



Comparative Economics of Maize and Paddy Cultivation in Punjab

Navjot Kaur, Raj Kumar and Ravneet Singh Brar

Department of Economics and Sociology,
Punjab Agricultural University, Ludhiana 141004 (Punjab)

ABSTRACT

This paper was an attempt to analyze the economics of maize (*Zea mays L.*) production and marketing in Punjab state of India. Two districts namely Hoshiarpur and SBS Nagar were selected for the collection of primary data from a sample of 100 maize growers. Multistage random sampling technique was employed to select sample representing different farm size categories to examine comparative economics of maize and its major competing crop (paddy) has been worked out. The data were collected using structured interview schedule. The results revealed that there was a major shift of maize area to rice. The assured market for paddy ensures better returns from paddy cultivation under present price policy. The results revealed that none of farmers sold their produce to the government agencies as the public procurement agencies do not procure maize which depressed the maize prices as compared to its MSP. The farmers have to sell their produce with high moisture content due to lack of drying facilities. Some high capacity dryers are there which are not beneficial to farmers having less farm produce. There is a need of low capacity dryers and set up of maize processing industries to enable farmers to fetch remunerative prices of maize produce. So, strengthening research to develop high yielding varieties and improvement in market infrastructure are prerequisites to make this crop more profitable.

Key Words: Constraints, Economics of maize, Maize, Marketing, MSP, Production practices.

INTRODUCTION

Maize (*Zea mays L.*) is known as Queen of Cereals is globally a top ranking cereal in productivity, human food, animal feed and as a source of large number of industrial products. Maize is the third most important Kharif season crop after paddy and cotton in Punjab. The area under maize in Punjab has declined from 1.65 lakh ha in 2000-01 to 1.27 lakh ha in 2015-16 (Anon, 2016). Similarly, with an average productivity of 36.83 q/ha, the total maize production in the state was 4.68 lakh tons during 2015-16 (Anon, 2016). The decrease in the area under these crops resulted in a sharp decline in diversity in the cropping pattern and the emergence of wheat-rice specialization over the past few decades. This declining diversity has severe effect in the terms of overuse of water resources, soil nutrients and ecological problems such as air water and soil pollution.

Maize crop can be promoted towards the crop diversification in Punjab due to less water consumption and reasonable returns. In the light of these concerns present study was planned to estimate the scope of maize crop in the present crop rotation of Punjab farmers. The present investigation was an attempt to study the cost of cultivation of maize vis-à-vis paddy and the constraints in production and marketing of maize in Punjab.

MATERIALS AND METHODS

The major maize growing districts were Hoshiarpur, Roopnagar, S.B.S. Nagar and Gurdaspur, which covers more than 83 per cent area under maize in the state. Out of these Districts, *i.e.* Hoshiarpur and SBS Nagar were selected for the study with two blocks from each district and a cluster of two to three villages were randomly selected from each block. Further, a sample of

*Corresponding Author's Email: navjotbhullar572@gmail.com

25 maize growers from each cluster of villages representing different farm size categories was taken following the probability proportion to size. These farmers were categorized into marginal farmers (up to 1 ha), small farmers (1 to 2 ha), semi-medium farmers (2 to 4 ha), medium farmers (4 to 10 ha) and large farmers (>10 ha) of operational holdings. The comparative economics of maize and paddy has been worked out on the basis of primary data collected from 100 farmers representing different farm size categories. The results regarding various cultivation practices being followed by the sample farmers, along with returns and costs involved in cultivation were calculated.

RESULTS AND DISCUSSION

Cropping pattern

The results presented in Table 1 show the crops preceding the maize crop and it depicts cropping pattern of the sample maize growers. A significant factor, which affects the productivity of maize crop, is the type of crop previous to maize crop raised by the farmers. Wheat was the most important *Rabi* crop in the selected districts covering about 34.97 per cent of the gross cropped area (GCA) in the selected district.

The main reason for growing maize crop instead of paddy was lack of availability of irrigation water. Another reason was that the maize crop was performing better than paddy in the study area. The overall results revealed that, maize stood at first place in *kharif* season with 23.55 per cent of GCA followed by paddy (15.0%), sugarcane (8.26%) and *kharif* fodder (2.81%). The analysis of the composition of crops as a whole revealed that wheat crop occupied highest area to the tune of 34.97 per cent, which was followed by maize with 23.55 per cent of the GCA. Maize occupied about two times more area than paddy and three times more than sugarcane. The percentage share of maize was observed to be 15.90, 24.80, 23.52, 26.63 and 27.53 per cent of GCA in case of large, medium, semi-medium, small and marginal farmers respectively.

The marginal, small, semi-medium and medium farmers grow maize due to the lack of availability of irrigation water in entire sample. At overall level, percentage of cropping intensity was 191.37 per cent.

Economics of *kharif* maize

The information regarding cost returns aspects of *kharif* maize has been presented in Table 2. The thorough perusal of the results revealed that human labour, farm machinery use and fertilizers and manures use together constituted 80.66 per cent of the total costs. It was observed that in the whole sample, large farmers managed to realize higher gross return from the *kharif* maize to the tune of Rs. 59847/-ha as compared to medium farmers (Rs. 58047/-ha), semi-medium farmers (Rs.51837/-ha), small farmers (Rs.48087/-ha) and marginal farmers (Rs.42175/-ha).

The returns over variable costs obtained by large, medium, semi-medium, small and marginal farmers were found to be Rs.28140/-, 27477/-, 21102/-, 17995/- and 12652/-ha, respectively. Overall, average returns over variable costs from *kharif* maize turned out to Rs.20940/-ha. The large farmers got higher returns over variable costs in the entire sample. This can be attributed to large marketable surplus and better bargain power. Another reason may be that the most of the farmers sell their produce after drying, which fetch higher price in the market as compared to the grains with moisture. The marginal, small and some semi-medium farmers have to sell their produce immediately after harvesting due to lack of drying facilities. As a result, they get lower price for their produce. At Overall level, gross return from *kharif* maize was to the tune of Rs. 51980/- ha.

The average productivity of maize crop was high in case of medium farm size category (47.38 q/ha) followed by large farmers (46.60q/ha), small farmers (45.40q/ha), semi-medium farmers (43.83q/ha) and marginal farmers (42.83q/ha). Productivity of medium farm size category was higher as compared to other categories because

Comparative Economics of Maize and Paddy

Table 1. Cropping pattern with the sampled farmers in Punjab, (ha/farm).

Particulars	Farm size category					
	Marginal	Small	Semi-medium	Medium	Large	Overall
Maize	0.35 (27.53)	0.69 (26.63)	1.25 (23.52)	2.82 (24.80)	3.54 (15.90)	1.61 (23.55)
Paddy	0.13 (10.44)	0.37 (14.40)	1.10 (20.74)	1.52 (13.37)	2.37 (10.64)	1.02 (15.00)
Kharif fodder	0.10 (7.91)	0.12 (4.49)	0.14 (2.63)	0.15 (1.34)	0.97 (4.36)	0.19 (2.81)
Sugarcane	0.06 (4.43)	0.14 (5.42)	0.15 (2.85)	0.86 (7.60)	3.46 (15.50)	0.56 (8.26)
Orchard	0.02 (1.58)	0.02 (0.77)	0.01 (0.15)	0.09 (0.81)	0.26 (1.15)	0.06 (0.82)
Moong	-	-	0.04 (0.75)	0.10 (0.98)	1.20 (5.38)	0.12 (1.82)
Wheat	0.42 (33.23)	0.94 (36.22)	2.11 (39.67)	3.78 (33.40)	6.23 (27.96)	2.39 (34.97)
Rabi fodder	0.10 (7.91)	0.12 (4.49)	0.17 (3.16)	0.19 (1.65)	0.60 (2.69)	0.18 (2.69)
Mustard	0.06 (4.75)	0.12 (4.80)	0.26 (4.81)	0.63 (5.52)	1.26 (5.63)	0.38 (5.51)
Potato	0.03 (2.22)	0.03 (1.24)	0.01 (0.23)	0.21 (1.83)	1.16 (5.19)	0.18 (2.58)
Green pea	-	0.02 (0.77)	0.02 (0.45)	0.06 (0.49)	0.47 (2.12)	0.03 (0.41)
Sunflower	-	0.01 (0.46)	0.03 (0.60)	0.07 (0.60)	0.37 (1.67)	0.06 (0.39)
Spring maize	-	0.02 (0.62)	0.02 (0.45)	0.10 (0.88)	0.40 (1.81)	0.05 (0.82)
Gross cropped area	1.26 (100.00)	2.58 (100.00)	5.32 (100.00)	11.37 (100.00)	22.29 (100.00)	6.83 (100.00)
Cropping intensity (%)	192.68	193.41	197.48	204.97	189.92	191.37

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

Table 2. Cost and returns of *kharif* maize cultivation on different farm size categorie (Rs/ha)

Particular	Farm size category					
	Marginal	Small	Semi-Medium	Medium	Large	Overall
Variable costs						
Seed and Seed Treatment	2317.50 (7.85)	2397.50 (7.97)	2585.00 (8.41)	2672.50 (8.74)	2745.00 (8.66)	2627.50 (8.47)
Fertilizers and Manures	6680.00 (22.63)	6892.50 (22.90)	7245.00 (23.58)	7875.00 (25.76)	8240.00 (25.99)	7660.00 (24.68)
Weedicides	282.50 (0.95)	310.00 (1.03)	445.00 (1.45)	410.00 (1.34)	435.00 (1.37)	410.00 (1.32)
Insecticides	722.50 (2.45)	792.50 (2.64)	1022.50 (3.32)	837.50 (2.74)	817.50 (2.58)	872.50 (2.81)
Irrigations	327.50 (1.11)	345.00 (1.14)	375.00 (1.22)	542.50 (1.78)	612.50 (1.93)	490.00 (1.58)
Human Labour	13012.50 (44.08)	12995.00 (43.19)	12675.00 (41.24)	12435.00 (40.68)	12130.00 (38.26)	12510.00 (40.30)
Machinery Use	4542.50 (15.39)	4720.00 (15.68)	4785.00 (15.57)	4870.00 (15.93)	5132.50 (16.19)	4867.50 (15.68)
Transportation Charges	540.00 (1.83)	502.50 (1.67)	470.00 (1.53)	435.00 (1.42)	410.00 (1.29)	450.00 (1.45)
Marketing Charges	447.50 (1.52)	472.50 (1.57)	457.50 (1.49)	492.50 (1.61)	485.00 (1.53)	470.00 (1.52)
Sub-total (I to viii)	28875.00 (97.80)	29430.00 (97.80)	30060.00 (97.80)	30267.50 (97.80)	31010.00 (97.80)	30357.00 (97.80)
Interest on variable costs @ 9 % for half the crop period	650.00 (2.20)	662.50 (2.20)	677.50 (2.20)	680.00 (2.20)	697.50 (2.20)	682.50 (2.20)
Total Variable Costs	29522.50 (100.00)	30092.50 (100.00)	30735.00 (100.00)	30570.00 (100.00)	31707.50 (100.00)	31040.00 (100.00)
Returns						
Main Product	42.83	45.40		47.38	46.60	45.18
	886.67	968.42		1130.36	1185.71	1052.50
	37972.50	43967.50		53550.00	55252.50	47547.50
By Product	51.40	51.85		58.15	60.98	55.13
	81.76	79.51		77.30	75.34	78.58
	4202.50	4122.50		4495.00	4595.00	4432.50
Gross Returns (a+b)	42175.00	48087.50		58047.50	59847.50	51980.00
Returns over variable costs (B-A)	12652.50	17995.00		27477.50	28140.00	20940.00

Figures in the parentheses are percentages to their respective total costs.

Comparative Economics of Maize and Paddy

they followed the PAU's recommendation. Human labour, fertilizers and manures were the important source of variables responsible for increasing the productivity. The use of these variables had to be carefully extended by medium farm size category to increase the productivity. None of the farmer sells their produce at minimum support price (MSP) in the maize grain market because of the high moisture content in produce. Mostly large, medium and some semi-medium farmers take the advantage of drying facility in markets but marginal and small farmers were not taking the advantage of drying facilities because of less quantity of produce. Those farmers who were sold the produce after drying fetch higher price in the market as compared to the grains with moisture. The marginal, small and some semi-medium farmers have to sell their produce immediately after harvesting due to lack drying facility.

Economics of paddy crop

Paddy is a major competitive crop of *kharif* maize. Economics of paddy had been discussed in Table 3. The high input requirements of the paddy crop have well been reflected in the operational cost of cultivation, which stands at Rs.29827/-ha. Human labour accounted for 30.52 per cent of the total cost of cultivation followed by farm machinery with 22.47 per cent. Another 21.22 per cent of the total cost is accounted for by the fertilizers and manures. The plant protection measures constituted another 7.92 per cent of the total cost. The gross returns of the paddy output realized by the farmers have been recorded at Rs. 78400 /-ha. The returns over variable costs accruing to the large, medium, semi-medium, small and marginal farmers have been observed to be Rs. 51932/-ha, 45917/-ha, 47272/-ha, 48215/-ha and 45762/-ha, respectively.

Comparison between maize vis-à-vis paddy

The economics of a crop in comparison to its competing crops was the major factor which affects its choice by the farmers. Therefore, it was considered relevant to analyze the returns over variable costs from maize crop vis-à-vis the

paddy crop. An effort has been made to make the comparison of different cultivars of maize with the competing crop paddy.

The costs comparison of *kharif* maize and paddy conclusively established that both the cost and returns were the highest in the case of *kharif* maize crop (Table 4). It had been revealed that cost of maize cultivation was higher as compared to paddy. This may be due to the higher cost on human labour, machinery labour, seed and seed treatments and fertilizers and manure. Quite marked differences have been observed in case of gross returns accruing from paddy and *kharif* maize cultivation. Per hectare gross returns from paddy have been recorded at Rs. 78,400/- as compared to Rs. 51,980/- for *kharif* maize. Similar trend has been observed in case of returns over variable cost.

Paddy, the major competing crop has the assured market price and procurement price but in the case of maize, the support price was generally less than even the post-harvest market price. Further, the productivity of maize crop is subjected to high degree of variations owing to climatic fluctuations, attack of birds and animals, insects and diseases. The comparative crop economics has given clear cut verdict in favour of paddy as compared to *kharif* maize, thus, the area under paddy is bound to increase at the cost of maize.

CONCLUSION

To increase the area under maize crop, its MSP need be fixed in such a way that it can compete with paddy. High capacity dryer have been installed in maize markets in Punjab state which were only beneficial for medium and large farmers whereas marginal and small farmers can't use these dryer due to low farm produce. Therefore, low capacity dryers should be implanted in maize markets to eradicate this problem. The marketing of maize has to be improved by Government agency, which must procure the maize produce from the farmers as in case of wheat and paddy. To diversify the agriculture, it is necessary to encourage maize

Table 3. Cost and returns of paddy cultivation on different farm size categories in sample farmers in Punjab. (Rs./ha)

Particular	Farm size category						
	Marginal	Small	Semi-medium	Medium	Large	Overall	
Variable cost							
i. Seed and Seed Treatment	747.50 (2.67)	780.00 (2.67)	897.50 (3.04)	987.50 (3.03)	1025.00 (3.38)	945.00 (3.17)	
ii. Fertilizers and Manures	5865.00 (20.93)	6000.00 (20.50)	6217.50 (21.04)	6415.00 (19.69)	6475.00 (21.36)	6320.00 (21.19)	
iii. Weedicides	552.50 (1.97)	792.50 (2.71)	747.50 (2.53)	842.50 (2.59)	940.00 (3.10)	817.50 (2.74)	
iv. Insecticides	1300.00 (4.64)	1467.50 (5.01)	1590.00 (5.38)	1535.00 (4.71)	1507.50 (4.97)	1540.00 (5.16)	
v. Irrigations	1587.50 (5.67)	1642.50 (5.61)	1597.50 (5.41)	1860.00 (5.71)	1975.00 (6.52)	1770.00 (5.93)	
vi. Human Labour	9297.50 (33.18)	9497.50 (32.44)	9217.50 (31.19)	9025.00 (27.69)	8785.00 (28.98)	9087.50 (30.47)	
vii. Machinery Use	6235.00 (22.25)	6410.00 (21.90)	6625.00 (22.42)	6720.00 (20.62)	6932.50 (22.87)	6692.50 (22.44)	
viii. Transportation Charges	1082.50 (3.86)	1265.00 (4.32)	1242.50 (4.20)	1205.00 (3.70)	1185.00 (3.91)	1217.50 (4.08)	
ix. Marketing Charges	737.50 (2.63)	775.00 (2.65)	767.50 (2.60)	785.00 (2.41)	822.50 (2.71)	782.50 (2.62)	
x. Sub-total(i to viii)	27402.50 (97.80)	28632.50 (97.80)	28902.50 (97.80)	31872.50 (97.80)	29650.00 (97.80)	29170.00 (97.80)	
xi. Interest on variable costs @ 9 % for half the crop period	617.50 (2.20)	645.00 (2.20)	650.00 (2.20)	717.50 (2.20)	667.50 (2.20)	657.50 (2.20)	
Total Variable Cost	28017.50 (100.00)	29275.00 (100.00)	29552.50 (100.00)	32587.50 (100.00)	30317.50 (100.00)	29827.50 (100.00)	
Return							
Main product	Average Productivity (q/ha)	52.70	55.35	54.88	56.08	58.75	56.00
	Average Price (Rs/q)	1400.00	1400.00	1400.00	1400.00	1400.00	1400.00
	Return	73780.00	77490.00	76825.00	78505.00	82250.00	78400.00
B. Gross Returns	73780.00	77490.00	76825.00	78505.00	82250.00	78400.00	
Returns over variable costs(B-A)	45762.50	48215.00	47272.50	45917.50	51932.50	48572.50	

Note: Figures in the parentheses are percentages to the total costs

Comparative Economics of Maize and Paddy

Table 4. Comparative economics of *kharif* maize and paddy.

(Rs/ha)

Particular	Farm size category					
	Marginal	Small	Semi-medium	Medium	Large	Overall
Variable Costs						
Maize	29522	30092	30735	30570	31707	31040
Paddy	28017	29275	29552	32587	30317	29827
Gross Returns						
Maize	42175.00	48087	51837	58047	59847	51980
Paddy	73780.00	77490	76825	78505	82250	78400
Returns over variable costs (ROVC)						
Maize	12650	17997	21100	27475	28140	20937
Paddy	45762	48215	47272	45917	51932	48572
Returns per rupee spent						
Maize	3.58	4.00	4.23	4.75	4.73	4.18
Paddy	6.58	6.63	6.50	6.03	6.78	6.58
Breakeven price for maize at which ROVC from maize become equal to ROVC from paddy(Rs./q)						1664

crop so that the area under paddy can be reduced. According to sample farmers, the increase in Minimum Support Price (MSP) of maize should be Rs. 1664/-q (this is a Break-even price for maize at which ROVC from maize become equal to ROVC from paddy) will result into shifting the paddy acreage towards maize crop. An institutional framework could be created for development of maize crop.

Improved extension activities and subsidized inputs could be provided to maize farmers to sustain their income level. To increase the production of maize crop in the state, there is need to have proper

price policy. The Punjab state should establish more processing industries of maize, so that demand of maize within state increase. The agricultural production system in Punjab, where groundwater is depleting very fast, needs to be diversified in favour of less water-requiring crops, it needs policy environment conducive to promote the cultivation of such crops.

REFERENCES

Anonymous (2016). *Statistical Abstract of Punjab 2016*. Economic and Statistical Organisation, Government of Punjab, Chandigarh.

Received on 11/4/2018 Accepted on 15/6/2018