Journal of Agricultural Development and Policy, 2019
Volume 29, No. 2, 188-200

Groundnut Cultivation in Punjab- An Approach towards Crop Diversification

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Abstract

The present study was undertaken in Hoshiarpur district of Punjab to estimate costs and returns from groundnut in relation to its competing crop/crops,to work out the level of productivity of groundnut on the farms of different size groups and to analyze the constraints associated with production of groundnut in the study area using the primary data collected from 60 groundnut growers during the year 2017-18.The study revealed that per acre gross returns received from groundnut crop were higher by Rs. 694 as compared to maize crop while in case of paddy the gross income was higher by Rs. 24442 as compared to groundnut crop. The total variable costs came out to be less in maize crop than groundnut crop while in the production of paddy, more of Rs. 32556 were spent on variable expenses than the groundnut crop. The returns over variable costs from maize and paddy were worked out to be Rs. 7822 and Rs. 27859 respectively whereas from groundnut it came out to be Rs. 6355. Although paddy was found to be more profitable crop yet farmers in the study area preferred to grow groundnut as the expenses incurred on fertilizers ,human labour, machine use , plant protection chemicals on paddy were more as compared to groundnut crop. Majority of the farmers used local varieties of groundnut crop which gave less yield and consequently less profits. The high cost of seed, labour, hiring of farm machinery and other farm inputs were main constraints faced by the farmers in the cultivation of groundnut. Availability of hybrid seeds on subsidy, provision of subsidized inputs (plant protection chemicals), better marketing infrastructure and effective public procurement of the groundnut at the minimum support price (MSP) will promote its cultivation in the state.

Keywords: Costs,Groundnut, Productivity, Profitability

JEL Classification: Q11, Q12, Q13

Introduction

India is the fourth leading oilseeds producing country in the world next only to the USA, China and Brazil harvesting about 32.10 million tonnes of oilseeds per annum (2.7 per cent of world's oilseed production), grown in an area of nearly 26 million ha (19 per cent of world's oil seeds area) with an annual average yield of 1224 kg/ha (Anonymous 2017a).India is blessed with varied agro-ecological environments ideally

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suited for growing a variety of oilseeds which include groundnut, rapeseed and mustard, sunflower, soybean, sesamum, safflower, castor, linseed, niger seed and two perennial oilseeds (coconut and palm oil). Groundnut is one of the principal and an important oilseed and supplementary food crop in the world. Groundnut crop was raised on 25.30 million hectare area with total production of 43.07 million metric tons in 2016-17 in the world. China is the largest producer of groundnut, contributing about 41 per cent of the world production and around 20 per cent of area (Anonymous, 2018a). Globally, with annual all-season coverage of about 70 lakh hectares, India ranks first in acre age and with an output of about 85 lakh metric tonnes of in-shell groundnuts, it ranks second in production (Anonymous, 2017b). Major groundnut producing states were Gujarat, Andhra Pradesh, Rajasthan and Karnataka in India during 2016-17. However, total area under these states was decreased by 6.30 lakh ha (13.4 %) from 47.10 in 2016-17 to 40.80 lakh ha in 2017-18 and total production of crop also decreased by 2.75 lakh metric tonnes (5 %) from 53.75 in 2016-17 to 51.00 lakh metric tonnes in 2017-18. (Anonymous, 2018b).

Groundnut is called as the "King" of oilseeds. The seed of groundnut contains about 45 per cent oil and 26 per cent protein. The oilcake obtained after the extraction of the oil is a valuable organic manure and animal feed. It contains 7-8 per cent nitrogen, 1.5 per cent phosphorus and 1.5 per cent potash. Groundnut oil is also used in preparation of soap, fuel, cosmetics, shaving creams, leather and dressing furniture lubricant etc. Straw and haulms of groundnut are good source of animal feed and its raw material is used for silage. Groundnut being tasty and nutritious holds a lot of potential for value addition. An array of processed products of groundnuts alone or in combination of other foodstuffs can be popularized for enhancing direct consumption (Patel 2016). Despite being the fourth largest oilseed crop producing country in the world, India is also one of the largest importers of vegetable oils today. There is a spurt in the vegetable oil consumption in recent years in respect of both edible as well as industrial usages. The demand supply gap in the edible oils has necessitated huge imports accounting for 60 per cent of the country's requirement (Jha, 2017). Production of edible and non-edible vegetable oils was 7.6 million tons while the import of vegetable oil was 15.0 million tons during 2016-17 of worth Rs. 73048 crores. Despite commendable performance of domestic oilseeds production of the nine annual crops (compound growth rate of 3.89%), it could not match with the galloping rate of per capita demand which is increasing at the rate of six per cent due to enhanced per capita consumption (18 kg oil per annum) driven by increase in population and rise in enhanced per capita income.

In Punjab the total area under oilseeds cultivation was 43.1 thousand hectares while production was of 56.8 thousand tonnes in 2018-19. Groundnut is grown mainly in Hoshiarpur district in the Punjab state and is grown in very small area i.e., nearly 1.2 thousand hectares. The productivity of groundnut in Punjab was 816 kg per hectare in 1990-91, which increased to 1739 kg per hectare in 2012-13 and then to 1920 kg per hectare in 2016-17 (Anonymous, 2018c). Due to paddy-wheat monoculture, the area under oilseeds showed a declining trend over the years. Due to over exploitation of

ground water, increased cost of cultivation and soil structure deterioration there is an urgent need to change the cropping pattern for sustainable agriculture in Punjab. Ascertaining the importance of oilseeds and to step up oilseed production on sustainable basis, diversification of cropping systems has become essential. Thus, an attempt has been made in the present study to work out the profitability of groundnut in relation to its production in Hoshiarpur district of Punjab with the specific objective to examine the costs and returns from groundnut in relation to its competing crop/crops. The study also analyzed the constraints associated with production of groundnut in the study area.

Data Sources and Methodology

Multistage sampling technique was used to select the sample respondents. Hoshiarpur district was purposively selected for having the highest area under groundnut in Punjab. At the first stage of sampling, one block namely Bhunga was selected as the density of groundnut growers was the highest. Three villages from Bhunga block were chosen randomly at the second stage of sampling. From each village, 20 farmers were selected randomly making a sample of 60 groundnut growing farmers for the study. Using cube root frequency method of stratification, farmers were then categorized into three categories viz. small, medium and large on the basis of area under groundnut crop. The selection of farmers was done on the basis of probability proportional to the number of farmers in each category. Consequently, 32 small farmers, 14 medium farmers and 14 large farmers were selected based on their area under groundnut. Primary data were collected from sample households for the year 2017-18 by personal interview method using specially designed & pre-tested schedules. Information regarding the input use pattern and returns obtained from groundnut as well as competing crops i.e. maize and paddy crops was gathered from the sampled farmers. The costs, returns and profits in groundnut and competing crops were computed and compared on per acre basis.

The sum total of costs incurred on seeds, fertilizers, plant protection chemicals, human labour, machinery/ tractor hours and interest on working capital for half of the period covered under groundnut and competing crops constitute total variable costs. The gross returns were worked out by multiplying the total output and the average price received by the farmers. In order to compute the returns over variable cost, the total variable costs from the gross returns were deducted.

For the interpretation and comparison of costs and returns from crops and productivity levels on different sizes of farms and to generate information on other parameters, tabular analysis was carried out. Garret's Ranking Technique was used to rank the problems perceived by the sampled respondents. The degree of response with regard to problems faced by sampled respondents was ranked. The most prevalent problem was given 1st rank and accordingly the next important problem was ranked on the basis of the severity of the problem.

Per cent position= 100*(Rij – 0.5)/Nj

Where

Rij = Rank given for ith items/problems by the Jth respondent

Nj = Number of items/problems ranked by the Jth respondent

The relative position of each rank is converted into scores by referring the table given by Garrett and Woodworth (1971). Then for each factor problem, the scores of individual respondents were added together and mean score was calculated. The factor with highest mean score was considered to be the most important problem

Results and Discussion

Operational holding

Operational holding details of the sampled farmers have been depicted in Table 1. The average owned land in case of small, medium and large farmers was 3.89, 7.39 and 14.93 acre, respectively. About 0.84 acres of land was leased-in by the small farmers while medium farmers and the large farmers had 7.79 and 18.64 acres of lease in land respectively. Overall the operational land holding of the farmers was 13.90 acres while on small, medium and large farmers was the operational holding was 4.73, 15.18 and 33.57 acres respectively. Overall, owned and leased-in land of the farmers was 7.28 and 6.62 acres respectively.

Area under groundnut

A perusal of Table 2 depicts the average operational land holding and average area under the groundnut crop in the different categories of farmers. On overall basis, operational average area under groundnut was found to be 77.20 per cent (10.73 acres) of the operational holding. Average operational land holding of small, medium and large farmers were 4.73, 15.18 and 33.57 acres respectively, while the average area under groundnut on respective categories of farmers was 3.48, 12.63 and 25.39 acres respectively. The per cent area under groundnut was respectively74, 83 and 76 per cent of the operational holding for small, medium and large farmers respectively.

Cropping pattern

The major kharif and rabi crops in study area were groundnut and wheat that were grown on about 40 and 45 per cent of the gross cropped area respectively. A perusal of Table 3 indicated that gross cropped area under small, medium and large farmers was nine, 30 and 64 acres respectively. The medium farmers allocated more area under groundnut i.e. 42

Table 1: Size of operational holding of respondents in Hoshiarpur district, 2017-18

(Acres)

Particulars	Farm size categories			Overall
	Small	Medium	Large	
Owned land	3.89	7.39	14.93	7.28
Leased-in	0.84	7.79	18.64	6.62
Average operational holding	4.73	15.18	33.57	13.90
	(100.00)	(100.00)	(100.00)	(100.00)
Irrigated area	3.34	12.32	25.29	10.56
	(70.61)	(81.16)	(75.34)	(75.96)
Unirrigated area	1.39	2.86	8.28	3.34
	(29.39)	(18.84)	(24.66)	(24.04)

Note: Figures in parentheses are the percentages to their respective totals

Table 2: Area under groundnut crop on the sampled farms in Hoshiarpur district, 2017-18 (Acres)

Particulars	Farm size categories			Overall
	Small	Medium	Large	
Average operational holding	4.73	15.18	33.57	13.90
Average area under groundnut	3.48	12.63	25.39	10.73
Per cent area under groundnut crop (2/1)*100	73.57	83.20	75.63	77.20

Table 3: Cropping pattern on the sampled farms in Hoshiarpur district, Punjab 2017-18 (Acres)

Particulars	Farm size categories			Overall
	Small	Medium	Large	
Kharif crops				
Groundnut	3.48	12.63	25.39	10.73
	(37.10)	(42.24)	(39.62)	(39.84)
Paddy	0.66	1.50	3.21	1.45
	(7.04)	(5.02)	(5.00)	(5.38)
Maize	0.18	0.23	1.18	0.43
	(1.92)	(0.76)	(1.84)	(1.60)
Sugarcane	0.08	0.46	3.05	0.86
	(0.85)	(1.54)	(4.76)	(3.20)
Vegetables	0.06	0.08	0.40	0.14
	(0.65)	(0.26)	(0.62)	(0.52)
Fodder (Sorghum)	0.27	0.28	0.34	0.29
	(2.87)	(0.94)	(0.54)	(1.07)
Zaid crop				
Spring maize	0.14	0.28	1.01	0.38
	(1.49)	(0.95)	(1.58)	(1.41)
Rabi crops				
Wheat	4.14	13.95	28.73	12.17
	(44.14)	(46.66)	(44.83)	(45.20)
Sugarcane	0.08	0.46	3.05	0.86
	(0.85)	(1.54)	(4.76)	(3.20)
Vegetables	0.08	0.11	0.38	0.15
	(0.86)	(0.36)	(0.59)	(0.56)
Fodder (Barseem)	0.29	0.38	0.40	0.33
	(3.09)	(1.27)	(0.62)	(1.22)
Net cropped area	4.73	15.18	33.57	13.90
Gross cropped area	9.38	29.90	64.09	26.93
	(100.00)	(100.00)	(100.00)	(100.00)

Note: Figures in parentheses are the percentages to the gross cropped area.

per cent followed by 38 per cent and 37 per cent by large and small farmers respectively. After groundnut crop, highest proportion of area was allocated under paddy by small (7.04 %), medium (5.02%) and large farmers (5.00 %) respectively. In rabi season area allocated under wheat on small, medium and large farms was 44 ,47 and 45 per cent of the gross cropped area respectively.

Source of seed

Seed is the most important and crucial input for crop production. On an average, 15 per cent of farmers used self retained seed as well as purchased from institutions while 13.33 per cent farmers used only purchased seed from institutions (Table 4). At overall level, the large proportion of farmers (71.67%) used their owned seed for groundnut crop which was retained in the preceding year. The farmers' own seed were first choice for the cultivation of crop as compared to any other source. Only small farmers purchased seed from institutions like KVKs. Majority of medium farmers (92.86%) used their owned seed followed by large farmers (85.71%) and small farmers (56.25%). The second preference went for home and institutional seed with seven per cent , 14 and 18 per cent of medium, large and small farmers respectively.

Varieties of groundnut crop

The productivity of seed is dependent upon quality and variety of seed. A perusal of Table 5 reveals that on an average, 40 per cent of farmers used local varieties of seeds.

Large number of the medium farmers (57.14%) used local seeds (T-24) followed by small farmers (50%).The hybrid seeds were used by 35 per cent of the small farmers followed by 14 per cent each of the medium and large farmers respectively. The large farmers used local varieties of seeds along with hybrid varieties of seeds. At the overall, local and hybrid seeds both were used by 22 per cent of the farmers. The local, hybrid and SG99 seeds were used by only 14 per cent of the large farmers while only six per cent of small farmers used local and SG99 seeds. The results revealed that the majority of farmers used local variety of seeds since they had been using same variety of seeds for many years.

Table 4: Source of groundnut seed of the sampled farmers in Hoshiarpur district, 2017-18

(Number)

Particulars	**Farm size categories**			**Total**
	Small	**Medium**	**Large**	
Self –retained	18	13	12	43
	(56.25)	(92.86)	(85.71)	(71.67)
Institutional (PAU) sources	8	-	-	8
	(25.00)			(13.33)
Self -retained & institutional	6	1	2	9
sources	(18.75)	(7.14)	(14.29)	(15.00)
Total sample size	**32**	**14**	**14**	**60**
	(100.00)	(100.00)	(100.00)	(100.00)

Note: Figures in parentheses are the percentages to their respective totals

Table 5: Different varieties of groundnut used by sampled farmers in Hoshiarpur District, 2017-18. **(Number)**

Particulars	Farm size categories			Overall
	Small	Medium	Large	
Local (T-24)	16 (50.00)	8 (57.14)	-	24 (40.00)
Hybrid (T-37)	11 (34.38)	2 (14.29)	2 (14.29)	15 (25.00)
Local (T-24) & Hybrid (T-37)	1 (3.13)	4 (28.57)	8 (57.14)	13 (21.67)
Local (T-24), Hybrid (T-37) & SG99	-	-	2 (14.29)	2 (3.33)
Local (T-24) & SG 99	2 (6.25)	-	-	2 (3.33)
Hybrid (T-37) & SG-99	-	-	2 (14.29)	2 (3.33)
SG-99	2 (6.25)	-	-	2 (3.33)
Total sample size	**32** (100.00)	**14** (100.00)	**14** (100.00)	**60** (100.00)

Note: Figures in parentheses are the percentages to their respective totals

Table 6: Resource use level of groundnut on the sampled farms in Hoshiarpur district, 2017-18.

Particulars	Units	Farm size categories			Overall
		Small	Medium	Large	
Area	Acres	3.48	12.63	25.39	10.73
Number of ploughings	No./acre	2.41	2.71	2.79	2.57
Seed	Kg/acre	40.94	42.50	45.43	42.35
Irrigations	No./acre	1.09	1.14	1.21	1.13
Fertilizers					
Urea	Kg/acre	10.16	12.50	17.86	12.50
MOP	Kg/acre	13.28	17.86	19.64	15.83
SSP	Kg/acre	39.84	41.07	55.00	43.66
Gypsum	Kg/acre	20.84	45.64	60.28	35.83
Human labour					
Family	Hrs/acre	23.63	20.70	16.72	21.33
Hired	Hrs/acre	56.69	58.32	63.00	58.62
Total	Hrs/acre	80.32	78.92	80.11	79.95
Machine use	Hrs/acre	6.95	7.30	7.90	7.17
Plant Protection Chemicals	No./acre	1.57	2.08	2.57	1.92

Costs and returns structure in the production of groundnut

Resource use structure

The quantities of various inputs directly affect the cost of cultivation and therefore, the use of different inputs like human labour, seeds, manures, fertilizers etc. in quantitative and monetary terms were studied in detail. The information on utilization of different resources for production of groundnut on the sampled farms is presented in Table 6. The area under groundnut in case of small, medium and large farmers was three, 13 and 25 acres respectively with overall average of 11 acres per farm. The large farmers ploughed the field on an average 2.79 times while 2.71 and 2.41 times ploughings were undertaken by small and medium respectively with an overall average of 2.57 times. The seed used per acre on large farms was 45.43 kg/ acre followed by medium farmers (42.50 kg/acre) and small farmers (40.94 kg/acre) with an average of 42.35 kg/acre. The fields irrigated by small, medium and large farmers were 1.09, 1.14 and 1.21 times respectively with overall average of 1.13 times. The use of fertilizers per acre increased as the size of farm increased. As such, fertilizers used per acre on small, medium and large farms were 84, 117 and 153 kg/acre respectively with an overall average of 108 kg/acre.

The human labour, a vital input to conduct various farm operations is generally provided by family members and hired labour. The human labour used by the small, medium and large farmers for performing different operations in groundnut cultivation was 80, 79 and 80 hours per acre respectively with overall average of 79.95 hours per acre. Out of total labour used, small, medium and large farmers employed 24, 21 and 17 hours of family labour respectively. The large farmers used more of hired labour (63 hours) as compared to medium (59 hours) and small (57 hours) farmers. At overall, average family labour and hired labour was used for 21 and 59 hours respectively. The machines used on large, medium and small farms were for 7.90, 7.30 and 6.95 hours per acre respectively with overall average of 7.17 hours per acre. The number of sprays of plant protection chemicals performed on large, medium and small farms was 2.57, 2.08 and 1.57 sprays respectively with an average of 1.92 sprays.

The variable costs in the production of groundnut have been presented in Table 7. Overall, the expenditure on seeds was 38 per cent of total variable cost while expenditure on seeds was 36, 39 and 40 per cent on small, medium and large farms, respectively. The expenditure on fertilizers was six, eight and nine per cent of total variable costs on the respective categories of farms with an average of seven per cent. The large farmers used more (21.79%) hired labour, while the respective figures for medium and small farmers were 20.18 per cent and 18.46 per cent respectively. The cost on the use of total labour for large farms was 27.55 per cent followed by medium (27.33 %) and small (26.14%) farms with an overall average of 26.74 per cent. The cost incurred on hiring machinery was found higher in small farms (21.32 %) followed by medium (9.68%) and large farms (3.88%) with overall average of 14.66 per cent of total variable costs. Large farmers spent more in owning machinery i.e, 6.04 per cent as compared to medium (4.45%) and small farmers (1.39%). The variable costs per acre in case of small farmers was found the highest as these were Rs.11760 followed

Table 7: Farm category wise variable costs of groundnut cultivation of the sampled farmers in Hoshiarpur district, 2017-18 (Rs. /acre)

Particulars	Farm size categories			Overall
	Small	Medium	Large	
Seed	4222.76 (35.90)	4383.07 (39.10)	4549.17 (39.83)	4336.33 (37.53)
Fertilizer				
Urea	63.25 (0.54)	93.29 (0.83)	155.36 (1.36)	91.75 (0.79)
MOP	185.74 (1.58)	267.96 (2.39)	312.50 (2.74)	234.50 (2.03)
SSP	261.56 (2.22)	199.37 (1.78)	276.78 (2.42)	250.60 (2.17)
Gypsum	145.90 (1.24)	319.59 (2.85)	337.00 (2.95)	231.02 (2.00)
Total	656.45 (5.58)	880.21 (7.85)	1081.64 (9.47)	807.87 (6.99)
Irrigation charges	20.50 (0.17)	63.68 (0.57)	45.44 (0.40)	36.39 (0.32)
Human labour				
Family	903.24 (7.68)	801.68 (7.15)	657.51 (5.76)	822.21 (7.12)
Hired	2170.76 (18.46)	2262.47 (20.18)	2489.22 (21.79)	2266.47 (19.62)
Total	3074.00 (26.14)	3064.15 (27.33)	3146.73 (27.55)	3088.68 (26.74)
Machine use				
Hired	2507.81 (21.32)	1085.71 (9.68)	442.86 (3.88)	1694.17 (14.66)
Owned	163.38 (1.39)	498.57 (4.45)	689.93 (6.04)	364.45 (3.15)
Total	2671.19 (22.71)	1584.28 (14.13)	1132.79 (9.92)	2058.62 (17.82)
Plant protection chemicals	979.96 (8.33)	1105.61 (9.86)	1334.79 (11.69)	1092.07 (9.45)
Interest on variable cost @ 7% for half of period of the crop	135.63 (1.15)	129.28 (1.15)	131.72 (1.15)	133.24 (1.15)
Total variable costs	11760.49 (100.00)	11210.28 (100.00)	11422.29 (100.00)	11553.20 (100.00)

Note: Figures in parentheses are the percentages to their respective totals

by large (Rs.11422) and medium (Rs. 11210) farmers. The interest on variable costs was estimated to the tune of Rs.136, Rs.129 and 132 on small, medium and large farmers respectively. On an average, the figure came out to be Rs. 133. The overall total variable cost in the production of groundnut was estimated to be Rs. 11553 per acre.

Productivity and returns from groundnut production

A perusal of Table 8 reveals that on an average yield of groundnut was estimated to be 4.93 quintals per acre while on small , medium and large farms it was 4.72, 4.83 and 5.51quintals per acre respectively. The price per quintal of produce received by small, medium and large farmers was Rs. 3453, Rs.3621 and Rs.3946 respectively. The large farmers got better price as compared to medium and small farmers because of their better bargaining power and good quality of produce. Similar findings were reported by Prasad *et al* (2013). The price per quintal of by-product was Rs.86, Rs.90 each for small, medium and large farmers respectively. The gross returns from groundnut were Rs. 16710, Rs. 17936 and Rs. 22250 on small, medium and large farms respectively with overall average of Rs.18226. The returns over variable costs were found to be Rs. 4949, Rs. 6726 and Rs.10828 for small, medium and large farmers respectively. The input-output ratio came out to be 1.57 on overall basis while it was 1.42, 1.60 and 1.94 respectively on the respective categories of farms in study area.

Comparative economics of groundnut vis-à-vis other competing crops

The comparative economics per acre of groundnut and its competing crops in kharif season is shown in Table 9. The gross returns of Rs. 694 were estimated more in groundnut crop as compared to maize crop while in paddy crop the gross income of Rs. 24442

Table 8: Productivity and returns from groundnut production on different categories of farms in Hoshiarpur district, Punjab, 2017-18 (Per acre)

Particulars	Farm size categories			Overall
	Small	Medium	Large	
Main product				
Yield (qtls)	4.72	4.83	5.51	4.93
Sale price (Rs./qtls)	3453.13	3621.43	3946.43	3607.50
Returns (Rs.)	16298.77	17491.50	21744.83	17784.97
By product				
Yield (qtls)	4.77	4.95	5.60	5.01
Sale price (Rs./qtls)	86.28	89.79	90.29	88.03
Returns (Rs.)	411.56	444.46	505.62	441.03
Gross returns	16710.33	17935.96	22250.45	18226.00
Total variable cost (Rs.)	11760.49	11210.28	11422.29	11553.20
Returns over variable costs	4949.17	6725.68	10828.16	6354.34
Input-Output ratio	1.42	1.60	1.94	1.57

Table 9: Comparative economics of groundnut vis-à-vis other competing crops in kharif season on sample farms in Hoshiarpur district, 2017-18 **(Rs./acre)**

Particulars	Groundnut	Maize	Difference	Groundnut	Paddy	Difference
Seed	4336.33	1216.76	3119.57	4336.33	202.74	4133.59
Fertilizers						
Urea	91.75	339.13	-247.38	91.75	845.64	-753.89
MOP	234.50	0.00	234.50	234.50	0.00	234.50
DAP	0.00	1006.40	-1006.40	0.00	395.52	-395.52
SSP	250.60	700.38	-449.78	250.60	224.29	26.31
Gypsum	231.02	0.00	231.02	231.02	0.00	231.02
Zinc	0.00	0.00	0.00	0.00	576.93	-576.93
Total	807.87	2045.90	-1238.03	807.87	2042.38	-1234.51
Irrigation charges	36.39	26.92	9.47	36.39	30.29	6.11
Human labour						
Family	822.21	1164.93	-342.72	822.21	3188.97	-2366.77
Casual	2266.47	2470.92	-204.45	2266.47	3866.96	-1600.49
Total	3088.68	3635.72	-547.04	3088.68	7055.93	-3967.25
Machine use	2058.62	1672.25	386.37	2058.62	3459.67	-1401.05
Plant protection chemicals	1092.07	1028.54	63.53	1092.07	1805.24	-713.17
Interest on variable cost @ 7% for half of period	133.24	84.23	49.01	133.24	212.86	-79.62
Total variable costs	**11553.20**	**9710.33**	**1842.87**	**11553.20**	**14809.11**	**-3255.91**
Main product	4.93	14.65	-9.72	4.93	26.84	-21.91
Sale price (Rs./qtls)	3607.5	1100	2507.50	3607.5	1590.00	12017.50
By product	5.01	14.25	-9.25	5.01	0.00	5.01
Sale price (Rs./qtls)	88.03	98.50	-10.47	88.03	-	88.03
Gross returns	**18226.00**	**17532.08**	**693.92**	**18226.00**	**42668.03**	**-24442.03**
Input-output ratio	1.57	1.81	-0.24	1.57	2.88	-1.31

Table 10: Perceived constraints in the production of groundnut in Hoshiarpur district, 2017-18

Problems	Total score	Rank
Costly fertilizers	2698	6
Costly labour	4708	1
Costly hiring of machinery	3014	4
High price of insecticide/pesticide	3392	3
Incidence of insect pest attack	2889	5
High interest on credit facilities	2280	7
Poor pod setting	3848	2

was estimated more as compared to groundnut crop. These results were in consonance with the findings of Thulasiram et al (2018). The table reveals that the cost of seed was much more in groundnut cultivation than maize and paddy. A difference in cost of seed of Rs. 3120 in case of maize and Rs. 4134 in case of paddy crop was observed. The cost of fertilizers human labour and plant protection chemicals was estimated more in maize and paddy crops as compared to groundnut crop. The total variable costs were estimated to be less in maize crop than groundnut crop while in the production of paddy more of Rs.3256 were spent than the groundnut crop. Though more of expenditure was to be incurred in production of paddy but on the other hand returns attained were much more due to more of yield level in paddy crop. But farmers in the study area preferred to put more area under groundnut (77.20 % of the operational holding) due to less variable expenses in the cultivation of groundnut and less number of irrigations required for groundnut crop.

Constraints in the production of groundnut

The constraints as perceived by groundnut farmers during the production of groundnut are presented in Table 10. However, many problems were faced by the farmers in the production of groundnut. According to Garrett Mean score, costly labour was at top rank. The constraint of poor pod setting was given the second rank by groundnut producers. The third rank was given to high prices of insecticides and pesticides. Lack of easy availability of insecticide and pesticide resulted in the increase in prices. Higher cost of hiring machinery was given fourth rank while incidence of pest attack, costly fertilizers and high interest on credit facilities were given fifth, sixth and seventh rank respectively.

Conclusion and Policy Implications

The study brought out that the cropping pattern of sampled farmers was dominated by groundnut crop and it contributed about 39 per cent share in the gross cropped area which was greater than the share of its competing crops viz . maize and paddy. The input-output ratios were greater than unity in groundnut indicated that it was a profitable crop in selected area. But it was observed that the input output ratio was found to be less in groundnut and maize crop as compared to paddy crop. Paddy crop was found to be more profitable than groundnut crop and maize. Use of local varieties of seeds, poor pod setting, costly labour, costly machinery, un-

remunerative output price etc were identified production problems in study area. Farmers should make use of hybrid varieties of seeds to increase yield and profitability. A regular trend to train producers may prove useful through KVK' s in order to enrich the farmers about technology like doses of fertilizers, insecticides- pesticides required for crop. The government's policy should ensure remunerative price to groundnut growers for their produce with a view to encourage its cultivation in the state particularly in the context of sustainable agricultural development.

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Received: September 5, 2019 Accepted: November 3, 2019