The economic analysis of sunflower production

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■ **ABSTRACT :** Economic analysis plays a major role in agricultural production of any country. The aim of this case study was to create awareness about economics of the irrigation farming sunflower production per hectare in Northern Transition Zone of Karnataka, India. The data were collected from the 40 randomly selected farmers, having more or less homogeneous red sandy loamy soil field, using face to face questionnaire method. The study revealed that sunflower production cost consumed total Rs. 20.92 kg^{-1} out of which labour consumption was 39.16% followed by rental value of the owned land (17.88%) and inorganic fertilizer (10.41%) in the total cost. Total labour (human labour, bullock labour and machine labour) constituted about 51.85% of the total variable cost. The results showed that cost of production, net returns over variable cost, net returns over total cost and benefit cost ratio for sunflower production were Rs.41451.23 ha^{-1}, Rs.38054.06 ha^{-1}, Rs.27911.77 ha^{-1} and 1.67, respectively.

■ **KEY WORDS :** Economic analysis, Net return; Sunflower production, Benefit Cost ratio

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Sunflower is originated in Southern United States and Mexico from where it was introduced into Europe and later into former USSR. Sunflower (Helianthus annuusL.) is an important oilseed crop in India popularly known as "Surajmukhi". The name Helianthus is derived from 'Helios' meaning 'sun' and 'anthos' meaning 'flower'. It is one of the fastest growing oilseed crops in India. In early 1970s, only about 0.1 million hectares were under sunflower cultivation, however by 2009-10, it had gone up to 1.48 million hectares of area with a production of 0.85 million tonnes in the year 2009-2010. Karnataka stands first place in both production and area of cultivation *i.e.* 35.76 per cent (0.30 million tonnes) and 53.79 per cent (0.79 million hectors) during the year 2009-2010 in the country (Source: Ministry of agriculture, Govt. of India). The present study to create clear idea of cost involved in sunflower production under irrigation farming during *Rabi* season in Northern Transition Zone (Zone 8), Karnataka, India.Economic analysis is most important consideration in agriculture; it may be in the forms, such as labour (human labour, bullock labour and machine labour), seeds, organic manure, inorganic fertilizer, plant protection chemicals, irrigation, etc (Nagaraj, 1993). Many studies have been done to evaluate the cost economics *viz.,* Madalia and Charan (1974) studied costs and returns in H-4 cotton seed production in Gujarat and reported

that the average cost of seed production was Rs. 44,688.80 per hectare. Thus, per kg cost and net profit were estimated to be Rs. 35.61 and Rs. 33.90, respectively. Kannababu and Rana (2003) studied economics of sorghum hybrid seed production in India during the *Rabi* season of 2000-2001.The estimated variable cost and fixed cost per hectare were 81 and 19 per cent, respectively in the total cost of production per hectare (Rs. 36,300) and total value of the produce was estimated at Rs. 52,750.The main objectives of this study are :

–To evaluate the fixed cost and variable cost involved in sunflower cultivation, to know the production cost share from different farm activity.

■ **METHODOLOGY**

The data were collected from the 40 randomly selected farmers, having more or similar red sandy loam type soil, using face to face questionnaire method. Twenty villages were chosen to represent the status of sunflower farm activity around HirekerurTaluk, Karnataka, India in the period of 2011-2012. The data collection involved the various operational capital inputs of 40 farmers. The capital input (total cost) separated into variable cost and fixed cost (Sandigodmath, 2007). Variable cost consists of different source of labour, seeds, organic manure, inorganic fertilizer, plant protection

chemicals, irrigation and interest on the fixed cost. On the other hand fixed cost consisted of depreciation of farm machines and equipment, rental value of owned land and interest on the fixed cost. The labour cost involved the use of human labour, bullock labour and machine labour in different activities from seed bed preparation to threshing and cleaning operation of the crop. The human labours involved the total men and women labour, the woman working of 8 hour per day is equivalent to 65 per cent of man working day of 8 hour (Sandigodmath, 2007). For calculation of the cost, average of all 40 farmers pattern of labour used for the different farm activity in sunflower production is shown in the Table 1.

The land preparation involves the use of bullocks, machines and farm equipment. After land preparation Farm Yard Manure (FYM) was transformed using machines and spread over the field by using men labour. Generally sowing was done using two indigenous bullock drown ploughs with two men operators and women labour used for the line sowing. Application of the inorganic fertilizer was applied one or two time depending on the farmer field condition and their convenience by manually. When crop reached the seedling stage, one or two times intercultural operations were done. Manual weeding was also done depending on the field weed dense. Surface irrigation method was used to irrigate the field by man labour supervision, the source of the irrigation water met out by the tube wells. During the different crop stages, the pesticides were used one or two times based on the need of crop and their convenient, with a manually operating knapsack sprayer. After crop reached the harvesting stage, farmers were going for manual harvesting using the sickle and gathered the heads to one place for making convenient for threshing and cleaning operation by using multi-crop thresher or sunflower thresher.

The different variable cost components such as labours (Rs.100 per day of 8 working hour for human), seeds (Rs. 400 per kg), organic manure (Rs.900 Per tonne), inorganic fertilizer (Rs.18.35, 26.66 and 28.78 per kg for Nitrogen, Phosphorus and potassium, respectively) and plant protection chemicals (Rs.220 Per lit) was calculated at the prevailing rate in the locality. Irrigation water met out by the tube wells by using the electric motor pump setup (average horse power of motor is 7.5 hp) , so the cost involved in the irrigation was taken in the form of units of electricity used *i e.* 445.58 kW-h, cost per unit (kW-h) electricity was Rs.1.1(standardized by local power supply authority). The interest on the total working capital (variable and fixed cost) was taken 11 per cent.

In the fixed cost components, depreciation per hour on each capital equipment and machinery owned by the farmers was calculated separately based on the purchase value using the straight line method.The average life of an asset as indicated by each farmer was used in the computation of the depreciation. The average value of an asset after its useful life (time value) was considered based on the value expressed by the respondents. The depreciation cost of each equipment apportioned based on its usage time. Other component of the fixed cost is rental value of land which was calculated at the prevailing rate per hectare per crop season in the locality for the period for farm business analysis.

■ RESULTS AND DISCUSSION

From Table 1, results showed that weeding and intercultural operation is the first most labour intensive operation *i.e.* 217.59 h, which can be minimised by using selective herbicides and carry out the weeding at right time. Harvesting is the second most labour intensive operation *i.e.* 103.46 h, can be minimised by using combines. So that, it saves the cost involved in the threshing and cleaning operation.In the present case, surface flooding irrigation method was followed to irrigate the crop, these having lower water use efficiency. This can be improving by switching to

Sr. No.	Operations	Male, man-hour	Female, female-hour	Total human labour, hour (per cent)[*]	Bullock labour, pair-hour	Machine labour, machine-hour
	Table 1 : Pattern of labour use in sunflower production per hectare					
1.	Land preparation	13.91	0	13.91 (2.44)	2.96	10.95
2.	FYM/compost (transportation and application)	11.41	0	11.41 (2.00)	0	4.11
3.	Sowing	20.70	47.46	68.16 (11.96)	0	0
4.	Application of inorganic fertilizers	11.49	0.00	11.49 (2.02)	0	0
5.	Weeding and intercultural operation	48.44	169.15	217.59 (38.18)	0	0
6.	Irrigation	79.64	0	79.64 (13.97)	0	0
7.	Plant protection chemicals application	29.54	0	29.54 (5.18)	0	0
8.	Harvesting	31.04	72.42	103.46 (18.15)	0	0
9.	Threshing and cleaning	10.42	24.31	34.73 (6.09)	0	6.53
10.	Total	256.59	313.34	569.93 (100)	29.56	21.59

[*]The values in the bracket showing the per cent values of the total human labour

new technique like alternate furrow irrigation method or drip irrigation method which saves the labour usage for supervision of the irrigation and can also save labour involvement in the manual inorganic fertilizer application by adopting the furtigation along with the drip irrigation method of irrigation (Singh and Mittal, 1992).

From Table 2,the total cost involved for cultivation was Rs. 41451.23 per hectare. In this total cost, major contribution from variable cost was about 75.53 per cent. In variable cost, machine labour cost was more(Rs. 8636.00 per hectare) due to predominant usage in the seed bed preparation by following the different tillage operations such as ploughing fallowed by smoothing with a 9 or 5 tyne cultivator and finally with blade harrows for sowing operation with tractor machine. These three or four operations can be achieved by adopting proper minimum tillage techniques by using rotavator cum seed drill or zero-till-drill at right time(Singh and Mittal, 1992). Next most contribution to total cost from the human labour due to involvement of human in all the activity as described in Table 1.The expense from inorganic fertilizers and organic manure

was around 10 per cent and (3.54%). The remaining variable costs included outlay in seeds for sowing,irrigation, other material charges (involves cost for kurpi, sickle, spade, plastic sheet to cover the harvested ear heads or threshing work etc.), plant protection chemicals, and interest on working capital (8.52%). Similarly in case of fixed cost, rental value of the land was major cost (about Rs. 3000 per acre as per locality) followed by depreciation on machinery and interest on fixed capital.

From Table 3,the total cost incurred for sunflower seed production was Rs.41451.23 per hectare, in this Rs.31308.94 was variable cost (75.53%) and fixed cost was Rs.10142.23 (24.47%). The average yield obtained from all the farmers was 1,981.80 kgper hectare. The price per kg of yield of sunflowerseeds wasRs. 35. The average gross return found per ha was Rs. 69363.00. Net returns over variable cost were Rs.38054.06 (54.86%) and net returns over total cost were Rs. 27911.77(40.24%) per hectare. The cost of production per kg of sunflower seeds was Rs.20.92 (Rakhunde, 1974). The benefit cost ratio was 1.67 in sunflower production.

Sr. No.	Particulars	Amount, (Rs./ha)	Percentage, (%)
Table 2: Cost of cultivation for sunflower production per hectare in the year 2011-12			
A	Variable cost		
1.	Labour	16234.22	39.16
	Human labour	5753.22	13.88
	Bullock labour	1845.00	4.45
	Machine labour	8636.00	20.83
2.	Seeds	1468.00	3.54
3.	Organic manure,	4269.50	10.30
4.	Inorganic fertilizer	4313.34	10.41
	Nitrogen	1832.04	4.42
	Phosphorous	539.95	1.30
	Potassium	1941.35	4.68
5.	Plant protection chemicals	303.60	0.73
6.	Irrigation,	490.14	1.18
7.	Other material charges	700.00	1.69
8.	Interest on working capital	3530.14	8.51
	Total variable cost	31308.94	75.53
B	Fixed cost		
1.	Depreciation cost, machinery	1727.20	4.16
2.	Rental value of the owned land	7410.00	17.87
3.	Interest on fixed cost	1005.09	2.42
	Total fixed cost	10142.29	24.45
	Total cost of cultivation	41451.23	100.00

Table 3 : Return structure in sunflower seed production

Particulars	Unit	Quantity/amount	Percentage
Costs			
Variable cost	Rs.	31308.94	75.53
Fixed cost	Rs.	10142.29	24.47
Total cost	Rs.	41451.23	100.00
Returns			
Yield	kg	1981.80	-
Price	Rs./kg	35.00	-
Gross returns	Rs.	69363.00	100.00
Net returns over variable cost	Rs.	38054.06	54.86
Net returns over total cost	Rs.	27911.77	40.24
Cost of production	Rs./kg	20.92	-
Benefit cost ratio	-	1.67	-

Conclusion :

The results concluded from the study were:

– The maximum labour intensive operation in weeding and intercultural operation followed by harvesting and irrigation.

– Even though total machine hour was less(21.59 hour), the cost added to total cost from this source were maximum followed by the rental value of the land and human labour(this was cheap labour source used about 569.9 hour).

– The net return over total cost in sunflower production was Rs. 27910 *i.e.* 40 per cent of the gross return with cost benefit ratio of 1.67.

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■ REFERENCES

Kannababu, N. and Rana, B. S. (2003). The economics of sorghum hybrid seed production. *Seed Res.*, **31**(1): 1-7.

Madalia, V. K. and Charan, A.S. (1974). A study of development of Hybrid-4 cotton in Gujarat and its production economics. *Indian J. Agric. Econ.*, **29**: 154-162.

Nagaraj, T. (1993). An economic analysis of cropping systems in Tungabhadra Project Command Area. M.Sc. (Ag.) Thesis, University of Agricultural Sciences, Dharwad, KARNATAKA (INDIA) .

Rakhunde, D.D. (1974). Economics of seed production in H-4 cotton in Parbhani district. M.Sc. (Ag.) Thesis, Maharashtra Agricultural University, Parbhani, M.S. (INDIA) .

Sandigodmath, Nirmala M. (2007). Sunflower seed production under contract farming In HaveriDistrict, Karnataka-An economic analysis. M.Sc. (Ag.) Thesis, University of Agricultural Sciences, Dharwad, KARNATAKA (INDIA).

Singh, Surendra and Mittal, J.P. (1992). *Energy in production agriculture*, Mittal Publications Newdelhi-110059 (India), First edition, pp:1-165.

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