 2266.66 | 7.25  | 2550.0  | 7.40  | 2833.33 | 7.38  | 2549.99    | 7.37  |
| Interest on Fixed capital       | 1520.00 | 4.86  | 1524.00 | 4.46  | 1440.00 | 3.75  | 1494.66    | 4.32  |
| Rental value of land            | 4029.85 | 12.88 | 4056.25 | 11.88 | 4053.33 | 10.55 | 4046.47    | 11.69 |
| **Total cost**                  | 31281.96| 100.00| 34132.15| 100.00| 38407.69| 100.00| 34607.27   | 100.00|

*Source:* Primary data, (Column of % represent per cent to total cost)
Table 3: Test of significance for cost of cultivation of Isabgol on small, medium and large farm ANOVA

| Cost of Cultivation | Sum of Squares | df | Mean Square | F | Sig. |
|---------------------|----------------|----|-------------|---|------|
| Between Groups      | 43454706.229   | 2  | 217272353.115 | 7.225 | .001 |
| Within Groups       | 231532102.971  | 77 | 30071845.493  |     |      |
| Total               | 275007689.200  | 79 |             |     |      |

Significant at the 0.05 per cent level of significance; Source: Researcher’s own computation from primary data.

Table 4: Cost of cultivation of Isabgol on the basis of different cost concepts on small, medium, large and overall farm size (₹/ha)

| Cost     | Small        | Medium       | Large        | Overall     |
|----------|--------------|--------------|--------------|-------------|
| Cost A1  | 22396.13     | 25548.29     | 29939.36     | 25960.87    |
| Cost A2  | 22396.13     | 25548.29     | 29939.36     | 25960.87    |
| Cost B1  | 23916.13     | 27072.29     | 31379.36     | 27455.53    |
| Cost B2  | 27945.98     | 31128.54     | 35432.69     | 31502.0     |
| Cost C1  | 27252.11     | 30075.98     | 34354.36     | 30560.42    |
| Cost C2  | 31281.96     | 34132.23     | 38407.69     | 34606.89    |
| Cost C3  | 34410.56     | 37545.45     | 42248.45     | 38067.49    |

Source: Researcher’s own computation from Primary data.

Cost A1 and A2 was found similar, total cost increases as the farm size increase, it was found at ₹ 22,396.13 per hectare on small, ₹ 25,548.29 per ha on medium ₹ 25,960.87 per hectare and ₹ 25,960.87 per hectare on overall farm size. Cost B1 was found to be ₹ 23,916.13 per hectare on small, ₹ 27,072.29 per hectare on medium farm, ₹ 31,379.36 per hectare on large farm size ₹ 27,455.53 per hectare on overall farm. Cost B2 was found at ₹ 31,502.0 per hectare on overall farm, cost C2 was found ₹ 34,606.89 per hectare on overall farm. The cost C3 was found to be ₹ 34,410.56 on small, ₹ 37,545.45 on medium ₹ 42,248.45 on large and ₹ 38,067.49 per hectare on overall farm. The different cost groups are presented in the Table 5 and in Table 4.

Fig. 1: Break-up of cost of cultivation of Isabgol of overall farm

Fig. 2: Total cost of cultivation of Isabgol production of small, medium, large and overall farmers (₹/hectare)

Fig. 3: Cost of cultivation of Isabgol on the basis of different cost concepts of different farmers

Farm business income, family labor income and farm investment income

The data collected revealed that farm business income, family labor income and farm investment income increases with increase in farm size. The
farm business income was found to be ₹ 29454.17 per hectare for small, ₹ 30551.91 per hectare for medium, ₹ 34660.64 per hectare for large and ₹ 31555.57 per hectare for overall farm size. The family labor income was found lower than farm business income for small, medium, large and overall farm size. It was found ₹ 23,904.34, ₹ 24,971.66, ₹ 29167.31, ₹ 26,014.43 per hectare for small, medium, large and overall farm size respectively. Farm investment income was found highest at ₹ 31685.64 per hectare for large size farm, followed by ₹ 27548.22, per hectare for medium, ₹ 26118.19 per ha for small and ₹ 28450.68 per hectare for overall farm. The cost of production was found lower on large farm it was found to be ₹ 5053.64 per quintal followed by ₹ 5094.35 per quintal on medium farm, ₹ 5128.19 per quintal for small size farm which was found highest and ₹ 5092.06 per quintal for overall farm size. The benefit cost ratio was found at 1.63 for overall farm size and was found to be 1.68 for large size farm, 1.64 for medium farm and 1.63 for small farm size.

Cost of production, operational cost and overhead cost of Isabgol cultivation

The gross return and net return was found highest at ₹ 64600 and ₹ 26192.31 on large farm followed by ₹ 56100.2 and ₹ 21967.85 on medium and ₹ 51850.3 and ₹ 20568.04 on small farm respectively. The gross return and net return was found to be ₹ 57516.83 and ₹ 22909.40 on overall farm.

Cost-Benefit Ratio of Isabgol cultivation

The data collected from the respondents regarding the cost and the benefit associated was used to calculate the operational cost ratio. It was observed that the operational cost increases as farm size increases and was found highest to be 47.10 per cent for large farm size followed by 46.25 per cent for medium, 45.15 per cent for small size and 46.16 per cent was found for overall farm size. Fixed cost ratio was found to be 14.23 per cent for overall farm size. The input-output ratio was found highest at 165.19 per cent for large size farm, followed by 165.75 per cent for small farm size, lowest 164.36 per cent for medium size farm and 166.19 per cent was found for overall farm size. Gross cost ratio was found to be highest at 60.84 per cent on medium farm, followed by 60.33 per cent for small and lowest at

Fig. 4: Farm business income, family labor income and farm investment income of Isabgol cultivation

Fig. 5: Total cost, gross return and net return of Isabgol cultivation on small, medium, large and overall farm

Fig. 6: Cost of production of Isabgol on small, medium, large and overall farms (per quintal)
59.45 per cent for large farm size and 60.20 per cent for overall farm size.

**Constraints faced in Isabgol production of sample farmers in the study area**

Farmers in the study area were inquired about the different constraints faced in Isabgol production and their responses were analyzed using Garett ranking (Henry Garret). The highest Garett score 68 was found for the problem related to crop damage by pest and diseases during fluctuation in weather condition and it was observed to rank first among all the problems. Lack of credit availability and requirement during crop grown period received the Garett score of 66 which was rank second among all the problems. Garett score problem related to lack of technical knowledge was found to be 47 at rank third followed by lack of good seed availability at rank fourth. The table 8 presents in detail.

**CONCLUSION**

Cost and returns of Isabgol cultivation was found higher on large, medium and small farmers. The cost of cultivation of Isabgol was found highest ₹ 38407.96 on large farm, followed by ₹ 34132.15 on medium size farm, ₹ 31281.96 on small farm and

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**Table 5:** Farms business income, family labor income and farm investment income of Isabgol cultivation of small, medium, large and overall farmers (₹/ha)

| Sl. No. | Landholding | Farm Business income | Family labor income | Farm investment income | Gross return | Net return | Benefit-cost ratio |
|--------|-------------|----------------------|---------------------|------------------------|--------------|------------|-------------------|
| 1      | Small       | 29454.17             | 23904.32            | 26118.19               | 51850.3      | 20568.04   | 1.63              |
| 2      | Medium      | 30551.91             | 24971.66            | 27548.22               | 56100.2      | 21967.85   | 1.64              |
| 3      | Large       | 34660.64             | 29167.31            | 31685.64               | 64600        | 26192.31   | 1.68              |
| 4      | Overall     | 31555.57             | 26014.43            | 28450.68               | 57516.83     | 22909.40   | 1.65              |

*Source: Researcher’s own computation from Primary data.*

**Table 6:** Cost of production, operational cost and overhead cost of Isabgol cultivation of different farmers (₹/ha)

| Sl. No. | Farmers | Cost of production (per quintal) | Operational cost/variable cost | Fixed cost/Overhead cost |
|--------|---------|----------------------------------|------------------------------|--------------------------|
| 1      | Small   | 5128.19                          | 23415.45                     | 7866.51                  |
| 2      | Medium  | 5094.35                          | 25951.88                     | 8180.35                  |
| 3      | Large   | 5053.64                          | 30028.03                    | 8379.66                  |
| 4      | Overall | 5092.06                          | 26465.12                    | 8142.17                  |

*Source: Researcher’s own computation from Primary data.*

**Table 7:** Cost-Benefit Ratio of Isabgol cultivation (in percent)

| Sl. No. | Particular       | Small | Medium | Large | Overall |
|--------|------------------|-------|--------|-------|---------|
| 1      | Operational Cost Ratio | 45.15 | 46.25  | 47.10 | 46.16   |
| 2      | Fixed Cost Ratio  | 15.17 | 14.58  | 12.94 | 14.23   |
| 3      | Gross Cost Ratio  | 60.33 | 60.84  | 59.45 | 60.20   |
| 4      | Input-Output Ratio| 165.75| 164.36 | 168.19| 166.19  |

*Source: Researcher’s own computation from Primary data.*

**Table 8:** Constraints in Isabgol production by sample farmers in the study area

| Sl. No. | Production related problems | Garett Score | Rank |
|--------|----------------------------|--------------|------|
| 1      | Lack of good seed availability | 44           | IV   |
| 2      | Damage by pest and diseases | 68           | I    |
| 3      | Lack of credit availability and requirement | 66 | II |
| 4      | Lack of technical knowledge | 47           | III  |
| 5      | Higher labor cost | 25           | V    |

*Source: Researcher’s own computation from primary data.*
34607.27 on overall farm size. The cost of cultivation increases as farm size increases. There is significant difference were found in cost of Isabgol cultivation on small, medium and large farm. The cost of production of Isabgol was found higher ₹ 5128.19 on small farm followed by ₹ 5094.35 medium and ₹ 5053.64 per quintal on large size farm. Benefit Cost (BC) Ratio was found higher on large farm followed by medium and small farm. The benefit cost ratio was found 1.65 on overall farm size it indicate cultivation of Isabgol crop is beneficial for the farmers. Farm business income, family labor income, farm investment income, Gross return and Net return income was found highest on large farm followed by medium size farm and small size farm. On overall farm size farm business income was ₹ 31555.57, family labor income was ₹ 26014.43, and farm investment income was ₹ 28450.68 Gross return was ₹ 57516.83 and Net return income was ₹ 22909.40. The most important constraints identified of the production of Isabgol was damage by pest and diseases of crop followed by lack of credit availability.

Policy Implication

The government should provide training and extension activities to train the farmers for the management of the pest and diseases of Isabgol crop during unfavorable climate to reduce losses of crop and to increase the production of crop for better return for the farmers. The economics of crop was found beneficial for the farmers in term of returns. So farmers should encourage towards opportunities of agribusiness for this crop. Government should emphasized on releasing high yielding and diseases resistant variety. Credit facilities should be avail to the needy farmers to cultivate this crop on large size farm of the farmers.

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