*Ann. Agric. Res. New Series Vol. 38 (4) : 457-463 (2017)*

# Cost analysis of fenugreek cultivation in Rajasthan

**Deepa K. Kumawat*, S.S. Jheeba and R.C. Kumawat**

*Department of Agricultural Economics, S.K.N. College of Agriculture, SKN Agriculture University, Jobner, Jaipur-303 329, Rajasthan*
*e-mail: deepakumarikumwat@gmail.com*

Received : March 2017 ; Revised Accepted: July 2017

**ABSTRACT**

Rajasthan is one of the major fenugreek producing states. In 2012-13, the total area under fenugreek in Rajasthan state was 82.36 thousand hectares and produced 87.38 thousand tones of fenugreek. Costs in agriculture play a significant role in making the farm sector economically viable and feasible under the pressure of continuous rise in input prices. The present study was aimed to estimate the cost of cultivation of fenugreek in the state of Rajasthan. Shri-Madhopur mandi (Sikar) and Chomu mandi (Jaipur) were selected on the basis of highest arrivals of fenugreek production during the past three years. The fenugreek growing farmers of the selected villages were divided into marginal, small, semi-medium, medium and large. The primary data were collected from the producers. Per hectare average total cost (cost $c_2$) of cultivation, operational costs on overall basis and overhead cost were ₹ 23827.81, ₹ 16902.87 and ₹ 6924.94, respectively. Per rupee return from cultivation was ₹ 1.92 and overall cost of production per quintal was ₹ 1128.04. Herewith, arrangement of co-operative marketing societies and enrollment of farmers to these societies may be better alternative to meet the financial obligations.

**Key words**: Cost of cultivation, fenugreek, Rajasthan.

Agriculture continues to be the backbone of Indian economy. Agriculture sector employ 58.2% of the total workforce. It contributed 13.7% of Gross Domestic product (GDP) and accounted for about 13.08% share of total value of country's export during 2012-13 (www.pib.nic.in). Horticulture, being one of the important sectors of Indian agriculture, plays an important role in the economy of the country. Currently horticulture contributes 30.04% of agricultural GDP (www.icar.org.in).

India has been known from time immemorial times as the land of spices. India had a virtual dominance in the international spices trade. India still continues to be the largest producer, consumer, and exporter of spices in the world.

Out of the 109 spices listed by the International Organization for Standardization (ISO), India produces as many as 63 owing to its varied agro-climatic regions. Out of the total 63 spices grown in India, 20 are classified as seed spices with 36% share in area and 17% share in production of total spice in India (Annual Report, 2012-13, NRCSS, Ajmer). Main seed spices of India are coriander, cumin, fennel, fenugreek, dill, ajwain, celery, anise nigella and caraway. Seed spice crops are extensively cultivated in the arid and semi arid region of India during *rabi* season covering an area of 12.20 lakh ha with production of 10.58 lakh tones annually (www.indianspices.com).

Rajasthan is the major seed spices producing state. It accounted for 57.7% of the total area and 55.5% of the total production of seed spices in the country (based on the quinquennial average)

*Corresponding Author : Ph.D. Research Scholar

average of 2008-09 to 2012-13. The main seed spices grown in the state are coriander, cumin, fennel, fenugreek and ajwain.

Rajasthan, Gujarat, Uttar Pradesh and Uttaranchal are the major fenugreek producing states of the country which together accounted more than 90% of the total area and total production of fenugreek in the country. In 2012-13, the total area under fenugreek in Rajasthan state was 82.4 thousand ha which account for 88.5% of the total area and produced 87.38 thousand tones of fenugreek, which accounted for 77.4% of the total production under fenugreek in the country. The state has great potential for increasing the productivity and production of fenugreek seed to meet out the growing export demand (Annual Report 2012-13, NRCSS, Ajmer).

Costs in agriculture play a significant role in making the farm sector economically viable and feasible under the pressure of continuous rise in input prices. The level of input use and their prices affect the profitability of the crop enterprise. This mechanism needs to be critically examined for formulating effective policies in relation to costs and output prices for understanding the income path in the farm sector (Gote *et al.*, 2010; Niranjan *et al.*, 2011; Shah *et al.*, 2006). As such there is a need to study the costs of and returns from fenugreek crop in the state. Keeping the above facts in view, the present study was aimed to estimate the cost of cultivation of fenugreek in the state of Rajasthan.

## Methodology

Two districts Sikar and Jaipur were selected randomly for study of cost of cultivation. One regulated market from each of these two districts, Shri-Madhopur mandi (Sikar) and Chomu mandi (Jaipur) were selected on the basis of highest arrivals of fenugreek production during the past three years. Separate lists of all the villages falling within the catchment area of the regulated markets were prepared. Three villages from each of the lists so prepared were randomly selected in proportion.

A list of all the fenugreek growing farmers of the selected villages was prepared from the information provided by the village patwaries. The total number of fenugreek growing farmers in the sample villages was 261 and 354, in Sikar and Jaipur districts, respectively. All the farmers were divided into following five size groups on the basis of size of their land holdings; marginal (less than 1 hectare), small (1-2 ha), semi-medium (2-4 ha), medium (4-10 ha), large (10 ha and above). The cumulative total of fenugreek growing farmers in selected village was 615, from which a sample of 150 farmers was selected on the basis of systematic sampling. The numbers, thus, obtained were 23 (marginal), 35 (small), 41 (semi-medium), 34 (medium) and 17 (large) farmers of selected village.

The primary data in respect of cost of cultivation, cost of production, returns from fenugreek were collected from the producers through personal interview method with the help of a pretested schedule specifically prepared for the purpose.

The cost of cultivation for fenugreek was worked out by considering the cost of hired human labour, owned machine labour, family labour, hired machine labour, owned seed, purchased seed, owned farm yard manure, purchased from yard manure, fertilizer and insecticides, irrigation charges, land revenue, interest on working capital, depreciation, miscellaneous expenses, rent paid for leased in land, interest on fixed capital and rental value of owned land.

**Estimation of cost for irrigation:** The cost of electricity / diesel was computed for the actual hours of use for a crop based on per hour consumption and prevailing prices which were paid by the farmers.

**Interest on working capital:** The interest was calculated at the 7% per annum for half of the length of crop production period (*i.e.* for 3 months).

**Depreciation:** Depreciation of assets was calculated by using the straight line method as follows (Varghese, 2007):

$$\text{Depreciation} = \frac{\text{Purchase price of an asset - junk value}}{\text{Number of useful years of life (expected life)}}$$

After calculating the total annual depreciation on the various assets of the farm, the depreciation for a particular crop was computed. This was calculated as follows:

$$\text{Depreciation for crop 'X'} = \frac{\text{Total annual depreciation}}{\text{Total cropped area}} \times \text{Area under crop 'X'}$$

**Interest on fixed capital:** Interest on fixed capital was charged at the rate of 12% per annum.

**Rental value of owned land:** It was calculated on the basis of prevailing rates in the sample villages which were one fifth of the gross product.

**Cost concepts:** In order to compute the returns to different factors of production, the various cost items were categorized into following cost groups (Singh *et al.*, 2010):

| Cost groups | Items of cost included |
|---|---|
| Cost $A_1$ | Sum of variable cost items that actually incurred in production |
| Cost $A_2$ | Cost $A_1$ + rent paid for leased in land |
| Cost $B_1$ | Cost $A_1$ + interest on fixed capital |
| Cost $B_2$ | Cost $B_1$ + rent paid for leased in land + rental value of owned land |
| Cost $C_1$ | Cost $B_1$ + value of family labour |
| Cost $C_2$ | Cost $B_2$ + value of family labour |

*Operational cost (O.C.):* Cost $A_1$ - Land revenue - Depreciation + Family labour charge

*Over-head cost (O.H.C.):* Cost $C_2$ - Operational cost

Cost of production = (Cost of cultivation – Value of by product) / Quantity of main product

**Income measures**

*Gross income (G.I.):* $Q_m \times P_m + Q_b \times P_b$; Where, G.I. = Gross income; $Q_m$ = Quantity of main product, $P_m$ = Price of main product; $Q_b$ = Quantity of by-product, $P_b$ = Price of by-product.

*Farm business income (F.B.I.):* Gross income - Cost $A_2$

*Returns, over variable cost (R.O.V.C.):* Gross income – Total variable cost

*Family labour income (F.L.I.):* Gross income – Cost $B_2$

*Net income (N.I.):* Gross income – Total cost (cost $C_2$)

*Return per rupee (R.P.R.):* Gross income / Total cost (cost $C_2$) (Bakawat, 1991)

## Results and Discussion

Various components of the total costs (operational costs + overhead costs) incurred in the cultivation of fenugreek by sample farmers in state of Rajasthan are presented in table 1.

**Operational costs:** It is revealed from the table 1 that among the various components of operational cost incurred in the cultivation of fenugreek, human labour was the major component of expenditure on sample farms. It accounted for 28.8, 27.0, 25.4, 23.2 and 21.5% of the total cost on marginal, small, semi-medium, medium and large farms, respectively. It was observed that the share of human labour was the maximum on marginal farms followed by small, semi-medium, medium and large farms (the lowest share). The overall share of human labour was 25.3% of the total cost. Its share was found to decrease with the increase in size of land holding. Machine labour was the second important item of operational cost. On an average, the share of machine labour in total cost was 21.1%. Its share increased with the increase in farm size. The overall share of manure was 7.7%. Its share was maximum 8.8% on marginal farms and minimum 6.4% on large farms. The share of this component was found to decrease with the increase in size of land holdings.

Seed and Irrigation charges accounted for 5.47 and 4.48% to the total cost, respectively. The share of seed was maximum (6.06%) on large farms and minimum (5.01%) on marginal farms. The share of irrigation charges varied from 3.79% on large farms to 5.56% on marginal farms. The overall share of fertilizers, plant protection measures and interest on working capital was 3.91, 2.18 and 0.86%, respectively of the total cost (Cost $C_2$).

It was observed from the results that the share of manures, irrigation charges and human labour cost in total cost decreased with the increase in size of holding whereas, the share of costs of machine labour, seed, fertilizers, interest on working capital and plant protection measures increased with the increase in the size of land holding.

**Overhead costs:** Among the various components of overhead costs, rental value of owned land was the major component of expenditure on sample farms. Rental value of owned land share was 20.79, 19.78, 18.75, 18.69 and 18.40% of the total cost (Cost $C_2$) on marginal, small, semi-medium, medium and large size farms, respectively. The overall share of rental value of owned land was 19.22% of the total cost. In absolute terms, it amounted to ₹ 4580/ha. On overall basis, the share of depreciation was 7.49%. Its share was maximum (9.30%) on large farms and minimum (4.16%) on marginal farms. On an average interest on fixed capital and land revenue was accounted for, 2.23 and 0.13% respectively of the total cost.

**Cost groups:** Various types of costs included in the cultivation of fenugreek are presented in table 2. It is evident from the table that on an average over all cost of cultivation (Cost $C_3$) per hectare of fenugreek cultivation was ₹ 26210.6. Among the different size groups of farms, it was ₹ 24386.8 on marginal, ₹ 25738.6 on small, ₹ 26478.0 on semi-medium, ₹ 26999.1 on medium and ₹ 27428.1 on large farms in the study area. Further, the cost of cultivation of fenugreek was highest on large farms followed by medium,

**Table 1. Components of total costs incurred in cultivation of fenugreek in the state of Rajasthan during 2010-2011.**

| Particulars | Size group | | | | | Over all |
|---|---|---|---|---|---|---|
| | Marginal | Small | Semi-medium | Medium | Large | |
| **(A) Operational cost** | | | | | | |
| Machine Labour | 4307.5 | 4705.5 | 5055.5 | 5429.1 | 5690.0 | 5015.7 |
| | (19.43) | (20.11) | (21.00) | (22.12) | (22.82) | (21.05) |
| Seed | 1110.1 | 1217.7 | 1283.6 | 1438.7 | 1511.1 | 1302.6 |
| | (5.01) | (5.20) | (5.33) | (5.86) | (6.06) | (5.47) |
| Manures | 1954.8 | 1927.0 | 1858.3 | 1749.7 | 1602.6 | 1835.5 |
| | (8.82) | (8.24) | (7.72) | (7.13) | (6.43) | (7.70) |
| Fertilizers | 722.7 | 825.7 | 966.4 | 1041.5 | 1138.5 | 932.7 |
| | (3.26) | (3.53) | (4.02) | (4.24) | (4.57) | (3.91) |
| Plant protection measures | 288.8 | 392.3 | 455.3 | 685.9 | 918.1 | 519.8 |
| | (1.30) | (1.68) | (1.89) | (2.79) | (3.68) | (2.18) |
| Irrigation charges | 1232.3 | 1143.1 | 1047.5 | 967.0 | 945.5 | 1068.3 |
| | (5.56) | (4.89) | (4.35) | (3.94) | (3.79) | (4.48) |
| Interest on working capital | 168.2 | 185.7 | 204.7 | 228.4 | 249.8 | 205.1 |
| | (0.76) | (0.79) | (0.85) | (0.93) | (1.00) | (0.86) |
| Human labour | 6375.7 | 6310.1 | 6124.7 | 5695.6 | 5361.4 | 6022.7 |
| | (28.76) | (26.97) | (25.44) | (23.21) | (21.50) | (25.28) |
| Total operating cost | 16160.6 | 16707.4 | 16996.3 | 17236.2 | 17417.3 | 16902.8 |
| | (72.89) | (71.4) | (70.61) | (70.22) | (69.85) | (70.94) |
| **(B) Over head cost** | | | | | | |
| Depreciation | 922.9 | 1540.9 | 1966.4 | 2129.1 | 2318.7 | 1783.9 |
| | (4.16) | (6.59) | (8.17) | (8.67) | (9.30) | (7.49) |
| Rental value of owned land | 4608.7 | 4628.5 | 4512.2 | 4588.2 | 4588.2 | 4580.0 |
| | (20.79) | (19.78) | (18.75) | (18.69) | (18.40) | (19.22) |
| Land revenue | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 |
| | (0.14) | (0.13) | (0.12) | (0.12) | (0.12) | (0.13) |
| Interest on fixed capital | 447.6 | 491.7 | 565.8 | 560.9 | 580.3 | 530.9 |
| | (2.02) | (2.10) | (2.35) | (2.29) | (2.33) | (2.23) |
| Total over head cost total | 6009.2 | 6691.2 | 7074.5 | 7308.3 | 7517.3 | 6924.9 |
| | (27.11) | (28.6) | (29.39) | (29.78) | (30.15) | (29.06) |
| Cost/Cost $C_2$ (A+B) | 22169.8 | 23398.6 | 24070.8 | 24544.6 | 24934.6 | 23827.8 |
| | (100) | (100) | (100) | (100) | (100) | (100) |

Figures in parentheses are per cent of total cost (cost $C_2$); (All values are in ₹/ha)

semi-medium, small and marginal farms. It was found to increase with the increase in size of farm.

The operational cost of fenugreek cultivation on overall basis was ₹ 16902.9. It accounted for 76.24% of the total cost (Cost $C_2$). This cost varied on different size group of farms. The operational cost was ₹ 16160.6 on marginal, ₹ 16707.5 on small, ₹ 16996.4 on semi-medium, ₹ 17236.2 on medium and ₹ 17417.3 on large farms. In absolute terms, it also increased with the increase in size of land holdings. The operational cost exceeded the overhead cost on all the size groups of farms.

On an average, the overhead cost was ₹ 6924.9. In absolute terms, the overhead cost also increased with the increase in farm size. It was ₹ 6009.2 on marginal, ₹ 6691.2 on small, ₹ 7074.5 on semi-medium, ₹ 7308.4 on medium and ₹ 7517.4 on large sized farms. On an average the cost $A_1$, $A_2$, $B_1$, $B_2$, $C_1$ and $C_2$ were ₹ 13744.4, ₹ 13744.4, ₹ 14275.3, ₹ 18855.3, ₹ 19247.8 and ₹ 23827.8, respectively. The cost $A_1$ was same as cost $A_2$ on all the size groups of farms because none of the sample farmers leased-in any land for cultivation of fenugreek in the study area.

Cost $B_1$ was ₹ 11185.4, ₹ 12862.5, ₹ 14464.4, ₹ 16000.5 and ₹ 17458.5, respectively on marginal, small, semi-medium, medium and large sized farms. Cost $B_2$ was ₹ 15794.1, ₹ 17491.0, ₹ 18976.6, ₹ 20588.7 and ₹ 22046.7, respectively on marginal, small, semi-medium, medium and large sized farms. Further, cost $B_1$ and $B_2$ were found to increase with the increase in farm size. Cost $C_1$ was ₹ 17561.1 on marginal farms, ₹ 18770.1 on small farms, ₹ 19558.7 on semi-medium farms, ₹ 19956.38 on medium farms and ₹ 20346.4 on large sized farms. Cost $C_2$ that is total cost ranged from as low as ₹ 22169.8 on marginal farms to as high as ₹ 24934.7 on large farms. Thus results shows that cost $A_1$, $A_2$, $B_1$, $B_2$, $C_1$, $C_2$ and $C_3$ increase with increase in farm size.

**Returns:** The per hectare returns from cultivation of fenugreek crop on different size groups of farms have been presented in the table 3. The table reveals that among the various components of returns, overall gross income was ₹ 45807.5 per hectare from fenugreek cultivation. It was ₹ 40336.5 on marginal, ₹ 43021.3 on small, ₹ 45805.7 on semi-medium, ₹ 48959.5 on medium and ₹ 52645.2 on large sized farms. It was observed that the gross income from fenugreek cultivation increased with the increase in size of land holdings.

**Table 2. Cost groups in cultivation of fenugreek in the state of Rajasthan during 2010-2011.**

| Particulars | Size group | | | | | Over all |
|---|---|---|---|---|---|---|
| | Marginal | Small | Semi-medium | Medium | Large | |
| Total operating cost | 16160.6 | 16707.5 | 16996.4 | 17236.2 | 17417.3 | 16902.9 |
| | (72.89) | (75.36) | (76.66) | (77.75) | (78.56) | (76.24) |
| Total over head cost | 6009.2 | 6691.2 | 7074.5 | 7308.4 | 7517.4 | 6925.0 |
| | (27.11) | (30.18) | (31.91) | (32.97) | (33.91) | (31.24) |
| Cost $A_1$ | 10737.8 | 12370.7 | 13898.6 | 15439.5 | 16878.1 | 13744.4 |
| | (48.43) | (55.80) | (62.69) | (69.64) | (76.13) | (62.00) |
| Cost $A_2$ | 10737.8 | 12370.7 | 13898.6 | 15439.5 | 16878.1 | 13744.4 |
| | (48.43) | (55.80) | (62.69) | (69.64) | (76.13) | (62.00) |
| Cost $B_1$ | 11185.4 | 12862.5 | 14464.4 | 16000.5 | 17458.5 | 14275.3 |
| | (50.45) | (58.02) | (65.24) | (72.17) | (78.75) | (64.39) |
| Cost $B_2$ | 15794.1 | 17491.0 | 18976.6 | 20588.7 | 22046.7 | 18855.3 |
| | (71.24) | (78.90) | (85.60) | (92.87) | (99.44) | (85.05) |
| Cost $C_1$ | 17561.1 | 18770.1 | 19558.7 | 19956.4 | 20346.4 | 19247.8 |
| | (79.21) | (84.67) | (88.22) | (90.02) | (91.78) | (86.82) |
| Cost $C_2$ | 22169.8 | 23398.7 | 24070.9 | 24544.6 | 24934.7 | 23827.8 |
| | (100) | (100) | (100) | (100) | (100) | (100) |
| Cost $C_3$ | 24386.8 | 25738.6 | 26478.0 | 26999.1 | 27428.1 | 26210.6 |

Figures in parentheses are per cent of total cost (cost $C_2$); (All values are in ₹/ha)

**Table 3. Returns (Rs/ha) from cultivation of fenugreek in the state of Rajasthan during 2010-2011.**

| Particulars | Size group | | | | | Over all |
|---|---|---|---|---|---|---|
| | Marginal | Small | Semi-medium | Medium | Large | |
| Gross income | 40336.5 | 43021.3 | 45805.6 | 48959.7 | 52645.2 | 45807.4 |
| Farm business income | 29598.7 | 30650.6 | 31907.0 | 33520.2 | 35767.1 | 32063.0 |
| Return over operating cost | 24175.9 | 26313.8 | 28809.3 | 31723.4 | 35227.9 | 28904.5 |
| Family labour income | 24542.4 | 25530.3 | 26829.0 | 28371.0 | 30598.5 | 26952.1 |
| Net income | 18166.7 | 19622.6 | 21734.7 | 24415.1 | 27710.5 | 21979.6 |
| Return per rupee | 1.82 | 1.84 | 1.90 | 1.99 | 2.11 | 1.92 |
| Cost of production (per qty.) | 1163.3 | 1157.7 | 1140.7 | 1098.5 | 1047.5 | 1128.0 |

(All values are in ₹/hec.)

Farm business income was ₹ 29598.7, ₹ 30650.6, ₹ 33520.2, ₹ 33520.2 and ₹ 35767.1, respectively on marginal, small, semi-medium, medium and large categories of farms. Overall, the farm business income was ₹ 32063.0. It was also found to increase with the increase in farms size. The net income per hectare was found highest on large farms followed by medium, semi-medium, small and marginal farms.

The overall net income from fenugreek cultivation was ₹ 21979.6. The net income was highest ₹ 27710.5 on large farms and lowest ₹ 18166.7 on marginal farms. On an average, returns over operating cost, family labour income and returns per rupee were ₹ 28904.5, ₹ 26952.1 and ₹ 1.9, respectively. Per rupee return was maximum (₹ 2.1) on large farms and minimum (₹ 1.8) on marginal farms. Cost of production per quintal of fenugreek was ₹ 1163.3 on marginal, ₹ 1157.7 on small, ₹ 1140.7 on semi-medium, ₹ 1098.51 on medium and ₹ 1047.5 on large farms. The overall cost of production per quintal of fenugreek was ₹ 1128.0. Further, the cost of production of fenugreek was lowest ₹ 1047.5 on large farms and highest ₹ 1163.3 on marginal farms.

## Conclusions and Recommendation

Per ha average total cost (cost $C_2$) of cultivation of fenugreek on state of Rajasthan was ₹ 23827.8. The operational costs on overall basis were ₹ 16902.8 and overhead cost was ₹ 6924.9. On an average, the cost $A_1$, $A_2$, $B_1$, $B_2$ and $C_1$ were ₹ 13744.3, ₹ 13744.3, ₹ 14275.3, ₹ 18855.3 and ₹ 19247.8, respectively on state of Rajasthan farms. On an average, gross income, farm business income, return over operating cost and family labour income, net income per ha of fenugreek cultivation were ₹ 45807.4, ₹ 32063.0, ₹ 28904.6, ₹ 26952.1 and ₹ 21979.6 respectively on state farms. Per rupee return from cultivation was ₹ 1.9 and overall cost of production per quintal was ₹ 1128.0.

Regarding the time of sale of fenugreek most of quantities were sold immediately after harvest to meet the financial obligations. This practice may be overcome by providing adequate credit facilities to the farmers at right time and on easy terms and conditions. Arrangements for marketing their product may be promoted through the co-operative marketing societies for better return. The farmers should be enrolled as the active members of the co-operative societies and co-operative feeling should be induced in them so that they may get better prices of their produce.

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