Socio- Economic Analysis of Ginger Crop in Himachal Pradesh

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ABSTRACT

The study was conducted with the objective to evaluate the socio-economics of ginger growers in Sirmour district of Himachal Pradesh, India. The data collected from 50 ginger growers of two blocks of the district by personal interview using multi-stage purpose sampling technique. In ginger farms average male members as well as their percentage were found to be more than their female counterparts. Majority of the farmers were literate. Farming followed by daily paid labourers, service and business was the main occupation of adult family members. Owned land holding for ginger farms were 1.76 hectares. Cropping intensity during the study period was 190.34% on ginger farms. Returns over variable cost for ginger crop was worked out as Rs. 113324/ha. BCR (over total variable cost) as well as BCR (over total cost) was worked out as 2.617 and 1.167 respectively for ginger crop. All income measures per hectare were found to be positive for ginger crop. 86% and 74% of selected ginger farmers' responded positively regarding availability of good quality seed/ seedlings and disease problem in seed/ seedlings in the initial stage of sowing of ginger crop respectively. 52% responded that there is lack of extension training facilities and 92% responded that there is a problem of weed infestation. 28% responded there is an un-remunerative price of produce, 98% responded that cost of marketing of produce was high, all the respondents were hiring transport to market the produce. 66% responded for favour of Govt. policies for ginger farming. 60% responded that there is lack of cheap credit from banks for ginger farming. Strongly suggested the strengthening of R&D work, extension services, training of farmers, establishment of semi-processing and cold storage facilities, and co-operatives farming societies for better ginger farming.

1. Introduction

Ginger belongs to *Zingiberaceae* family and is originated from South-East Asia. Tropical areas having high rainfall and hot and humid weather conditions are favourable for Ginger. The name 'ginger' is derived from the Sanskrit word *'Srngaveram'* which means 'horn root'. In South East Asia the most popular form of ginger is raw ginger. It is revered as one of the most important and valued spices of the world. For over 5000 years ginger has been recognized as the "universal medicine" by the ancient orientals of China and India. Today ginger remains a component of more than 50 percent of the traditional herbal remedies and has been used to treat nausea, indigestion, fever and infection and to promote vitality and longevity. Ginger contains 2-3 per cent protein, 0.9 per cent fat, 1.2 per cent minerals, 2.4 percent fiber, 12.3 per cent carbohydrate and a good source of calcium, phosphorous, iron and vitamins.

Ginger is one of mainstay in Indian spice account and has been used for flavoring and medicinal purposes. Ginger occupies fourth position among spices produced in India, fifth position in terms of quality and sixth position in export earning among spices. India has also imported significant quantities of ginger in various forms, viz. ginger fresh, ginger unbleached, ginger bleached, ginger powder (not elsewhere specified) including dried ginger to the tune of 12,807 tons valued at Rs. 1, 925 lakh in 2009-10. Nepal has been our main source of import (http://etd.uasd.edu/ft/th10189.pdf).

India is the major producer of ginger having production of 655000 MT of ginger from 132000 ha area under its cultivation (National Horticulture Board, 2014). Productivity of ginger in India is more (3,417 kg/ha) than the average productivity (2,546 kg/ha) in the world. USA is having the highest (51,925 kg/ha) productivity of ginger in the world.

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Though grown all over India, the finest quality ginger comes from Kerala due to its congenial climate and a rich earthy soil. 'Cochin Ginger' (NUGC) and 'Calicut Ginger' (NUGK) varieties are famous Indian dry ginger in the world market. Kerala, Karnataka, Orissa, Meghalaya, West Bengal, Sikkim and Mizoram are the major ginger producing states in India (Zala, 2009). In Himachal Pradesh, ginger is a cash crop of mid and low hills of the state and is being cultivated in an area of 3,230 ha with a production of 7640 MT (National Horticulture Board, 2014). In this state, ginger is mostly grown in Sirmour district having more than 3/4 of the area and production followed by Solan, Mandi, Shimla, Kangra, Bilaspur, Hamirpur and Chamba districts. Most of the fresh ginger produced in the state is sold to the nearby states like Punjab, Haryana, Delhi, Uttar Pradesh etc. (Dohroo et. al., 2012).

2. Methodology

For evaluating the objectives of the study, primary data were collected through personal interview method with the help of a well-structured and pre-tested schedule for the year 2012-13. The primary data with respect to household composition, educational profile, land ownership, cropping pattern, costs of inputs, returns and the problems involved in cultivation of ginger was collected from selected ginger growers from Himachal Pradesh. A field survey was undertaken to work out the socio-economics of ginger, factors affecting its productivity and the constraints in the production of this crop in the state of Himachal Pradesh. In case of ginger, Sirmour district is predominant in ginger farming having both area as well as number of farmers (*State Deptt. of Agriculture, Himachal Pradesh)*. Thus in the first stage, Sirmour district was selected. Secondly, two blocks (Paonta Sahib and Shillai from Sirmour district) having concentration of ginger growing farmers and area were selected. Depending on the number of growers and area under ginger; Masu, Sharli and Sataun villages from Paonta Sahib block and Bela, Dads and Kando villages from Shillai block were selected purposively. Further, 30 farmers from Paonta Sahib block and 20 farmers from Shillai block were selected purposively. The complete list of selected districts, blocks, villages and number of respondents is presented in the Table 1.

Economics of Ginger Crop

The data pertaining to input use pattern in ginger farming of Himachal Pradesh was collected from the sample farmers for the year 2012-13.

For valuation of various inputs, market price or cost were used in the analysis. For various machine related farm operations, rental value of farm operation prevailing in the selected villages was used for calculating total variable cost. Ginger in the study area is having rainfed irrigation. Farm labour used in various farm operations was imputed at the prevailing wage rate. Interest on the working capital was calculated @ 7 per cent for the life period of the ginger crop as per its season. Besides, for bringing out the gross returns, price realized by the respondent farmers by selling the produce was used. Average output obtained was recorded on the basis of respondent's perception. Benefit cost ratios were calculated for ginger crop to make the results of the study more specific.

Cost concepts

Costs were computed as per the guidelines of CACP (Commission for Agricultural Costs and Prices) and are discussed below:

(a) Cost A_1:
Includes following costs

(i) Value of hired human labour, (ii) Value of hired bullock labour, (iii) Value of owned bullock labour, (iv) Value of owned machinery, (v) Hired machinery charges, (vi) Value of seed/ seedlings , (vii) Value of manures , (viii) Value of fertilizers, (ix) Value of plant protection chemicals , (x) Irrigation charges, (xi) Depreciation on farm buildings and implements, (xii) Interest on working capital, (xiii) Insurance premium

(xiv) Land revenue, and (xv) Miscellaneous expenses

(b) Cost A_2: Cost A_1 + rent paid for leased-in land

(c) Cost B_1: Cost A_1+ interest on fixed capital (excluding land)

(d) Cost B_2: Cost B_1+ rental value of owned land + rent paid for leased-in land

(e) Cost C_1: Cost B_1 + imputed value of family labour

(f) Cost C_2: Cost B_2 + imputed value of family labour

(g) Cost C_3: Cost C_2 +10 per cent of cost C_2 as management cost

Income measures

For working out profitability of ginger cultivation in the study areas following income measures were worked out:

(a) Family labour income (FLI)

It is the return to family labour (including management).

F.L.I. = Gross income – Cost B_2

(b) Net income (NI)

It is the net profit after deducting all cost items *i.e.,* variable and fixed costs from gross income.

NI = Gross income – Total cost (Cost C_2)

(c) Farm business income (FBI)

It is the disposal income out of the enterprise and is defined as:

FBI = Gross income – Cost A_1 (cost A_2 in case of tenant operated land)

Table 1. District-wise Ginger respondents selected from cluster villages, Himachal Pradesh, 2012-13

District	Block	Villages	Number of Respondents
Sirmour	Paonta Sahib	Masu	14
		Sharli	13
		Sataun	3
	Shillai	Bela	10
		Dads	5
		Kando	5
Total	2	6	50

(d) Return per rupee (RPR)

$$RPR = \frac{Gross\ Income\ /ha}{Total\ Cost\ (Cost\ C_2)/ha}$$

Functional Analysis

To examine the factors affecting value productivity of ginger crop of Himachal Pradesh, both linear and log-linear production function were fitted and numerous equations were tried by taking different explanatory variables. Best fit function was determined on the basis of level of significance of the explanatory variables, the value of coefficient of multiple determinations (R^2) and the logical signs of the explanatory variables included in the model. Cobb-Douglas function of the following form was considered the most appropriate for the present investigation:

$$Y = A \sum_{i=1}^{n} X_i{}^{bi} e^u$$

Where, Y represented the value productivity per hectare of ginger crop under study. X_i the selected explanatory variables (per hectares); A, the technical efficiency parameter and b_i the coefficient of production elasticity of the respective variable X_i at the mean level of input used and output obtained. The 'e' is an error term. The estimated form of the equation becomes:

$$Log\ Y = Log\ A + \sum_{i=1}^{n} b_i \log x_i + u$$

Log Y= Log A + b_1 log x_1 + b_2 log x_2+……………..+b_n log x_n + u

Function fitted for Ginger crop was:

Log Y= Log A + b_1 log x_1 + b_2 log x_2+……………..+b_8 log x_8 + u

Where,

Y = Value productivity per hectare of ginger crop (Rs./ha)

X_1 = Value of seed (Rs./ha)

X_2 = Fertilizers (Rs./ha)

X_3 = Plant protection chemical (PPC) measures (Rs./ha)

X_4 = Bullock labour (Rs./ha)

X_5 = Irrigations (Rs./ ha)

X_6 = Human labour charges (Rs./ha)

X_7 = Machine labour charges (Rs./ha)

X_8 = Area under crop (hectares)

Statistical significance of the estimates:

To test the statistical significance of these estimates, t-value of the estimates was worked out at (n-k) degrees of freedom. The t-value of the regression coefficients (b_i) were worked out as under:

$$t_{(n-k)} = \frac{bi}{S.E.(bi)}$$

Where S.E. is the standard error of the variable X_i

Coefficient of multiple determinations (R^2)

The coefficient of multiple determination was worked out to estimate the proportion of variations in total output/gross returns per hectare explained by the different explanatory variables, taken together in the analysis. Statistical significance of R^2, which examines the goodness of fit of the function, was tested by working out F-ratio as follows:

$$F= \frac{R^2 / k}{(1- R^2) / n-k}$$

Where,

R^2 is the value of the coefficient of multiple determinations, n is the number of observations and k is the number of parameters included in the study.

Constraints Analysis

The respondent farmers were asked about the various constraints affecting the productivity of ginger crop. Simple tabular analysis using averages and percentages was also carried out to fulfil the objectives of the study.

3. Results and Discussion

Socio-Economic Characteristics of Sample Ginger Respondents:

It is necessary to look into the various socio-economic characteristics of sample farmers before proceeding for analysing a particular enterprise undertaken on the farm. This section deals with various socio- economic characteristics of sample respondents which includes their household composition, educational status, occupational status, land details, and cropping pattern followed on their farms.

(a) Household composition

The family composition of the sample households is displayed in Table 2. The average number of male members, female members, children (of 12-18 years age) and children (below 12 years age) per farm were found to be 5.14, 3.64, 2.14 and 1.72 respectively. Further, the percentage of male members, female members, children (of 12-18 years age) and children (below 12 years age) was found to be 40.66%, 28.80%, 16.93% and 13.61% respectively for ginger farms. Thus, in ginger farms average male members as well as their percentage were found to be more than their female counterparts.

Table 2. Household composition of ginger farms

Family composition	Number per household
Male	5.14(40.66)
Female	3.64 (28.80)
Children (12- 18 yr)	2.14 (16.93)
Children (below 12 yr)	1.72 (13.61)
Total	12.64

Figures in parentheses are percentages of total.

Table 3. Educational status of family

Particulars	%
Illiterate	8.00
Read & Write	12.00
Elementary (1 to 5 class)	28.00
Middle (6 to 7 class)	24.00
Secondary (8 to 12 class)	22.00
Graduate	6.00

Table 4. Occupational status of adults in the family

Particulars	Occupation/ farm
Farming	3.26 (63.42)
Business	0.18 (3.50)
Service sector	0.68 (13.23)
Daily Paid Labourer	1.02 (19.85)

Figures in parentheses are percentages of total.

(b) Educational status

The educational level of a person plays an important role in adoption of latest farm technology. Therefore, the educational status of head of the family who acted as decision maker was enquired from the sample farms. The educational status of head of the family members is depicted in Table 3. It was found that 8% were illiterate, 12% were who can read & write, 28% having elementary education, 24% having middle school education, 22% were having education up to secondary school and 6% were graduate. Thus majority of the farmers were literate.

(c) Occupational status

The occupational status of adult family members is displayed in Table 4. It is clear from the table that farming is the main occupation for 63.42% of the ginger farmers, 19.85% as daily paid workers and 13.23% in some service/jobs whereas only 3.50% were engaged in some petty business.

(d) Cropping pattern and cropping intensity

The cropping pattern of the sample farms has been analysed in order to work out the relative share of various crops grown as *kharif* and *rabi* crops on the sample farms. Ginger is mainly grown as rainfed and as an annual crop. The cropping intensity was worked out to see the number of crops grown on the farms. Cropping pattern and cropping intensity of sample ginger farms is presented in Table 6. It shows that relative share of maize (53.73%) was much higher than ginger (19.59%), vegetables (17.45%), pulses (5.91%), oilseeds (4.00%) and fodder crops (2.41%) on ginger farms. Maize, ginger and vegetables were found to be major *kharif* crops on ginger farms.

It is also evident from the table that wheat, ginger and vegetables are the major *rabi* crops of ginger growing farms. The relative share of wheat (44.45%), ginger (18.86%), and vegetables (8.95%) was much higher than pulses (6.18%) and fodder crops (1.14%) on ginger farms. Cropping intensity during the study period worked out to be 190.34% on ginger farms. The table 5 shows that the average operational holding was 1.76 hectares for ginger farms of Himachal Pradesh. Owned land holding for ginger farms were 1.76 hectares.

Table 5. Land holding details on sample ginger farms

Particulars	Hectares per farm
Owned	1.76 (100.00)
Leased in	Nil
Leased out	Nil
Average operational holding	1.76

Figures in parentheses are percentages of total.

Table 6. Cropping pattern and cropping intensity on sample ginger farms

Crops	Ha per farm
Kharif Crops	
Maize	0.95 (53.73)
Pulses	0.10 (5.91)
Oilseeds	0.07 (4.00)
Vegetables	0.31 (17.45)
Fodder Crops	0.04 (2.41)
Ginger	0.34 (19.59)
Other medicinal aromatic crops	0.004 (0.27)
Rabi Crops	
Wheat HYV	0.78 (44.45)
Oats	0.01 (0.64)
Other oilseed crops	0.01 (0.45)
Pulses	0.11 (6.18)
Potato	0.00 (0.00)
Pea	0.00 (0.00)
Other Vegetables	0.16 (8.95)
Fodder Crops	0.02 (1.14)
Mentha	0.00 (0.00)
Ginger	0.33 (18.86)
Other medicinal/aromatic crops	0.01 (0.55)
Perennial crops	
Fruit trees	0.11 (6.00)
Gross cropped area	3.35
Cropping intensity	190.34

Figures in parentheses are percentages of the total

Benefit cost ratio (BCR)

Benefit cost ratio (BCR) was undertaken to examine the profitability from ginger crop on sample farm and has been shown in Table 7.

Table 7. Benefit cost analysis of different medicinal crops on sample ginger farms

Particulars	Per hectare
Human labour (Rs.)	38247
Machine labour (Rs.)	1776
Seed/ seedlings (Rs.)	19857
Fertilizer use (Rs.)	5975
Plant protection chemicals *i.e.* PPC (Rs.)	1859
Irrigations (Rs.)	-
Interest on variable cost @ 7% p.a. (Rs.)	2370
Total variable cost (Rs.)	70084
Rental value of owned land (Rs.)	67634
Depreciation (Rs.)	10165
Interest on fixed capital @ 12% p.a. (Rs.)	9315
Total cost	**157198**
Yield (kg/ha)-main product	1467
Gross returns (Rs.)	183408
Returns over variable cost (Rs.)	113324
BCR (over total variable cost)	2.617
BCR (over total cost)	1.167

Table 8. Cost concepts and Income measures of ginger farms

Particulars	Ginger
Cost Concepts	
Cost A1	67320
Cost A2	67320
Cost B1	76636
Cost B2	144270
Cost C1	89564
Cost C2	157198
Cost C3	172918
Income Measures	
Family labour income (Rs.)	39138
Farm business income (Rs.)	116087
Net income (Rs.)	26209
Return per rupee (RPR)	1.166

Figures in parentheses are standard errors of regression coefficients

**, *, indicate significance at 1 per cent and 5 per cent level of significance

Cost concepts and Income measures

Table8 reveals that total variable cost of growing ginger worked out to be Rs. 70084 per hectare. The major constituents of total variable cost were human labour (Rs. 38247), planting material/ seed (Rs. 19857.00), fertilizers (Rs. 5975), plant protection chemicals (Rs. 1859.00), and machine labour (Rs. 1776). Yield of ginger on an average worked out to be 1467 kg/ha and gross returns were Rs. 183408/ha. Returns over variable cost for ginger crop worked out at Rs. 113324/ha. BCR (over total variable cost) as well as BCR (over total cost) was 2.617 and 1.167 respectively for ginger crop. Returns over variable cost, BCR (over total variable cost), and BCR (over total cost) were found to be positive and more than one respectively for ginger crop, which reveals that farmers cultivating this crop were recovering variable costs as well as getting returns over variable costs and total cost incurred.

Cost concepts (A_1, A_2, B_1, B_2, C_1 and C_2) and income measures (family labour income, farm business income, net income and return per rupee) for ginger crop has been presented in Table 8. Overall costs A_1, A_2, B_1, B_2, C_1 and C_2 were found to be Rs.67320, Rs. 67320, Rs.76636, Rs. 144270, Rs. 89564 and Rs. 157198 respectively. Family labour income, farm business income, net income and returns per rupee were Rs. 39138, Rs. 116087, Rs. 26209 and 1.166 respectively. The analysis reveals that all income measures were positive for ginger crop. However, farmers of this region grow these kinds of cash crops only in some proportion on their farms and not on all land holdings because crops like ginger are risky and there is high price valtality, during some years it gives high profits and may lead to losses in other years as price falls. Majority of other crops being grown are those having minimum support price (MSP) like wheat and maize which gives them assured income.

Factors affecting productivity of ginger crop

The discussion in previous section was focused on studying the various parameters related to economics of ginger crop. Various factors affecting productivity of ginger are discussed in this section. This section will bring out the strategies needed to augment the value productivity of these crops. The regression coefficients of various explanatory variables included in the model for ginger crop have been depicted in Table 8. The table reveals that the value of adjusted coefficient of multiple determinations (R^2) came out to be 0.418 for ginger crop which shows that only 41.80 per cent of the variation in the model has been explained by the explanatory variables included in the model. The coefficient of expenditure on fertilizer and machine labour were found to be positive and significant at five per cent level of significance showing thereby that with increase in expenditure on fertilizer and machine labour by one per cent the resultant value productivity

of ginger increases by 0.063 per cent and 0.165 percent respectively. The coefficients of expenses incurred on bullock labour were negatively related to value productivity of ginger at one per cent level of significance. It shows the excessive use of bullock labour on the ginger crop. Hence, with increase in expenses on bullock labour by one per cent, the resultant value productivity decreases by 0.091 per cent. The regression coefficients of other explanatory variables such as expenditure on PPC, human labour and area under ginger crop were found to be positive but non-significant; whereas regression coefficient of planting material/ seed was found to be negative but non-significant.

Therefore, on ginger, the explanatory variables affecting the value productivity of ginger crop positively and sufficiently were found to be; expenses on fertilizer and machine labour. Also there is excessive use of bullock labour on ginger farms. From the results it is suggested that bullock labour should be replaced by machine labour for having more efficiency on ginger farms.

Issues/ Problems related to Ginger Farming

Since cultivation of ginger farming has both direct and indirect effect on the establishment and working of herbal industry related to value addition of ginger, so it becomes important to study the problems/ issues related to the ginger farming. The problems/ issues highlighted by farmers during survey are presented in Table 9.

(a) Seed/ Seedling issues

Certain issues related to seedlings were studied for ginger crop. When asked about the availability of sufficient quantity of planting material, all the farmers of ginger farms responded for the availability. 86%, 88% and 74% of selected ginger farmers' responded regarding availability of good seed/ seedlings, availability of seed/ seedlings at reasonable price, and disease problem in seed/ seedlings in the initial stage of sowing of ginger crop respectively.

(b) Input issues

Regarding know-how support from any organization, 68% of ginger farmers responded positively. All the ginger growers responded for availability of inputs (fertilizers/ chemicals), whereas regarding availability of labour, 72% responded positively.

Table 9. Problems/ issues highlighted by farmers during the survey

Issues/Problems	Response	
	Yes	No
A. Seed/ Seedlings Issues:		
Getting seed/ seedlings in sufficient quantity	50 (100)	0 (0)
Getting good quality seed/ seedlings	43 (86)	7 (14)
Reasonable price of seed/ seedlings	44 (88)	6 (12)
Any special subsidy on seed/ seedlings	0 (0)	50 (100)
Disease problem	37 (74)	13 (26)
B. Input Issues		
Know- how support from any organization	34 (68)	16 (32)
Availability of inputs (fertilizers/ chemicals)	50 (100)	0 (0)
Labour availability	36 (72)	14 (28)
C. Agronomic Issues		
Availability of package of practices	30 (60)	20 (40)
Lack of extension training facilities	26 (52)	24 (48)
Weed problem	46 (92)	4 (8)
Insect/pest problem	22 (44)	28 (56)
Favorable Government Policies	33 (66)	17 (34)
D. Marketing Issues		
Adopting grading system	41 (82)	9 (18)
Getting prices according to grades	41 (82)	9 (18)
Marketing through middleman	17 (34)	33 (66)
Availability of regulated market	50 (100)	0 (0)
Unremunerative prices	14 (28)	36 (72)
High cost of marketing of produce	49 (98)	1 (2)
Own Means of transport	0 (0)	50 (100)
E. Credit Issues		
Acquired loan from bank	22 (44)	28 (56)
Lack of credit facility	21 (42)	29 (58)
Lack of cheap credit	30 (60)	20 (40)

Figures in parentheses are percentages of the total.

c) Agronomic issues

When asked about certain agronomic issues, 60% of ginger farmers reported that there is availability of package of practices in local language, 52% respondents were of the view that there is lack of extension training facilities, problem of weed infestation was reported by 92% respondents and 44% responded that there is insect/pest infestation. About 66% responded for favour of Govt. policies for ginger farming.

d) Marketing issues

Marketing issues were also studied for ginger crop. 82% of ginger growers adopted grading system, 82% were getting prices according to grades and 32% ginger growers were marketing their produce through middlemen. All the ginger growers responded positively for having nearby regulated market for ginger produce at Dehradun. Only 28% responded there is an un-remunerative price of produce. 98% responded that cost of marketing of produce was high as all the respondents were marketing their produce through hired means of transport.

(e) Credit issues

When asked about the availability of credit, 44 % respondents said that they avail the facility of crop loan from bank, 42% responded that there is lack of credit facility and 60% responded that there is lack of cheap credit from banks for ginger farming.

Suggestions to Overcome the Constraints

- More emphasis should be given on R&D to release new verities/ seed for better yield and more resistance from diseases especially rotting problem of ginger.

- Govt. institutes should provide more extension services for getting good quality and high yield Farmers should also be trained for grading practices of ginger produce for having better market prices.

- Govt. should make provision for establishment of storage facility so that produce could be sold out during favorable market price of the produce.

- Establishment of cleaning, grading and semi-processing facility for fresh ginger raw material at the village level will ensure better returns to the ginger growers.

- Co-operative farming societies for ginger should be promoted to reduce high costs incurred on transport for marketing of produce.

- Govt. should also make provision for cheap financial services to promote ginger farming.

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