



Economic Evaluation of Green Fodder Crops in Comparison to Other Crops in Punjab

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ABSTRACT

The present study was conducted in three agro-climatic zones of Punjab state *viz.*, sub mountainous zone, central plain zone and south western zone for assessing the profitability of various green fodder crops and other competing crops. It was observed from the study consisting of a total sample size of 120 farmers growing green fodder and other competing crops that the profitability from crop rotation based on green fodder crops was little higher than the predominant paddy-wheat rotation. Among the important kharif fodder crops, bajra fodder was the most profitable with overall profit of ` 49,111/ha compared to paddy with profit of ` 64,925/ha. The profit from berseem was observed to be ` 78,918/ha which is the main fodder crop in rabi season. The main competing crop in this season was wheat with profit of ` 57,584/ha. Therefore, there is need to create awareness among the farmers to shift some area from paddy- wheat rotation to enhance green fodder production.

Key Words: Cropping pattern, Kharif, Profit, Rabi, Variable cost, Zone.

INTRODUCTION

Livestock being a key source of supplementary income and livelihood especially for small land holders and landless rural plays an important role in the rural economy of the country. Presently, livestock sector contributes 26.90 per cent of agricultural GDP in India (Anon, 2016a) and 35.90 per cent in Punjab state (Anon, 2016b). Despite being the leading milk producer nation, the Indian dairy sector is plagued by several hurdles such as low productivity of animals, inadequate availability of quality green fodder and quality fodder seeds etc. The area under fodder crops in India has stagnated at about 8.5-9.0 m ha during the past decade and accounts for only about 4.6 per cent of the total cultivated area. The deficit of green fodder is estimated to be 46.38 per cent in the state (Kaur *et al*, 2014). The costs and returns analysis for various green fodder crops in comparison to other competing crops will be helpful to examine the relative profitability of these crops in various regions of the state. The present study, in this direction, has been aimed to study the regional cost-returns structure associated with

production of green fodder and other competing crops in Punjab so that real picture can be brought in front of the farmers for better adoption of green fodder crops which will help in boosting the growth of dairy sector as well as promoting the much needed agricultural diversification in the state.

MATERIALS AND METHODS

Punjab state has been divided into three homogeneous agro-climatic zones *viz.*, sub mountainous zone, central plain zone and south western zone. The study was conducted in all the three zones. Three districts, one from each zone, were selected purposively on the basis of the highest area under fodder crops. Amongst the selected districts, two blocks from each district, one block near and one distant to the periphery of district headquarter was selected randomly to realize the effect of distance factor in the findings. In the next stage, a cluster of three villages was selected randomly from each selected block. A sample of 20 fodder growing farmers from each cluster was selected making a total sample of 120 farmers. Primary data were

collected using a specially designed and pre-tested schedule by personal interview method for the agricultural year 2016-17. Appropriate statistical tools and techniques like averages and percentages etc. were used to draw relevant inferences. Tabular analysis was adopted to analyze the cost and returns associated with different fodder and other competing crops. One way analysis of variance was applied to test the significance of difference between various zones. Independent t-test was applied when the comparison was only between two zones.

RESULTS AND DISCUSSION

Cropping pattern

Cropping pattern of fodder crops and competing crops among the sample households in various zones of Punjab state is presented in Table 1. The scrutiny of table brought out that among kharif crops, maximum area was under paddy crop (4.34 ha) followed by bajra (0.76 ha). The per cent marketed surplus was the highest for sugarcane (100 %) followed by paddy. (99.92 %) and for fodder crops, it was the highest for bajra (22.04%) followed by maize fodder (17.72 %) and sorghum (2.65 %). Among rabi season crops in Punjab state,

the maximum area was under wheat crop (4.75 ha) followed by berseem (0.83 ha) and oats (0.31 ha). The per cent marketed surplus was the highest in sugarcane (100) followed by capsicum (99.97%) and wheat (93.55%) and percent marketed surplus for fodder was maximum in berseem (47.04 %).

Cost and return structure of maize fodder

A perusal of data (Table 2) revealed that for maize fodder, the total variable cost was observed to be the highest in south-western zone with ` 22,516/ha followed by ` 21,102/ha and ` 20,207/ha in central and sub mountainous zones, respectively with an overall figure of ` 20,790/ha in Punjab. The gross returns from maize crop was found to be the highest in central zone with ` 56,135/ha. It was further observed that profit was the highest in sub mountainous zone with ` 35,241/ha followed by ` 35,033/ha and ` 32,844/ha in central and south western zones, respectively with an overall profit of ` 34,830/ha in Punjab. Kumar and Grover (2014) reported that the total variable cost on per hectare basis for maize fodder was found to be Rs 8948/- which was only seventy per cent as compared to maize (grain) during the season.

Table 1. Cropping pattern of the sample fodder growers in different zones of Punjab.

Crop	Area sown (ha)	Production (q)	Family Consumption (q)	Dairy consumption (q)	Marketed surplus (q)	Per cent marketed Surplus
<i>Kharif</i>						
Paddy	4.34	341.28	0.26	-	341.02	99.92
Maize	0.35	20.66	0.92	7.34	12.40	60.02
Sugarcane	0.04	32.66	-	-	32.66	100.00
Maize fodder	0.20	95.00	-	78.17	16.83	17.72
Sorghum	0.32	160.25	-	156.00	4.25	2.65
Bajra	0.76	319.88	-	249.38	70.50	22.04
<i>Rabi</i>						
Wheat	4.75	241.00	11.55	4.00	225.45	93.55
Sugarcane	0.04	32.66	-	-	32.66	100.00
Capsicum	0.07	10.42	0.003	-	10.417	99.97
Berseem	0.83	847.00	-	448.53	398.47	47.04
Oats	0.31	167.38	-	167.38	-	-

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The cost and return structure of sorghum crop

The total variable cost was observed to be the highest in sub mountainous zone with ` 24,285/ha followed by ` 23,519/ha in south western zones, respectively with an overall figure of ` 23,662/ha in Punjab. The gross returns from sorghum crop was found to be the highest in south western zone with ` 72,678/ha followed by ` 68,280/ha in sub mountainous zone. It was further observed that profit was the highest in south western zone with ` 49,159/ha followed by ` 43,995/ha in sub mountainous zone with an overall profit of ` 47,896/ha in Punjab. Grover and Kumar (2013) reported that total variable cost of sorghum was Rs 11946/ha and more than 60 per cent of it is being accounted for human labour. More than 60 per cent of total produce is directly sold to forwarding/commission agent.

The cost and return structure of bajra

The total variable cost was observed to be the highest in sub mountainous zone with ` 18,547/ha followed by ` 18,493/ha in central zone with an overall figure of ` 18,489/ha in Punjab. The gross returns from bajra crop was found to be the highest in central zone with ` 70,128/ha followed by ` 67,558/ha in sub mountainous zone with an overall figure of ` 67,600/ha in Punjab. It was further observed that profit was the highest in central zone with ` 51,635/ha followed by ` 49,011/ha in sub mountainous zone with an overall profit of ` 49,111/ha in Punjab. There was significant difference in profit of sub mountainous and central zone.

The cost and return structure of berseem crop

The perusal of the table 2 showed that the total variable cost was observed to be the highest in sub mountainous zone with ` 45,707/ha followed by ` 43,596/ha and ` 37,426/ha in central and south western zone, respectively with an overall figure of ` 41,622/ha in Punjab. It was further found that profit was the highest in south western zone with ` 82,047/ha followed by ` 77,389/ha and ` 75,408/ha in central and sub mountainous zones, respectively

with an overall profit of ` 78,918/ha in Punjab. Berseem was found to be more remunerative as compared to sorghum but still the returns over variable cost were only 65 per cent as compared to the most important competing crop during the rabi season (wheat) (Grover and Kumar, 2012).

The cost and return structure of oats crop

The total variable cost was observed to be the highest in sub mountainous zone with ` 22,292/ha followed by ` 21,407/ha and ` 19,115/ha in central and south western zones, respectively with an overall figure of ` 21,520/ha in Punjab. It was further found that profit was the highest in south western zone with ` 52,310/ha followed by ` 46,433/ha and ` 46,228/ha in sub mountainous and central zones, respectively with an overall profit of ` 49,388/ha in Punjab.

Cost and return structure of paddy crop

The cost and return structure of various competing crops is presented in Table 3. A scrutiny of table brought out that for paddy crop the total variable cost was observed to be the highest in south western zone with ` 50,334/ha followed by ` 49,930/ha and ` 48,594/ha in central and sub mountainous zones, respectively with an overall figure of ` 49,828/ha in Punjab. It was further found that the profit was the highest in central zone with ` 70,295/ha followed by ` 67,404/ha and ` 51,116/ha in south western and sub mountainous zones, respectively with an overall profit of ` 64,925/ha in Punjab.

Cost and return structure of maize crop

The cultivation of maize was practiced in sub mountainous zone only. None of the farmers were engaged in cultivation of maize in central and south western zones. It was revealed from the perusal of the table the total variable cost in sub mountainous zone as well overall in Punjab was ` 31,988/ha. The gross returns from maize crop was found to be ` 80,918/ha. It was further found that the profit was ` 48,930/ha.

Table 2. Enterprise budget of various green fodder crops in various zones of Punjab state. (₹/ ha)

Sr. No.	Particular	Maize fodder				Sorghum			Bajra			Berseem				Oats			
		SM	C	SW	P	SM	SW	P	SM	C	P	SM	C	SW	P	SM	C	SW	P
1	Tractor use (Diesel)	4250	4375	4063	4250	4173	4095	4115	4438	4083	4260	5343	5388	5063	5265	4310	4345	3458	4220
2	Seed	3293	2958	3188	3183	4463	4040	4148	975	1008	990	9550	9508	7415	8825	2353	2173	2543	2318
3	Manures	1880	1668	3635	2140	1735	1755	1750	1903	1890	1895	1903	1890	1900	1898	1825	1845	1735	1820
4	Fertilisers	4293	3855	4563	4223	3030	2875	2913	2700	2858	2780	4940	4853	3955	4583	3543	3425	2230	3353
5	Plant protection Chemicals	2665	3123	2750	2808	2750	2190	2333	-	-	-	4495	4465	3920	4290	-	-	-	-
6	Human Labour	1833	3293	1063	2090	2033	2408	2270	2600	3458	2988	3890	4248	2775	3578	3305	2735	2793	2958
	Family labour	63	1250	1063	568	1020	1283	1220	1225	1708	1360	1965	2025	1365	1720	1638	1458	1418	1575
	Hired Labour	1770	2043	0	1523	1013	1125	1050	1375	1750	1628	1925	2223	1410	1858	1668	1278	1375	1383
7	Harvesting charges	980	1100	2218	1298	4078	4090	4085	3648	3225	3438	9195	8253	7910	7895	4528	4628	4748	4590
8	Transportation and marketing charges	813	520	813	593	1783	1833	1813	2100	1788	1955	5938	4558	4118	4875	2208	2043	1418	2048
9	Interest on variable costs @ 4 % for half of the crop period	200	210	223	205	240	233	235	183	183	183	453	433	370	413	220	213	190	213
10	Total Variable cost	20207 ^b	21102 ^{ab}	22516 ^a	20790	24285 ^a	23519 ^b	23662	18547 ^a	18493 ^a	18489	45707 ^a	43596 ^a	37426 ^b	41622	22292 ^a	21407 ^a	19115 ^b	21520
11	Gross returns	55448 ^a	56135 ^a	55360 ^a	55620	68280 ^b	72678 ^a	71558	67558 ^b	70128 ^a	67600	121115 ^a	120985 ^a	119473 ^a	120540	68725 ^{ab}	67635 ^b	71425 ^a	70908
12	Profit (11-10)	35241 ^a	35033 ^{ab}	32844 ^b	34830	43995 ^b	49159 ^a	47896	49011 ^b	51635 ^a	49111	75408 ^a	77389 ^a	82047 ^a	78918	46433 ^b	46228 ^b	52310 ^a	49388

Figures followed with different superscripts are significantly different ($p < 0.05$)

S- Sub Mountainous C- Central SW- South Western P- Punjab

Table 3. Enterprise budget of various competing crops in various zones in Punjab state. (₹/ha)

Sr. No.	Particular	Paddy				Maize		Wheat				Capsicum		Sugarcane	
		SM	C	SW	P	SM	P	SM	C	SW	P	SW	P	SM	P
1	Tractor use (Diesel)	6988	6358	6460	6533	4500	4500	5263	5278	5258	5265	7250	7250	7600	7600
2	Seed	1155	1133	1468	1273	3293	3293	4365	4270	4718	4455	30000	30000	25750	25750
3	Manures	1900	1930	2093	1988	1780	1780	1910	1838	1758	1820	4000	4000	3000	3000
4	Fertilisers	8513	8175	8603	8418	6063	6063	5475	5493	5418	5463	6313	6313	8400	8400
5	Plant protection Chemicals	6833	6798	6408	6650	2683	2683	2645	2653	3065	2788	5625	5625	6800	6800
6	Irrigation	6915	7645	8263	7730	-	-	-	-	-	-	-	-	-	-
7	Human Labour	10245	12178	11563	11545	4893	4893	2638	2283	2930	2638	12250	12250	16025	16025
	Family labour	2613	2475	2193	2428	938	938	1500	1125	1388	1358	5250	5250	3725	3725
	Hired Labour	7630	9703	9370	9118	3955	3955	1138	1158	1543	1280	7000	7000	12300	12300
8	Harvesting and threshing charges	3215	2885	2698	2883	6348	6348	3913	2803	2640	2785	47500	47500	9500	9500
9	Transportation and marketing charges	2350	2333	2280	2315	2110	2110	1758	1850	1713	1790	7500	7500	21550	21550
10	Interest on variable costs @ 4 % for half of the crop period	480	495	498	493	318	318	280	265	275	270	1205	1205	1973	1973
11	Total Variable cost	48594 ^b	49930 ^{ab}	50334 ^a	49828	31988	31988	28247 ^a	26733 ^a	27775 ^a	27274	121643	121643	100598	100598
12	Gross returns	99710 ^b	120225 ^a	117738 ^c	114753	80918	80918	76165 ^b	89145 ^a	89595 ^a	84858	237500	237500	216625	216625
13	Profit (12-11)	51116 ^b	70295 ^a	67404 ^c	64925	48930	48930	47918 ^b	62412 ^a	61820 ^a	57584	115857	115857	116027	116027

Note: Figures followed with different superscripts are significantly different (p<0.05)

S- Sub Mountainous C- Central SW- South Western P- Punjab

Cost and return structure of wheat crop

The total variable cost was observed to be the highest in sub mountainous zone with ` 28,247/ha followed by ` 27,775/ha and ` 26,733/ha in south western and central zones, respectively with an overall figure of ` 27,274/ha in Punjab. Further, it was observed that the profit was the highest in central zone with ` 62,412/ha followed by ` 61,820/ha and ` 47,918/ha in south western and sub mountainous zones, respectively with an overall profit of ` 57,584/ha in Punjab.

Cost and return structure of capsicum

The cultivation of capsicum was practiced only in south western zone. None of the farmers were engaged in cultivation of capsicum in central and sub mountainous zones. The total variable cost in south western zone as well as overall in Punjab was observed to be ` 1,21,643/ha. The gross returns from capsicum crop was found to be ` 2,37,500/ha. Further, the profit was observed to be ` 1,15,857/ha.

Cost and return structure of sugarcane

The cultivation of sugarcane crop was practiced in sub mountainous zone only. None of the farmers was engaged in cultivation of sugarcane in central and south western zones. It was observed from the perusal of the table that the total variable cost in sub mountainous zone as well as overall in Punjab was found to be ` 1,00,598/ha. The gross returns from sugarcane crop was found to be ` 2,16,625/ha. Further, the profit was observed to be ` 1,16,027/ha.

CONCLUSION

It may be concluded that the profitability from crop rotation based on important green fodder crops was little higher than the predominant paddy-wheat rotation. Among the important kharif fodder

crops, bajra fodder was the most profitable fodder crop with overall profit of ` 49,111/ha followed by sorghum with ` 47,896/ha and the main competing crop was paddy with profit of ` 64,925/ha. The profit from berseem was observed to be ` 78,918/ha which is the main fodder crop in rabi season. The main competing crop in this season was wheat with profit of ` 57,584/ha. But, the farmers are not aware about the comparative profitability of various fodder crops and other competing crops. Therefore, there is need to create awareness among the farmers to shift some area from paddy- wheat rotation to enhance green fodder production for feeding the existing number of animals properly and further, for increasing the herd size.

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Received on 3/4/2018

Accepted on 30/6/2018