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Economic Analysis of Saffron Cultivation in Kashmir Valley of India

IMTIYAZ-UL-HAQ[1]
Department of Economics
University of Kashmir, Srinagar, J&K
India
SAHINA SHAFI
University of Kashmir, Srinagar, J&K
India

Abstract:

In India almost entire production of saffron comes from the valley of Kashmir. Although, interms of quality saffron produced in Kashmir valley is second only to the world's best quality produced in Spain, but ranks sixth interms of productivity among the top seven saffron producing countries of the world. It has also been observed that in Kashmir valley production as well as acreage under saffron cultivation has shrunk over the past few years causing a setback to this important activity. Some of the major causes responsible for low productivity are primarily attributed to lack of proper irrigation facilities and traditional unscientific methods of cultivation. Moreover, our study revealed a price spread of more than three hundred percent between the farm gate prices and the market prices, the advantage of which is reaped by the network of intermediaries that dominate the marketing channels in this trade. Our analysis further reveals that small/medium farms use their resources optimally relative to the large farms, which is reflected in their higher productivity and profitability ratios. On the other hand, the large farms were found to be least profitable because of their lower productivity owing to their lower labour absorption rate, due to which their overall cost of production was also lowest. The present study is an attempt to explore in detail the

[1] Corresponding author: imtiyaz786haq@gmail.com.

cost structure and the returns in the context of different farm sizes in tehsil Pampore of district Pulwama which is a dominant producer of saffron in the Kashmir valley. The returns have been captured both in absolute and relative terms, while as costs have been worked out as variable and fixed costs. Besides, the study also involves a survey of socio-economic and farm profile of the saffron growers. Finally, Cobb-Douglas production function has been employed to estimate the elasticities of output (yield per hectare) with respect to some major economic and noneconomic variables.

Key words: benefit cast-ratio**,** efficiency, gross margin, Jammu and Kashmir, productivity, production function, net margin, saffron.

1. Introduction

Saffron popularly known as golden spice is a small volume high priced legendary crop regarded as a pivotal economy regulating factor for the development of the Jammu and Kashmir economy. It is one of the important commercial activities and second largest industry after fruit production in the state. Kashmir is famous for the cultivation of saffron where it is mainly grown on Karewas in the Kharief season. Saffron growing areas of the state are concentrated in district Pulwama, Budgam, Srinagar and Doda. The hub of this activity is district Pulwama which occupies about 86 percent of the total area under saffron in the whole state of Jammu and Kashmir and out of which about 80 percent of the saffron area belongs to Tehsil Pampore alone. Cultivation of saffron around Padampore (now Pampore) in the District Pulwama of Kashmir valley dates back to 500 B.C. *(Agarwal et al.).* More than 10,000 farm families of 226 villages are associated with this crop directly or indirectly, and nearly 85 percent families associated with its cultivation are small (marginal) farmers. Saffron cultivation is highly labour intensive activity where most of the field and post harvest operations are carried out by women *(Kamli et al.).* In

our field study the human and the animal labour component together accounted for about half of the total cost of per acre production.

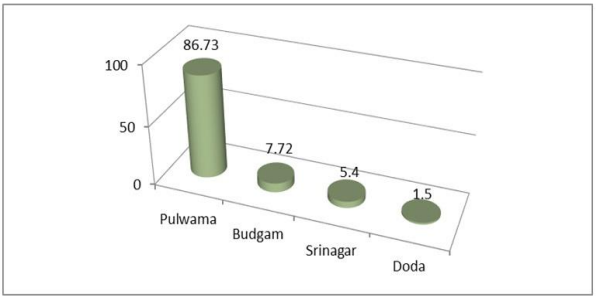

Fig. 1: Percentage Area under Saffron Cultivation in J&K.
Source: Office of the Directorate of Agriculture, Jammu and Kashmir.

During past few years saffron cultivation, however, has received a serious setback due to various economic, non-economic and climatic factors in Kashmir valley. Area under saffron cultivation has shrunk from 5707 hectares in 1996-97 to just 3883 hectares in 2004-05. Production of saffron is reported to have gone down from 173.82 quintals to 80 quintals from 1997-98 to 2004-05. There has also been a sharp fall in productivity from 3.17 Kg. per hectare to around 2.0 Kg. per hectare in 2004-05 *(Directorate of Agriculture, 2004)*. This fact almost conforms to the results of our field study where per acre productivity was found to be 0.73 Kg. (1.82 Kg. per hectare).

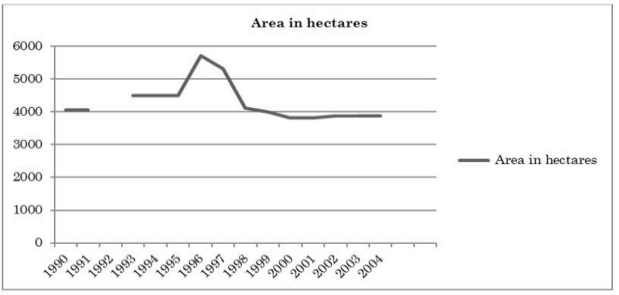

Fig. 2: Variations in area under saffron cultivation in Kashmir Valley
Source: Appendix Table 1A

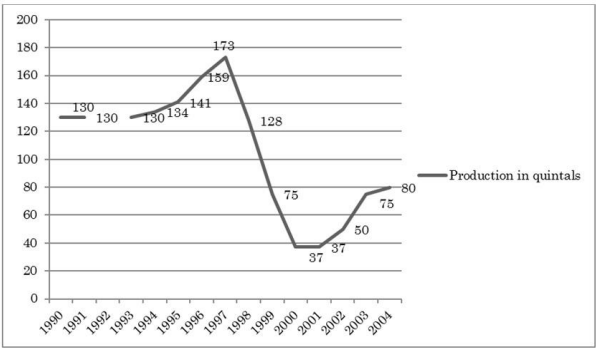

Fig. 3: Variations in Saffron Production in Kashmir Valley
Source: Appendix Table 1A

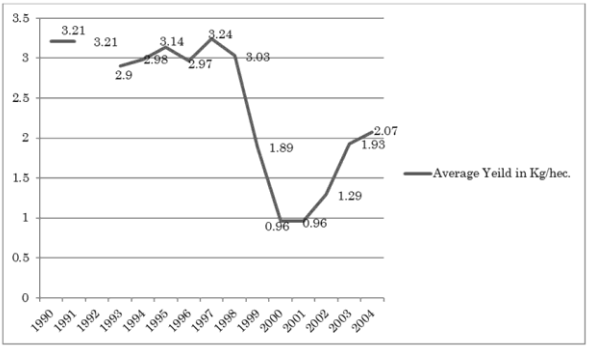

Fig. 4: Variations in Productivity in Kashmir Valley
Source: Appendix Table 1A

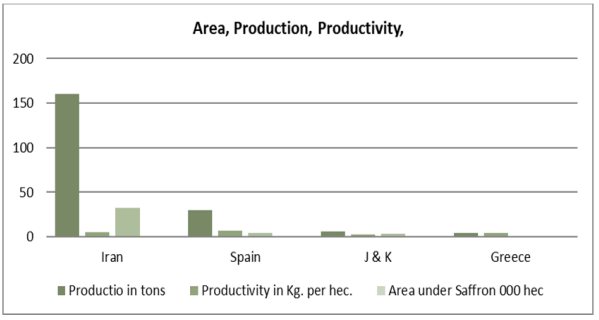

Fig. 5: International Dimensions of Saffron Cultivation
Source: Appendix Table 1A

At the international level India is reported to occupy the third place, where the entire production comes from the state of Jammu and Kashmir, contributing 4.46 tons with an average productivity of around 2.0 Kg. per hectare. The largest saffron is produced in Iran with an average production of 160 tons and average productivity of 5 Kg. per hectare. Spain is the second largest producer of saffron producing 29.15 tons with an average productivity of 6.96 Kg. per hectare. While interms of average productivity Jammu and Kashmir (India) occupies a 6th rank, as per quality Kashmir saffron is second only to that grown in Spain *(Agarwal et al.)*

2. Objectives of the Study

i. To study the cost structure and profitability of the saffron crop.
ii. To examine the relationship between farm size, productivity and profitability.

3. Data and Research Methodology

This paper is based on an analysis of the data collected through a field study conducted in tehsil Pampore of district Pulwama. The study is designed to make an analysis of cost structure, returns to investment and productivity of saffron cultivation. Since Pampore is known all over the world for the quality saffron it produces owing to its peculiar topography, suitable climatic conditions, soil and water table, it was chosen as an area of our study.

Out of a total of 29 villages from tehsil Pampore, 4 (13.79%) villages namely Konibal, Khrew, Barsoo and Pathpore were randomly selected on simple random basis. The detailed study was confined to 120 farms selecting 30 farms from each village. The design adopted for the study was a two stage stratified random sampling with village as a primary unit and the

household saffron growing crop as the secondary and ultimate unit of sampling. The present study based on these accounts does not pretend to generalize these results for the entire state. However, the empirical findings do indicate, within reasonable limits, the trends in productivity and profitability of saffron cultivation in Kashmir valley.

In order to study whether saffron cultivation is a profitable venture, we are required to study the costs and return and yield per hectare (productivity). Costs are usually thought of as the expenditures incurred in cultivation by a farmer as variable costs and fixed costs. The variable costs (human labour, mechanical labour, animal labour, fertilizers) and fixed costs (average value of the seed/corm, rental value of land, depreciation of tools and equipment) comprise the total cost of production. The analysis of the data for the empirical estimation of the above mentioned variables has been done in the context of farm sizes. For this purpose, the farms have been categorized into three classes viz., small farms with a size of less than 2 acres, medium size farms ranging between 2 to 4 acres and large farms with a size of more than 4 acres. It will be pertinent to mention here that our endeavour will also be to study whether there is any relation between the productivity and the size of holdings. A detailed cost and return analysis was worked out to study the profitability of the saffron cultivators. Information on the various components of the variable and fixed costs was obtained through a well designed open end questionnaire. Following analytical tools have been employed:

Net Returns (NR)

NR = GR – TPC where NR= net returns (profit); GR = gross revenue; TPC = total production cost

Gross Margin (GM)

GM = [(GR – TVC) ÷ GR] where GR= gross revenue; TVC = total variable cost.

Net Margin (NM)

NM = [NR ÷GR] where NR= net returns (profit); GR = gross revenue.

Benefit Cost ratio (BCR) / Net Returns per Rupee of Investment

BCR = NR÷TPC where NR= net returns (profit); TPC = total production cost

Econometric Model Specification

The Cobb-Douglas production function is the most commonly used functional form for analyzing agricultural production data. The major reasons for using this functional form are due to its mathematical properties, simplicity of computation, and interpretation. In addition, Cobb-Douglas production function is relatively simpler to estimate because of logarithmic transformation into linear form. Cobb-Douglas production function was used as the lead equation. It was linearized into a double logarithmic function to get a form amenable to practical purposes as expressed below:

$$lnY = lna + b_1 lnX_1 + b_2 lnX_2 + b_3 lnX_3 + b_4 lnX_4 + b_5 lnX_5 + b_6 lnX_6 + lnU_i$$

Where; Y = Yield per acre, X_1 = age measured in years, X_2 = education measured in years, X_3 = Saffron growing experience (years), X_4 = Fertiliser (Kgs.), X_5 = Labour (man days), X_6 = Bullock labour (days) Ui = error term which included unknown factors affecting the yield of saffron, ln = natural logarithm, a = constant, $b_1, b_2, b_3, b_4, b_5, b_6$ are the parameters to be estimated empirically.

4. Results and Discussion

Present study has been discussed under the following headings:

i. Demographic and Farm Profile
ii. Economic Analysis.

4.1. Demographic and Farm Profile of Saffron Growers

4.1.1 Age of Farmers

Age is one of the important factors that plays a vital role in the farmers' response to the adoption of new ideas and innovations

and plays an important role in agricultural activities. Table 1 shows that at the time of survey, only 16.6 percent of the farmers were found below the age of 40 years, while 80.8 percent were found in the age group of 40-60 years and just 2.5 percent under the age of 60 and above. During our interaction with the households it was observed that the role of younger generations, who are more educated and can easily adopt new ideas, is less. The role of older generation in the decision making process is more. Because of their age, they are not only the heads of the families but also the final decision makers.

Age (years)	**No. of farmers**	**Percentage**
20-40	20	16.6
40-60	97	80.8
Above 60	3	2.5
Total	120	100

Table 1: Age of Farmers
Source: Field Survey

4.1.2 Educational Level

Education plays an important role in the development of agriculture. It enhances the overall personality of an individual and helps him to think in the most efficient manner. There is a close relationship between the educational level and the adoption of agricultural innovations, which in turn increases productivity and hence more profits to the farmers. The table 2 shows the level of education of the selected households. The table reveals that 50 percent of the selected households are illiterate. About 30 percent have attained primary level education and 16.6 percent of the farmers fall into the category of secondary education. Only 3.3 percent are well educated and this is a major obstacle, as revealed below from our analysis, for production and productivity which intern brings lower returns to the farmers.

Education Level	No. of farmers	Percentage
Illiterates	60	50
Primary Education	36	30
Secondary education	20	16.6
Higher education	4	3.3
Total	120	100

Table 2: Educational Level
Source: Field Survey

4.1.3. Experience in Saffron Cultivation

Experience in saffron cultivation is very crucial for a successful crop. It requires a special knowledge regarding the choice of corm, timely and judicious application of fertilisers, preparation of beds, intercultural operations, post harvest management practices etc. The data in Table 3 obtained during our field study reveals that a majority group of the growers (more than 75%) had experience ranging between 10-20 years in cultivation of saffron.

Experience in Years	No. of farmers	Percentage
< 5 Years	03	2.5
5-10 Years	13	10.8
10-15 Years	25	20.8
15-20 Years	31	25.8
20-25 Years	38	31.6
>25 Years	10	8.3
Total	120	100

Table 3: Experience in Saffron Cultivation
Source: Field Survey

4.1.4 Sources of Irrigation

Although the potential for irrigation in Pulwama district is adequate as river Jhelum runs through the base of karewa belt of Pampore but unfortunately the irrigation system in the district is not adequately developed. The production of saffron is totally rain fed in the district. No attempts have been taken by the government for providing timely irrigation facilities to the saffron growers, so that both production and productivity

could enhance. The irrigation system in context to saffron can be understood with the help of Table 4. It shows that the whole area of saffron is rain fed in Pulwama district. Irrigation facilities at proper time are essential for increasing saffron production and productivity and consequently enhance the returns to the farmers.

Source	**No. of Farmers**	**Percentage**
Canals	-	-
Ponds	-	-
Rain	120	100
Tanks	-	-
Total	120	100

Table 4: Irrigation System
Source: Field Survey

4.1.5 Financial Sources

Among several agricultural activities saffron cultivation is said to be the most profitable and very easy to cultivate as the corm survives up to 15 years, so the farmers can easily provide more land towards its cultivation but this is not possible as saffron corms are very expensive and it becomes difficult for a poor grower to purchase corms for production. Therefore, need for borrowing arises. The sources from which these farmers received loans at the time of survey is documented in Table 5.

Source	**No. of farmers**	**Percentage**
Banks	-	-
Dalals	40	33.3
Friends/Relatives	80	66.6
Total	120	100

Table 5: Financial Sources
Source: Field Survey

It is clear from the table that among 120 respondents, 40 respondents (33.3%) received cash in advance from dalals at the time of need and 80 i.e., 66.6 percent relied on interest free

loans from their friends and relatives. No loan was taken by the sample respondents at the time of survey from banks or any other financial institution.

4.1.6 Area under Operational Holdings and Tenancy Status

It can be observed from the Table 6 that the total area under saffron cultivation of 120 households is 462.41 acres and the total area under operational holdings is 744.89 acres which means 62 percent of the total cropped area. Out of 120 sample households 52 (43.3%) were marginal (small) farmers, 33 (27.5%) were medium farmers and 35 (29.16%) were large farmers. The production of land devoted to saffron cultivation is largest in case of large size farmers 66.8 percent. The smallest size group accounts for only 12.5percent and the medium size class has a share of 20.5percent. All the selected households were peasant proprietors having their own land. None of the cultivators was having leased in land or leased out land.

Size Class	**No. of House Holds**	**Area under operational holdings (acres)**	**Area under Saffron (acres)**	**%age area under saffron**
Below 2 acre	52	145.995	57.865	12.5
2-4 acre	33	167.47	95.245	20.5
Above 4 acre	35	731.425	309.3	66.8
Total	120	744.89	462.41	100.00

Table 6: Category Wise Area under Operational Holdings and Saffron Crop

Source: Field Survey

Size class acre	No. of households	Tenancy status Owned land (Leased in/Leased out)
Below 2 acre	52	52 - -
2-4	33	33 - -
Above 4 acre	35	35 - -

Total	120	120

Table 7: Tenancy Status
Source: Field Survey

4.1.7 Marketing and Trade Mechanism

Agricultural marketing in its wide sense comprises all the operations involved in the movement of produce and raw material from the farm to the final consumer. It includes the handling of the product at the farm, initial processing, grading and packaging in order to maintain and enhance the quality and avoid the wastages. Marketing of the saffron is concentrated in the hands of a few traders because a common grower cannot directly sell his meagre produce as he cannot grade, pack and store the produce at individual level (*Zaki et al., 2002).* Because of the poor financial status the farmers are prompted to sell their produce through middlemen to the owners of the trading firms. Between the grower and the ultimate consumer there exists a long chain of the intermediaries. The main marketing channels of saffron in the valley of Kashmir are shown below:

Dalals (C1)⟹Local Traders (C2) ⟹Agents (C3) ⟹ Sub Firms (C4)

The Table 8 indicates the growers' transactions with different types of marketing agencies. The information in the table has been gathered during our field study. Most of the selected households (50 percent) preferred to sell their produce to dalals, whereas about 40 percent of the sample households preferred to sell their produce to sub-firms. The marketing channels expropriate a substantial proportion of the profit from both growers as well as the consumers. In Pampore, the traditional saffron marketing centre of Kashmir valley, the big traders purchase the marketed surplus at relatively cheaper prices from the growers and dalals during the months of November to January, primarily for hoarding. The growers who lack finance and storage facilities and have no idea about the demand and

supply conditions at the terminal markets incur huge losses.

Channel	No. of Growers				%age of Total
	Large	Medium	Small	Total	
Dalals	**9**	**10**	**41**	**60**	**50**
Local Traders	**-**	**6**	**1**	**7**	**5.8**
Agents	**1**	**2**	**-**	**3**	**2.5**
Sub Firms	**25**	**15**	**10**	**50**	**41.6**
Total	**35**	**33**	**52**	**120**	**100**

Table 8: Growers' Preferences to various channels
Source: Field Survey

4.2. Economic Analysis

This section is designed to make an analysis of cost structure, productivity (yield per hectare) of saffron cultivation and returns to investment.

4.2.1 Cost Structure

Saffron requires a variety of inputs. These input costs, as already mentioned above, are categorised as fixed and variable costs. The description of each of these costs has been given below.

4.2.1.1 Seed/Cormlets

Huge initial investment is needed for saffron cultivation. The basic input of saffron crop is seed. Seed of saffron plant is known as corm. It is 1.0 - 6.0 cm in diameter. Fresh, disease free and well developed corms are essential for the better produce. About 2 quintal seed corms are required for one canal of land as the initial investment. The cost of one quintal of corm is Rs 5,000 which comes out to be 16 quintals per acre. This input alone involves an expenditure of about Rs 80,000 per acre. As reported by the sample house holds the seed cormlets resume the growth in the month of August and give rise to daughter cormlets. The corms formed in a year give flowers in

the following year and provide food to the new developing corms and in such a process the corm itself shrinks, collapses and expires out. New corms develop each year to replace the older corms. The corms have a life span of about 15 years. The cost at the initial stage as reported by sample households during the reporting season, however, was worked out to be Rs 9,000 per canal which means Rs.72,000 per acre, including labour cost for sowing of seed as well. Thus average cost is Rs 4,800 per acre per year.

4.2.1.2 Human Labour

Labour plays a dominant role in the field of agriculture. Labour is the most important factor responsible for the cultivation of saffron. Human labour is employed on daily wage basis and paid in cash. The labourers are paid for ploughing, hoeing, sowing and picking of flowers etc. The whole process is largely labour intensive as compared to other crops. The various stages of labour requirement are largely fulfilled by the family members as well as by hiring of labour. Family labour engaged was accounted for and charges estimated as if they were paid in cash. The Table 9 shows that human labour cost per acre is lowest in large size class i.e., Rs 5,600 per acre and highest in medium size class i.e. Rs 8,800 per acre. The proportion of hired labour to total labour is more in large size farms i.e.54.4 percent, followed by medium size farms 43.4 percent, and lowest in small size farms i.e. 34.6 percent. On the other hand number of labour days used per acre is more in medium size farms i.e. 44 days and less in large size farms i.e. 28 days. As such per acre human labour utilization of medium sized farms is 57 percent higher viz-a-viz large farm.

Size Class	No. of Households	Area under Saffron (acre)	Total No. of Labour days				No. of labour days per acre	Unit labour Cost (Rs)	Labour Cost per acre
			Domestic	Hired	Total	Proportion of Hired			
Below 2 acre	52	57.865	1469	778	2247	34.6	38	200	7600
2-4 acre	33	95.245	2390	1840	4230	43.4	44	200	8800
Above 4 acre	35	309.3	4000	4790	8790	54.4	28	200	5600

Table 9: Category wise use of human labour and labour cost
Source: Field Survey

4.2.1.3 Animal Labour

Animal labour in the traditional agricultural operations plays an important role but in saffron cultivation animal labour is required only once when drains on all sides of field beds are prepared. Since saffron never thrives in water logged conditions, the soil must be well drained.

Size Class	House holds	Area under Saffron (acres)	Animal Labour Days	Animal labour days/acre	Animal labour cost/acre @Rs. 350/= per unit
Below 2 acre	52	57.865	400	7	2,450
2-4 acre	33	95.245	575	6	2,100
Above 4 acre	35	309.3	2194	6	2,100

Table 10: Category wise application and cost of Animal labour
Source: Field Survey

The Table 10 depicts the animal labour requirements as revealed by the farmers. It is evident from the table that the average animal labour days used per acre is slightly more in small size class i.e. 7 days per acre than in large and medium size classes. The cost per acre is accordingly worked out to be Rs 2450 in small size class and 2100 in medium and large farms each. Animal labour has been defined interms of 6 hours

a day worked by a pair of bullock and a person needed to operate the bullocks. The cost has been estimated at the prevailing rates and food charges have also been included.

4.2.1.4 Fertilizers

Fertilizers have a direct relationship with output. Output is directly affected by the volume, quantity and quality of fertilizers. Fertilizers have a paramount role in the enhancement of yield in agriculture. According to agricultural scientists, different types of fertilizers i.e. Nitrogen, Phosphate and Potash (NPK) should be used in a balanced proportion to maintain the productivity of soil. It is recommended to use a mixture of 40 kg nitrogen, 50 kg phosphorus and 30 kg potassium per hectare but farmers are using fertilizers according to their own choice.

Size Class	Household	Area under Saffron (acre)	Quantity of fertilizer applied					Value/acre (Rs)		Cost per acre (Rs.)
			Urea in (Kgs)	Urea Per acre (Kgs)	DAP (Kgs)	DAP Per acre (Kgs)	Total application of Urea and DAP per acre (Kgs)	Urea @ Rs 6 Per (Kg)	DAP@ Rs. 11 per (Kg.)	
Below 2 acre	52	57.865	1905	32	2273	39	71	192	429	621
2-4 acre	33	95.245	3730	39	4795	50	89	234	550	784
Above 4 acre	35	309.3	1240	39	14850	48	87	234	528	762

Table 11: Category wise application and cost of fertilizers
Source: Field Survey

Generally two doses are given at the time of hoeing. Hoeing is done to break the upper crust of soil. Mostly used chemical fertilizers in saffron cultivation are Urea and DAP (Di-

Ammonium Phosphate). The market value of Urea during the reporting season was Rs. 300 per sac of 50 Kgs and Rs. 550 per sac of DAP. It can be observed from the table that use of fertilizer was reported to be highest i.e. 89 Kgs per acre in case of medium size farms, followed by large size farms with 87 kgs per acre and 77 Kgs per acre in case of small size farms. Accordingly, the cost of fertilizers per acre has been recorded more in medium and large size class than in small size class. It can be seen from the table that all the three types of farms, on an average, use about 36 Kgs of Urea and 45 Kgs of DAP per acre of land, while as no farmer reported the use of potash. Thus application of Urea and DAP seems to be two and a half times higher than the recommended dose.

4.2.1.5 Manures and Pesticides

According to our survey none of the farmers used any pesticides or manures. This is because of their lack of information, superstitious notions, myths and their traditional ways of cultivation. All of them conveyed of a disease known as "Corm Rot Disease" which is caused by fungal attack. The fungus usually attacks the corms after penetrating through the protective covers and destroying the corm. In spite of that the farmers don't apply any pesticides for the protection of their crop and because of this productivity may decline.

4.2.1.6 Tools and Equipments

The cultivation of saffron is carried out by traditional agricultural methods. No modern technology has been adopted by any of the cultivators because no awareness programme has been rendered by the Agriculture Department as reported by farmers. As documented in the Table 12, all the respondents are using traditional equipments like plough, harrow and tangroo. None of them have used any modem technology.

Equipments	No. of users	Percentage
Modern	Nil	-
Traditional	120	100
Total	120	100.00

Table 12: Usage of Equipments
Source: Field Survey

4.2.1.7 Aggregation of Inputs

In order to work out cost of saffron cultivation per acre all the variable costs i.e. human labour, animal labour, fertilizer and fixed costs i.e. depreciation of tools and equipments, average value of seed, rental value of land, land revenue, watch and ward etc. have been clubbed together . By clubbing them together total expenditure has been worked out which is shown in Table 13. Cost of cultivation per acre, infact, is revealed to be highest by medium size farms i.e. Rs. 20,412, and lowest by the large size farms i.e. 16,509, while as small farms exhibit per acre cost of cultivating saffron to be Rs. 19,366 which is close to that of medium size farms.

Holding Size	Area under saffron (acre)	Human Labour		Animal Labour		Fertilizer		Seed per acre (Rs)	Other costs per acre	Rental value of land (Rs.)	Total cost per acre (Rs.)
		Man Days	Wages @ Rs. 200	Pairs per acre	Cost @ Rs. 350 per pair	Unit Kg	Price per 5OKgs@				
Small Farms	57.8	38	7600	7	2450	71	621	4800	767	3227	19366
Medium Farms	95.2	44	8800	6	2100	89	784	4800	669	3259	20412
Large Farms	309.3	28	5600	6	2100	87	762	4800	679	2577	16509

Table 13: Size of Holding and Input Cost per Acre

Farm Size	Human Labour	Seed	Animal Labour	Fertilizer	Rent	Other	Total Cost	Cost/acre
Small	39.25	24.78	12.65	2.70	16.65	3.97	100	19,366
Medium	43.11	23.52	10.29	3.85	15.96	3.27	100	20,412
Large	33.92	29.08	12.73	4.62	15.60	4.05	100	16,509
All the Three	38.76	25.79	11.89	3.72	16.08	3.76	100	18,762

Table14: Category wise Cost Structure Composition (Per acre)

Referring to Tables 13 and 14, the analysis shows that human labour is the most costly input for all the three types of farms, accounting for more than 38 percent of total cost of cultivation on an average. However, this component of the total cost is also highest for medium size farms i.e. 43.11percent of their total cost of cultivation, lowest for the large farm size i.e. 33.92percent, while as in case of small farms human labour component constitutes close to 40 percent of total cost. From the Table 12, we can also find that per acre use of human labour is highest i.e., 44 man days in case of medium farms. It is least in case of large farms i.e. 28 man days.

Cost of seed is the second major component of saffron cultivation accounting for more than one-fourth (25.79%) of the total cost on an average. According to farm size, however, cost of seed per acre accounts for about 30 percent of the total cost for large farms, which is highest among the three farm sizes. The cost of seed in case of small farm size and medium sized farms stands in close proximity accounting for 24.78 percent and 23.52 percent respectively. However, it may be noted that in case of all the three farms, the cost of seed per acre is same. i.e., Rs 4,800, which is because of a uniform and universally accepted pattern of sowing the saffron corm.

Rental value of land appears only next to the seed cost accounting for more than 16 percent of the total cost on an average. It was calculated to be highest for the small farm size, accounting for about 17 percent of total cost. Rental values of land in case of medium farms and large sized farms stands in

close proximity accounting for 15.96 percent and 15.60 percent of total cost respectively. As the farm size increases, the rental value goes on decreasing.

Cost of animal labour, is another major component accounting for more than 11 percent of the total cost on an average. It is highest in the small and large sized farms accounting for 12.65 percent and 12.73 percent respectively of total cost. Animal cost is lowest in case of medium farm size i.e. about 11 percent of total cost.

The share of fertilizer cost is very small as compared to other items. Fertilizer cost accounts for about 3 percent of the total cost on an average. According to farm size however, fertilizer cost is highest in case of large farm size which accounts for about 5 percent of total cost. Fertilizer cost is lowest for small farm size i.e. 2.70 percent, while as in case of medium farms its share is only 3.85 percent of the total cost.

The cost of other items like land revenue, depreciation of implements, watch and ward form an insignificant proportion of the total cost and, hence, have been clubbed together. The cost of these inputs is about 4 percent of the total cost on an average. It is highest i.e. 4.05 percent in case of large farm size, lowest in case of medium farm size i.e. 3.27 percent , while as in case of small farms it accounts for 3.2 percent of total cost which is close to medium farm size.

4.2.2 Output/Returns

The output of saffron includes the flowers, seed (corm) and by product (Patti). During the reporting season corm was not sold by the farmers in the market. Earlier they used to sell the surplus corm in the market but because of drought conditions and Corm Rot disease they didn't possess sufficient quantities even for their own land. They also used to sell by-product patti in the market at the rate of Rs 40 per tola. But during the reporting season it was not accepted by the intermediaries. Only one type of saffron was sold i.e., Lacha. Therefore it is

evident that these components are not included in our analysis and are likely to diminish the size of returns to the farmers.

From our analysis, as shown in the table, it can be observed that yield per acre (productivity) exhibited by the large farms is the lowest i.e., only 0.64 Kgs./acre, while as it is at its highest value of 0.8 Kgs/acre in case of medium size farms, followed by the small farms with a productivity of 0.74 Kgs per acre. On the average the yield is worked out to be 0.72 Kgs/acre (1.8 Kgs/hectare). It is pertinent to note here that for Kashmir division productivity per hectare, by using the official secondary data, during the period 1990 to 1998 (pre drought period) comes out to be 3.05 Kgs/hectare, while between 1998 and 2001 (drought period) it works out to be 1.27 Kgs/hectare, and in the period from 2002 to 2004 (post drought period) productivity on the average increased to 1.76 Kgs/hectare. It may, therefore, be concluded that our farm analysis for the year 2007-08 reveals a trend that almost coincides with the official secondary data in case of productivity of saffron for the whole valley in the post drought period.

Holding Size	Total Area in acres	Total quantity of saffron produced (Kgs)	Yield per acre (Kgs)	Total Gross Returns		Cost per acre	Net Returns (Profitability)	
				FGP @ Rs. 370 per tola	Market Price@Rs.1000 per tola		FGP	MKT Price
Small	57.86	43.02	0.74	27,508	74,345	19,366	8,142	54,979
Medium	95.24	76.33	0.80	29,652	80,140	20,412	9,240	59,728
Large	309.30	199.21	0.64	23,830	64,406	16,509	7,321	47,897
All the Three	462.40	318.56	0.72	26987	72937	18,762	8,225	54,175

Table 15: Category Wise Cost, Returns and Profitability.

Returns can be calculated in two ways i.e., at farm gate prices at a rate of Rs 370 per tola as reported by the farmers and verified from the market; and at market prices at which dalals and intermediaries sell the product in the market. The market price of saffron was reported at the time of the survey to be Rs 1000 per tola. From the table, it is quite evident that the gross returns at farm gate prices are shown to be highest (about Rs 29,652 per acre) in case of medium size farms, followed by small farms (about Rs 27,508 per acre) and lowest in case of large farms (around Rs 23,830 per acre). On an average, the gross returns accounted for Rs.26,987 for all the farms taken together. After deducting the corresponding cost of production which amounts to Rs.18,762, the net returns per acre, on an average, work out to be Rs.8,225 at FGP. These net returns are observed to be lowest i.e. Rs.7,321 for large farms and highest i.e. Rs.9,240 for medium sized farms. The net returns, on an average, could however be raised by more than six fold to Rs.54,175 if the growers were able to sell the produce at market prices. But generally it was observed that due to dominance of middlemen and intermediaries over the marketing channels this net return of Rs.54,175 is distributed between middlemen and growers in the sequence of Rs.45,950(85%) and Rs.8,225(15%) respectively. Thus, it becomes clear that intermediaries take the lions share out of net returns and farmers share is very low, which is a hurdle for its extension.

Farm Size	Total Cost (Rs.)	Gross Returns (Rs.)		Net Returns (Rs.)	
		FGP @ Rs. 300	Market Price @ Rs. 1000	FGP	Market Price
Small	19,366	27,508	74,345	8,142	54,979
Medium	20,412	29,652	80,140	9,240	59,728
Large	16509	23,830	64,406	7,321	47,897
All Three (Average)	18,762	26,996	72,963	8,234	54,201

Table 16: Distribution of Gross and Net Returns per acre

An examination of the data suggests that medium size farms have an edge over the small and large farms in efficiency (profitability) and productivity both in the absolute and relative terms. Absolute contribution of these farms interms of yield, gross returns, and net returns is highest among all the three categories of farms at both FGP and market prices. Even these farms are the largest providers of employment as is evident from the per acre use of human labour (see the table above), due to which their cost of production per acre is also highest. In relative terms their performance was worked out by employing gross margin, net margin and benefit cost ratio at both FGP and market prices. In almost all these indicators they show better returns except gross margin at FGP which is due to their relatively higher variable costs owing to the higher usage of human labour.

Large farms use fewer inputs because of which their yield (productivity) and net returns (profitability per acre of output) remains low, indicating a phenomenon of suboptimal use of resources. This observation is supplemented by the evidence from the medium farms that use higher amounts of inputs, hence maximizing both yield and net returns. However, there is one important point worth to be made which is regarding the tendency of the diminishing returns as reflected in the declining value of the gross margin for medium size farms from 0.64 to 0.60 as depicted in the Tables 17 and 18.

Table 17: Net and Gross Profit Margin per acre production at FGP

Farm Size	Gross Returns (Rs)	Total Production Cost (Rs)	Net Returns (Rs)	Total Variable Cost (Rs)	Gross Margin	Net Margin
Small	27508	19366	8142	10572	0.61	0.29
Medium	29652	20412	9240	11684	0.60	0.31
Large	23830	16509	7321	8462	0.64	0.30
All three (Average)	26996	18762	8234	10239	0.62	0.30

Farm Size	Gross Returns (Rs)	Total Production Cost (Rs)	Net Returns (Rs.)	Total Variable Cost (Rs)	Gross Margin	Net Margin
Small	74345	19366	54979	10572	0.85	0.73
Medium	80140	20412	59728	11684	0.85	0.74
Large	64406	16509	47897	8462	0.86	0.74
All three (Average)	72963	18762	54,201	10239	0.85	0.74

Table 18: Net and Gross Profit Margin per acre production at Market Price

This decline in the value of gross margin from large to medium farms is attributed to the fact that as the total variable costs/expenditure increase by about 38 percent (from Rs.8462 per acre in case of large farms to Rs.11684 in case of medium farms), the corresponding increase in the gross returns/revenues per acre was noted about 24 percent only (from Rs.16509 large farms to Rs. 20412 medium farms). Since human labour is the dominant input ranging between 33.92 and 43.11 percent of the total cost and between 66.17 and 75.31 percent of the variable cost(see Table 3A in the Appendix) which means labour must take maximum share of the increased expenditure. It follows that percentage increase in the expenditure made on labour input is associated with less than proportionate increase in the yield per hectare, hence the tendency for the diminishing returns to set in. This is confirmed from the data given in the table that increase in the expenditure made on employing more labour per acre from medium farms to large farms in absolute terms is Rs.3200, which in percentage terms amounts to an increase of about 36 percent compared to a corresponding increase of about 24 percent in the yield per acre in monetary terms as pointed out above.

Farm Size	Net Returns at Market Prices (Rs.)	Net Returns at Farm Gate Prices (Rs.)	Total Production Cost (Rs)	Benefit-Cost Ratio at Market Price	Benefit-Cost Ratio at Farm Gate Price
Small	54979	8142	19366	2.8	0.42
Medium	59728	9240	20412	2.9	0.45
Large	47897	7321	16509	2.9	0.44
All three (Average)	54201	8234	18762	2.8	0.44

Table 19: Net Returns per Rupee of Investment (Benefit-Cost Ratio) at FGP and Market Prices

	Costs			*Returns at Farm Gate Prices*					*Returns at Market Prices*				
	TFC	*TVC*	*TPC*	*GR*	*NR*	*GM*	*NM*	*BCR*	*GR*	*NR*	*GM*	*NM*	*BCR*
Small	*3*	*2*	*2*	*2*	*2*	*2*	*3*	*3*	*2*	*2*	*2*	*1*	*2*
Medium	*2*	*3*	*3*	*1*	*1*	*3*	*1*	*1*	*1*	*1*	*2*	*2*	*1*
Large	*1*	*1*	*1*	*3*	*3*	*1*	*2*	*2*	*3*	*3*	*1*	*2*	*1*

Table20: Costs and Returns Indicator Ranking

Note: In case of cost components the lower numbers indicate lower values. In case of return variables the lower variables indicate the higher values. The values to the indicators have been assigned on the basis of calculations carried out in the above tables.

However, to improve the land and labour productivity, there seems to be scope for judicious combination of technical inputs like fertilizers (the use of which was found inconsistent with standard prescriptions as documented in Table 11) and especially assured irrigation facilities in the form of drip and sprinkle irrigation, given the fact that saffron cultivation in this part is totally dependent upon the rain water.

4.2.3 Production Function Estimates

To examine the input-output relationship the data for all 120 sampled respondents were analyzed using SPSS ver. 16 and Microsoft Excel 2010. The estimated results of Cobb-Douglass

production function revealed that value of R^2 was 0.87 and F-value of 133.460 (Sig.0.01), which indicates that our model fits the data well. The estimated parameters are presented in Table 21.

Variable	Beta	t value	Sig. Level
Constant		-3.786	0.000
In-Age (years)	0.232	2.049	0.043
In-Education (years)	0.398	4.809	0.010
In- Saffron growing experience (years)	0.391	2.495	0.050
In-Labour (man-days)	0.088	2.574	0.011
In- Animal labour(days)	0.52	1.244	0.216
In- Fertilizer	- 0.210	-3.701	0.012
R2	0.876		
Adjusted R^2	0.870		
F-ratio	133.460 (Sig. 0.01)		

Table 21: Regression Coefficients of Production Function

The selected input variables are capable of explaining 87 percent variations in the output (yield per acre). The coefficients of education, and experience were found to be significant at 1 percent and 5 percent level respectively, suggesting a very good relationship with the yield per acre. It implies that a 1 percent increase in either the level of education or experience must lead to 0.39 percent increase in the level of yield per acre. Further the age, human labour and animal labour variables also show a positive relationship with the output but the contribution of animal labour seems to be statistically insignificant. Furthermore, one important observation from the model is negative relationship between fertilizer application and its impact on the productivity (yield per acre). This result is in conformity with our observation from the field survey wherein indiscriminate use of fertilizer application inconsistent with the standard practice and recommendations was found in general. According to agricultural scientists, different types of fertilizers i.e.

Nitrogen, Phosphate and Potash (NPK) should be used in a balanced proportion to maintain the productivity of soil. It is recommended to use a mixture of 40 kg nitrogen, 50 kg phosphorus and 30 kg potassium per hectare but no such practice was followed by the farmers. It can be seen from the table that all the three types of farms, on an average, use about 36 Kg. of urea and 45 Kg. of DAP per acre of land, while as no farmer reported the use of potash.

4.3. Summary of Major Findings.

It is evident from the analysis that:

1. Very little proportion of the young age saffron growers i.e. about 16 percent actually are engaged in this pursuit. Half of the growers are illiterate. Both age and education variables were found to have a significant positive relationship with the yield.
2. There is complete lack of modern irrigation facilities in the form of drip and sprinkle irrigation. The only source of irrigation is rain water subjecting this agricultural activity to the vagaries of weather.
3. Role of the banks and regulated financial institutions is completely missing in promoting this venture. Growers generally prefer interest free loans from their relatives and friends. However, a significant proportion of farmers borrow funds from intermediaries i.e. Dalals.
4. All the farmers were found making an indiscriminate use of chemical fertilisers over and above the recommended doses which has actually had an adverse impact on the yield, as is evidenced by our econometric study.
5. Human and bullock labour is dominant input accounting for about 50 percent of cost of production, followed by cost of seed which accounts for about one-fourth of total cost, indicating that saffron cultivation in Kashmir valley is highly labour intensive activity.

6. A price spread of about 300 percent has been observed between farm gate and market prices. Since marketing channels are dominated by intermediaries, they become major beneficiaries leaving saffron growers with a little margin.
7. The yield per acre (Productivity) increases with the increase in the size of holding from small farms to medium size farms, but shows a. declining trend from medium to large sized farms.
8. Medium farms exhibit the highest gross and net returns and also account for highest cost per acre, but still these farms show the highest profitability out of three categories of farms.
9. The study also shows that large farms are least profitable because of their low productivity and not due to the higher cost of production which in fact is lowest in this case.

Generally speaking, size of holding and productivity of agricultural production have positive relationship. But in case of our analysis conducted on different farm sizes for the year 2007-08 the small/medium size farms appear to have higher productivity compared to large size farms. The reasons are:

a) The farmers with small holdings use their land optimally compared to large holders. (ii) It is relatively, easy to maintain small holdings than large ones.
b) Inability of the farmers to use the land up to the optimum level because of their weak financial status, resulting into the lower productivity especially for large farms.
c) The use of hired labour per acre for large farms is comparatively greater than smaller farms. This also affects the productivity in the sense that use of family labour is more efficient than hired one.

d) Lack of mechanized labour generally affects the productivity of large farms.

Limitations of the Study

1. The field study has been confined to Pampore tehsil of district Pulwama. It cannot pretend to generalise the results for the Kashmir valley, although 80 percent of the saffron is produced in this area.
2. The soil fertility, which influences the saffron productivity varies across the farm, has been taken as constant in our analysis.
3. Farmers don't maintain any farm records; hence the study had to depend absolutely on the memories of the illiterate farmers.
4. Though the reference period was, by and large, a normal year so far as climatic conditions are concerned, yet due to draught like conditions that prevailed in the valley consecutively for many years may have had some influence on the reference period.

4.4. Concluding Remarks

It has been found from our analysis that the new educated generation is not taking up this venture as a profession for their livelihood and due to this most of the control of this activity are still in the hands of illiterate and higher age farmers, whose mental status is against the adoption of new technology. The concerned government departments and agencies need to encourage and involve educated unemployed youth in the rural areas of the saffron growing belts to take over this venture on scientific basis. Organising the foreign tours especially to the countries like Spain, Netherlands, Iran etc. is very essential to motivate and encourage the educated youth. Poor economic background of these farmers compels them to borrow money in advance from dalals resulting into

distress sale. This issue needs to be tackled by the government by providing cheap credit facilities to the growers. Besides, emphasis should be given on inculcating the spirit of cooperative farming. By cooperative marketing the chains of middlemen and intermediaries can be eliminated. Direct link between the ultimate consumers and the growers can improve their financial status and provide them with the market incentives necessary for the expansion of this otherwise shrinking sector. The government agencies should also provide the farmers with the spray pumps for spraying water over the fields in the absence of the natural rains in the month of September- October to enhance the yield. Alternatively, water reservoirs and tube wells for utilizing the underground water need to be built for assured irrigation. Another area of serious concern, as revealed from the field study, is regarding the use of fertilizers in an unscientific way without following the standard prescriptions. Right combinations of water, fertilizers, and human effort are required to improve the yield which has deteriorated over the period of time.

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Appendix Tables

SNo	Country	Acreage Under Saffron (000hec) with rank	%age area of the world	Avg. Annual Production(tons) with rank	%age share of the world production	Productivity Kg/hec.	Productivity (Rank)	Quality (Rank)
1	Iran	32.0(1st)	74.0	160.0 (1st)	78.43	5.0	3rd	
2	Spain	4.2 (2nd)	9.7	29.5 (2nd)	14.46	6.9	1st	1st
3	J&K	3.8 (3rd)	8.9	6.46 (3rd)	3.15	2.28	6th	2nd
4	Greece	1.0 (4th)	2.3	4.30 (4th)	2.10	4.3	4th	
5	Azerbaijan	0.7(5th)	1.6	3.70 (5th)	1.81	5.4	2nd	
6	Morocco	0.5(6th)	1.1	1.00 (6th)	0.49	2.0	7th	
7	Italy	---	---	0.28 (7th)	0.13	3.1	5th	

Table 1A: Statement Showing Growth in Area, Production, and Yield of Saffron.(Base Year 1990)

Source: compiled and computed from the data collected from Financial Commissioner's Office

Year	Area (hectares)	Growth Rate	Production (quintal)	Growth Rate	Productivity (yield/hec.)
1990	4050	0.00	130	0.00	3.21
19991	4050	0.00	130	0.00	3.21
1992	--	--	--	--	--
1993	4496	11.01	130.65	0.5	2.90
1994	4496	11.01	134.25	3.3	2.98
1995	4496	11.01	141.28	8.7	3.14
1996	5707	40.91	159.52	22.7	2.79
1997	5316	32.37	173.36	33.7	3.17
1998	4116	-1.63	128.80	-0.9	3.03
1999	3997	-1.31	75.54	-41.9	1.89
2000	3827	-5.51	36.91	-71.6	0.89
2001	3287	-5.51	36.91	-71.6	0.96
2002	3883	-4.12	50.00	-61.5	1.29
2003	3883	-4.12	75.00	-42.3	1.93
2004	3883	-4.12	80.00	-38.5	2.07

Table 2A: International Dimensions of Saffron Cultivation

Source: Agarwal, S. G, F. A, Nehvi, M.K. Verma, Success, SKAUST, 2004.

Farm Size	Total Production Cost (Rs.)	Total Fixed Cost (Rs.)	Total Variable Cost (Rs.)	Human Labour Cost (Rs.)	Human Labour Cost as % of Total Variable Cost
Small	19366	8794	10572	7600	72.04
Medium	20412	8728	11684	8800	75.31
Large	16509	8074	8462	5600	66.17
All the three (Average)	18762	8532	10239	7333	71.6

Table 3A: Human Labour Cost as a Proportion of Total Variable Cost.
Source: Compiled from the field survey