



Economic Appraisal of Kharif and Zaid Paddy in Tarai Region of Uttarakhand

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Abstract

The main aim of this study is to measure the profitability of paddy crop grown in Kharif and Zaid season. To estimate the profitability, the cost of cultivation and returns has been worked out on per hectare basis for Kharif and Zaid paddy for each category of farmers and compared with the CACP concept. The study is based on the primary data collected from 100 sample farmers of tarai region of Uttarakhand. Among all the districts, Udham Singh Nagar district is selected purposively as this district has the highest production of paddy in the state. Among both the paddy crops, in general, cost of cultivation (₹/ha) of Zaid paddy was higher than that of Kharif paddy. On an average, farmers in the study area experienced net profit on Kharif paddy and Zaid paddy was ₹ 16578.01 and ₹ 20043.98 per hectare, respectively. Due to availability of rain water in Kharif season, expenditure on irrigation for Kharif paddy was found to be significantly lower than the expenditure on irrigation for Zaid season paddy. It is also found that all the categories of farmers were more conscious about seed and fertilizer use in paddy. Total interest amount on fixed capital of large farmers was found to be higher than that of other categories of farmers, which reveals that farm asset position of large farmers was better than other categories of farmers in the study area. On an average, farmers of the study area had to spend ₹ 745.75 and ₹ 725.63, for producing one quintal of Kharif paddy and Zaid paddy, respectively, which was less than the average price received by the farmers for these crops. Average price received by the farmers was ₹ 1001.88 and ₹ 1006.25 per quintal for Kharif paddy and Zaid paddy, respectively. Thus, it can be concluded that cultivating paddy grown in Kharif and Zaid was profitable for the farmers in the study area. This is true not only for average sample farmer but also for all categories of farmers of the study area.

Keywords: Profitability, kharif, zaid, paddy, tarai region

Whenever agriculture as well as food grains are talked about, rice comes first. Rice (*Oryza sativa*) is the world's most important food. More than half of the world's population depends on rice for food calories and protein, especially in developing countries. By the year 2025, the world will need about 760 million tons of paddy in order to meet the growing demand of rice (Duwayri *et al.* 2000). India is one of the world's largest producers of rice, accounting for 20 per cent of world's rice production. Rice is India's prominent crop and is the main staple food of the people of the country. Rice production had steadily increased during the Green Revolution, but recently its growth has substantially slowed down. Moreover, crop intensification during the Green Revolution has exerted tremendous pressure on natural resources and the environment. On the other

hand, under the globalization of the world economy, domestic rice producers are exposed to competition not only from other rice producing countries but also producers of other crops. Therefore, to increase the domestic rice production, we need to improve productivity.

Uttarakhand is primarily an agricultural state. Agriculture sector of Uttarakhand is the most significant sector, which provides employment to about 70 % of state's population though it contributes only 17 % to the state's gross domestic product (Watershed Management Directorate, Dehradun). Sugarcane, rice and wheat are the main crops of Uttarakhand. Since almost 90 per cent of the terrain of Uttarakhand is hilly, yield per hectare is not very high. There is significant disparity in the gross cropped area between hills and plains. Hills comprise

only 14 per cent of the gross cropped area whereas the plains comprise the rest. It is important to note that Uttarakhand's food grain production has not shown any significant increase during the last ten years or so. Food grain production of Uttarakhand has increased only by 0.06 million ton in a span of almost a decade from 1.72 million tons in 2001 to 1.78 million tons in 2010 (PHD Chamber of Commerce and Industry, 2011).

Uttarakhand consists of 13 districts and spreads over plains, terrain, sub mountainous and alpine zones. The growth of food grain production is quite variable in different areas. As a result, agriculture scenario presents a mixed picture. In the hills the major crops grown include wheat, paddy, mandua, ramdana and potato whereas in the plains the major crops are wheat, paddy, pulses, sugarcane and mustard. Rice is the major cereal crop of kharif season accounting for more than 54 percent of the total area under cereals in the state. The annual rice production of the state is around 5.5 lakh tonnes from an area of about 2.80 lakh hectares. Half of this area is in the plains and half in the hills, but the total rice production of the hills is twice the total production of the plains. Rice is cultivated in all the 13 districts of the state, but maximum area (33 per cent) is in district Udham Singh Nagar which produces about 48 per cent of the total rice produced annually in the state. Districts Nainital, Haridwar and Dehradun occupy about 17.5 per cent area and contribute 22.2 per cent in the total production. From productivity point of view these districts are classified in the medium category. Rest of the nine districts is classified in the low productivity category. These nine districts together occupy about 49.2 per cent area, but contribute only to 30 per cent of the total production. Udham Singh Nagar District is the food bowl of Uttarakhand State and is famous for its agriculture and irrigation on synchronized pattern. Over the years, it has become very popular for its productivity in paddy crops; that's why, it is rightly called "*Chawal ki Nagari*" in Uttarakhand (District Groundwater Brochure, 2012). Agriculture is the primary occupation of the people in Udham Singh Nagar; about 64 per cent of the total work force is engaged in farming in the district. It is observed that the paddy crop in the district is grown in both the seasons Kharif and Zaid.

A stress is always visible on agriculture land, as it is reducing year by year. During the last five years, about 15 thousand hectares of agriculture land in Uttarakhand has been diverted to other use which is a matter of great concern. After the creation of the state some decline in rice area has been observed due to industrialization in the plains and diversion of area for other development

purposes (Mani, 2013). Since the hills are constrained in the development of large scale industrialization due to inaccessibility, fragility and vulnerability, the growth and development of the agriculture sector remains the prime focus. Even at the national and global level, the food security related concerns and unexpected price escalations has drawn focus towards agriculture for sustaining the growth experienced in other sectors.

Database and Methodology

Udham Singh Nagar district was selected purposively for the present study as this district has the highest production of paddy in the state. Firstly, a list of all the developmental blocks of the district Udham Singh Nagar was prepared. Udham Singh Nagar district has seven development blocks namely Jaspur, Kashipur, Bajpur, Gadarpur, Rudrapur, Sitarganj and Khatima. Out of these seven development blocks, two blocks were selected randomly for the present study. Selected development blocks are Khatima and Bajpur. In the second stage, five villages from each block were selected randomly for the study. There are total 90 villages in Khatima and 115 villages in Bajpur block of Udham Singh Nagar district. Out of these, ten villages (five villages from Khatima and five from Bajpur) were selected randomly by using random number table. In the third stage, farmers were classified into different categories such as marginal (less than 1 hectare of land holding), small (1-2 hectares of land holding), semi-medium (2-4 hectares of land holding), medium (4-10 hectares of land holding) and large (more than 10 hectares of land holding). Then, 50 farmers from each block with 10 farmers from each farm size category were selected randomly for the present study.

The present study is mainly based on primary data. The required primary data were collected from selected farmers on pre-structured schedule through personal interviewing method for the agricultural year 2011-12. Most of the required secondary data were obtained from the district agriculture office, block development office, etc. Some other important information was collected through district's official website and publications. A brief description of data collected and used in the study is given below. The primary data were collected by intensive household survey. This method was demarcated as the most need based, appropriate and feasible for this study. On the other hand, secondary data were collected from the District Statistical Office, Block Development Office and other published sources.

For the collection of primary data, an in depth

purposely developed survey instrument (pre-structured schedule) was used. Total cost of cultivation includes operational cost, material cost and other costs in crop production. Operational cost is sum of cost of human labour, machinery cost and bullock charges. Hired labour cost includes actual wage paid in cash and the wage paid in kind. The wage paid in kind is converted into monetary terms at the prevailing prices. Imputed value of family labour is calculated using the prevailing wage rate in the study area. In case of bullock, tractor and other machinery, hiring charges are applied to all these for those who don't own these items whereas cost of fuel and repairing and maintenance costs are calculated for those who own these items. Material cost includes amount spent by the farmers on seeds, manure, chemicals, fertilizers and irrigation charges. It is calculated on per hectare basis for different categories of farmers. Owned seed is priced at prevailing seed price in the study area. Other costs include land revenue, interests on fixed assets, interest on working capital, depreciation and rental value of land. Rental value of land prevailing during the study period is taken. Depreciation on fixed asset is calculated for per hectare. There is no case of leased-in and leased-out land in selected sample farmers in the study area. The interest on working capital is taken at the rate of 7.5 per cent for six month crop and 14 per cent for annual crop whereas interest on fixed capital is taken at the rate of 12 per cent which was prevailing rate charged by bank or cooperative societies in the study area during the study period.

The analytical framework used in the study is presented and discussed in the following sub-sections. To estimate the profitability, the cost of cultivation and returns has been worked out on per hectare basis for different crops for each category of farmers. Return from a crop is estimated by calculating the gross return from the same as $GR = MP + BP + BPP$, $NR = GR - COC$, where, GR = Gross returns from crop (₹/ha); MP = Main products of crop (Qt/ha); BP = By products of crop (Qt/ha); MPP = Price of main product of crop (₹/Qt); BPP = Price of by-product of crop (₹/Qt); NR = Net returns from crop (₹/ha); COC = Cost of cultivation of crop.

Cost A_1 : variable cost excluding family labour cost and including land revenue, depreciation and interest on working capital.

Cost A_2 : Cost A_1 + Rent paid for leased in land.

Cost B_1 : Cost A_1 + Interest on value of owned capital assets (excluding land).

Cost B_2 : Cost B_1 + imputed rental value of owned

land (net of land revenue) + Rent paid for leased in land.

Cost C_1 : Cost B_1 + Imputed value of family labour.

Cost C_2 : Cost B_2 + Imputed value of family labour.

Cost C_2^* : Cost C_2^* will be estimated by taking into account statutory minimum wage rate or actual wage rate whichever is higher.

Cost C_3 : Cost C_2^* + 10 per cent of cost C_2^* on account of managerial function performed by the farmers.

Results and Discussion

In the study area, paddy crop was grown in two seasons i.e. Kharif and Zaid. Paddy was planted mainly during the Kharif season but on semi-medium, medium and large farms it was planted in Zaid season also. Tables 1 and 2 depict the cost of cultivation of paddy crop grown during Kharif season and Zaid season in the study area, respectively. The operational cost of Kharif paddy includes labour cost (family and hired labour) and machinery cost. Machinery cost for Kharif paddy is found to be lower than the labour cost. Although average machinery cost in the study area is ₹ 4501.72 per hectare, it varies from ₹ 3924.87 per hectare for large farms to ₹ 4905.05 per hectare for medium farms. In fact, large farms incur the lowest proportion of total cost (7.20 per cent) on machinery whereas marginal farms incur the highest proportion (11.68 per cent). This is mainly because large farmers have their own farm implements whereas their smaller counterparts' particularly marginal farmers rely on hired machinery.

In case of marginal, small and semi-medium farmers, share of family labour cost was more than 5 per cent of the total cost whereas on medium and large farms, share of family labour cost was around 3 per cent. On marginal, small and semi-medium farms, most of the family members worked as a family labour. On the other hand, in case of medium and large farms, due to scarcity of labour in peak period, hired labour cost is significantly high. Expenditure incurred on hired labour was ₹ 8994.50 per hectare for medium farms and ₹ 9557.50 per hectare for large farms. This is mainly due to high labour wage (₹ 150/man-day) during peak season when labour is usually scarce. Share of machinery cost to the total cost was highest for the marginal farmers (11.68 per cent) and lowest for the large farmers (7.20 per cent). This may be because most of the large farmers have their own machineries whereas large proportion of the marginal farmers is required to hire the same. Overall average figure shows that the share of family labour, hired labour and machinery cost was 5.00, 14.86 and

9.42 per cent of the total cost (Cost C_3), respectively. The overall average expenditure incurred on operational cost was 29.28 per cent of the total cost.

Overall labour cost incurred in Zaid paddy was ₹ 12021.57 per hectare which was around 27 per cent higher than that of Kharif paddy (₹ 9498.28 per hectare). Overall average operational cost incurred in paddy crop grown during Zaid season was ₹ 17197.33 per hectare i.e., 33.33 per cent of the total cost (Cost C_3). This shows that the operational cost acquired by the paddy crop grown in Zaid season was higher than that in Kharif season.

Material costs of paddy crop (Kharif and Zaid)

include expenditure on seeds, fertilizers, manure, irrigation and plant protection chemicals. As it is clear from the table 1, per hectare expenditures on seed, fertilizer and plant protection chemicals, etc. were found to be different for different farm size groups in the study area. The expenditures incurred on seeds for Kharif paddy were ₹ 920, ₹ 1125, ₹ 1150.85, ₹ 1200.51 and ₹ 1270.76 per hectare by marginal, small, semi-medium, medium and large farmers, respectively. It is clear from the same table that besides spending highest amount on fertilizers and manures, farmers of all sizes used effective amount of plant protection chemicals in paddy cultivation. On overall basis, average amount spent on

Table 1: Cost of cultivation of paddy (Kharif) crop on different size group of farms

(₹/ha)

Particulars	Farm size group						
	Marginal	Small	Semi-medium	Medium	Large	Overall Average	Weighted Average
I. Operational cost							
1. Human labour							
(a) Owned	2829.10 (6.84)	3092.65 (7.39)	2506.66 (5.28)	1773.11 (3.29)	1759.87 (3.23)	2392.28 (5.00)	2321.09 (4.95)
(b) Hired	5823.99 (14.09)	5272.13 (12.59)	5881.88 (12.40)	8994.50 (16.69)	9557.50 (17.53)	7106.00 (14.86)	7218.97 (14.65)
2. Bullock + machinery	4871.68 (11.68)	4057.24 (9.69)	4749.75 (10.01)	4905.05 (9.10)	3924.87 (7.20)	4501.72 (9.42)	4586.60 (9.52)
Sub total	13524.77 (32.72)	12422.02 (29.68)	13138.29 (27.70)	15672.66 (29.08)	15242.24 (27.96)	14000.00 (29.28)	14126.66 (29.14)
II. Material cost							
1. Seed	920.00 (2.23)	1125.00 (2.69)	1150.85 (2.43)	1200.51 (2.23)	1270.76 (2.33)	1133.42 (2.37)	1147.71 (2.37)
2. Fertilizers and manure	3065.81 (7.42)	3688.26 (8.81)	4041.84 (8.52)	4515.24 (8.38)	4385.16 (8.04)	3939.26 (8.24)	4046.01 (8.32)
3. Irrigation charges	1281.76 (3.10)	1633.99 (3.90)	3691.19 (7.57)	3323.34 (6.17)	3771.85 (6.92)	2740.43 (5.69)	2936.04 (5.87)
4. Plant protection chemicals	514.16 (1.24)	723.91 (1.73)	2439.94 (5.14)	2248.88 (4.17)	3219.87 (5.91)	1829.35 (3.83)	1953.25 (3.88)
Sub total	5781.73 (13.99)	7171.16 (17.13)	11223.82 (23.66)	11287.97 (20.95)	12647.64 (23.20)	9622.46 (20.13)	10056.54 (20.43)
III. Other cost							
1. Interest on working capital	723.99 (1.75)	734.74 (1.76)	913.58 (1.93)	1011.02 (1.88)	1045.87 (1.92)	885.84 (1.85)	906.87 (1.86)
2. Rental value of land	12500 (30.24)	12500 (29.86)	12500 (26.35)	12500 (23.20)	12500 (22.93)	12500 (26.15)	12500.00 (26.02)
3. Land revenue	0.00 (0.00)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	0.80 (0.00)	0.87 (0.00)
4. Depreciation	1895.42 (4.59)	2026.14 (4.84)	2040.37 (4.30)	5090.95 (9.45)	4675.56 (8.58)	3145.69 (6.58)	3303.47 (6.57)
5. Interest on the value of fixed assets	3155.45 (7.63)	3199.51 (7.64)	3308.84 (6.98)	3427.43 (6.36)	3441.19 (6.31)	3306.48 (6.92)	3324.74 (6.89)
Sub total	18274.86 (44.21)	18461.39 (44.10)	18763.79 (39.55)	22030.40 (40.88)	21663.62 (39.74)	19838.81 (41.50)	20035.94 (41.34)

Note: 1. Figures in parentheses are percentage to the Cost C_3 .

2. Last column presents weighted average where weights are in proportion to land holding under different size group of farms in Udham Singh Nagar district.

the plant protection chemicals by the sample farmers was 3.83 per cent of total cost (Cost C_3).

Tables 1 and 2 reveal that among the material costs, proportionate expenditure on seed and fertilizers was almost same for paddy grown in both the seasons (Kharif and Zaid) whereas amount spent on irrigation and plant protection chemicals was much higher in Zaid paddy than Kharif paddy. Overall average figure shows that the total material cost on paddy grown during Zaid season (₹ 16864.66 per hectare) was 75 per cent higher than the paddy grown in Kharif season (₹ 9622.46 per hectare), it is mainly due to irrigation cost.

The third component of the total cost is other costs

which can also be called as non-cash expenditure. It constitutes (i) interest on working capital (ii) rental value of land (opportunity cost of the land) prevalent in the area (iii) land revenue (vi) depreciation on the farm assets used in the cultivation of paddy crop and (v) interest on the value of fixed assets. Depreciation was calculated on the value of assets like bullock, farm buildings, farm equipment, etc. used in the cultivation of crop. The total annual depreciation and interest obtained on the value of farm assets during the year was apportioned according to percentage to area under paddy of the total cropped area on the farm during the year. This was mainly done in view of the fact that these fixed farm

Table 2: Cost of cultivation of paddy (Zaid) crop on different size group of farms

(₹/ha)

Particulars	Farm size group				
	Semi-medium	Medium	Large	Overall Average	Weighted Average
I. Operational Cost					
1. Human labour					
(a) Owned	2684.65 (5.82)	2653.87 (5.01)	2265.18 (4.05)	2534.57 (4.96)	2590.26 (5.13)
(b) Hired	7919.65 (17.17)	9654.50 (18.21)	10886.85 (19.47)	9487.00 (18.28)	9240.88 (18.06)
2. Bullock+ machinery	5256.87 (11.40)	5045.85 (9.52)	5224.56 (9.34)	5175.76 (10.09)	5159.71 (10.19)
Sub total	15861.17 (34.39)	17354.22 (32.73)	18376.59 (32.87)	17197.33 (33.33)	16990.86 (33.38)
II. Material Cost					
1. Seed	1385.75 (3.00)	1424.55 (2.69)	1476.66 (2.64)	1428.99 (2.78)	1420.05 (2.80)
2. Fertilizers and manure	5672.95 (12.30)	6115.65 (11.53)	6251.12 (11.18)	6013.24 (11.67)	5975.48 (11.75)
3. Irrigation charges	5685.56 (12.33)	6200.54 (11.70)	7001.55 (12.52)	6295.88 (12.18)	6161.93 (12.10)
4. Plant protection chemicals	2881.79 (6.25)	3205.08 (6.05)	3292.77 (5.89)	3126.55 (6.06)	3100.55 (6.09)
Sub total	15626.05 (33.88)	16945.82 (31.96)	18022.10 (32.23)	16864.66 (32.69)	16658.00 (32.73)
III. Other Cost					
1. Interest on working capital	629.74 (1.37)	686.00 (1.29)	727.97 (1.30)	681.24 (1.32)	672.97 (1.32)
2. Rental value of land	6250.00 (13.55)	6250.00 (11.79)	6250.00 (11.18)	6250.00 (12.17)	6250.00 (12.33)
3. land Revenue	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)
4. Depreciation	1220.07 (2.65)	4119.19 (7.77)	4455.76 (7.97)	3265.01 (6.13)	3094.79 (5.88)
5. Interest on the value of fixed assets	2345.45 (5.08)	2842.23 (5.36)	2995.45 (5.36)	2727.71 (5.27)	2685.17 (5.25)
Sub total	10446.26 (22.65)	13898.42 (26.21)	14430.18 (25.81)	12924.96 (24.89)	12703.94 (24.79)

Note: 1. Figures in parentheses are percentage to the Cost C_3 .

2. Last column presents weighted average where weights are in proportion to land holding under different size group of farms in Udham Singh Nagar district.

assets were used in all the crops grown by the farmers. In case of Kharif paddy, among all non-cash expenditure, share of rental value to the total cost (Cost C₃) was very high for all the categories of farmers. It ranged from 22.93 per cent on large farms to 30.24 per cent on marginal farms. Overall average rental value of land was ₹ 12500 per hectare. Interest on working capital is worked out at 7.5 per cent for half of the crop period whereas interest on fixed assets was worked out at 12 per cent of the crop period.

Among all non-cash expenditure incurred for Zaid paddy, share of rental value was the highest followed by depreciation and interest on fixed assets. If we compare non-cash expenditure incurred on paddy for both the seasons, we found that non-cash expenditure was 53.49 per cent higher for Kharif paddy than Zaid paddy. It may be because paddy grown during summers is short duration crop and it stands only for three months in the field.

Cost A₁ includes all cash expenses made by the farmer in raising the crop. This cost is also known as out of pocket expense (cash expenses). When all farms are taken together, Cost A₁ was found to be ₹ 25262.51 per hectare for Kharif paddy. However, per hectare Cost A₁ for Kharif paddy on marginal, small, semi-medium, medium and large farms was found to be ₹ 19096.81, ₹

19262.41, ₹ 24810.40, ₹ 31290.49 and ₹ 31852.44, respectively (see, table 3). Cost A₁, Cost A₂, Cost B₁, Cost B₂, Cost C₁, Cost C₂ and Cost C₃ also showed the increasing trend with the increase in area operated by the farmer. It was found that the actual wage rate (₹ 150/man-day) was higher than the minimum statutory wage rate (₹ 120/man-day) in the study area, thus the Cost C₂ and Cost C₂* was the same for all the farms size groups.

Per hectare Cost C₃ is the total cost of cultivation which includes the managerial cost of farmers also. Large farmers were found to spend the highest amount on Kharif paddy cultivation (₹ 54508.85 per hectare), which was 31.85 per cent more than that of marginal farmers (₹ 41339.50 per hectare). The average cost of cultivation of Kharif paddy was ₹ 47807.40 per hectare in the study area.

For paddy grown during Zaid season, Cost A₁ varied from ₹ 30653.38 per hectare (semi-medium) to ₹ 39318.24 per hectare (large). When all sample farms taken into account, Cost A₁ for Zaid season paddy (₹ 35474.66 per hectare) was found to be 40.42 per cent higher than that of Kharif season paddy (₹ 25262.51 per hectare). However, Cost C₃ for Zaid season paddy (₹ 51685.63 per hectare) was only 8.11 per cent higher than that of Kharif season paddy (₹ 47807.40 per hectare). Cost C₃ for Zaid season paddy was ₹ 46125.83, ₹

Table 3: Cost concept wise cost of cultivation of paddy (Kharif) crop

(₹/ha)

Particulars	Farm size groups					Overall Average	Weighted Average
	Marginal	Small	Semi-Medium	Medium	Large		
(a) Cost A ₁	19096.81 (46.20)	19262.41 (46.02)	24810.40 (52.30)	31290.49 (58.06)	31852.44 (58.44)	25262.51 (52.84)	26073.32 (53.60)
(b) Cost A ₂	31596.81 (76.43)	31762.41 (75.88)	37310.40 (78.65)	43790.49 (81.26)	44352.44 (81.37)	37762.51 (78.99)	38573.32 (79.30)
(c) Cost B ₁	22252.26 (53.83)	22461.92 (53.66)	28119.24 (59.28)	34717.92 (64.42)	35293.63 (64.75)	28569.00 (59.76)	29398.05 (60.44)
(d) Cost B ₂	34752.26 (84.07)	34961.92 (83.52)	40619.24 (85.63)	47217.92 (87.62)	47793.63 (87.68)	41069.00 (85.91)	41898.05 (86.14)
(e) Cost C ₁	25081.36 (60.67)	25554.57 (61.05)	30625.90 (64.56)	36491.03 (67.71)	37053.50 (67.98)	30961.27 (64.76)	31719.14 (65.21)
(f) Cost C ₂	37581.36 (90.91)	38054.57 (90.91)	43125.90 (90.91)	48991.03 (90.91)	49553.50 (90.91)	43461.27 (90.91)	44219.14 (90.91)
(g) Cost C ₂ *	37581.36 (90.19)	38054.57 (90.91)	43125.90 (90.91)	48991.03 (90.91)	49553.50 (90.91)	42340.77 (90.91)	44219.14 (90.91)
(h) Cost C ₃	41339.50 (100.00)	41860.03 (100.00)	47438.49 (100.00)	53890.14 (100.00)	54508.85 (100.00)	47807.40 (100.00)	48641.06 (100.00)

Note: 1. Figures in parentheses are percentage to the Cost C₃.

2. Last column presents weighted average where weights are in proportion to land holding under different size group of farms in Udham Singh Nagar district.

53018.31 and ₹ 55911.76 per hectare for semi-medium, medium and large farms, respectively (see, table 4). As mentioned earlier, on an average, farmers in the study area spent around 8 per cent more cost on paddy crop grown during Zaid season than that grown in Kharif season.

For Kharif paddy crop, per quintal cost of production

and returns over costs Cost A₁, Cost A₂, Cost B₁, Cost B₂, Cost C₁, Cost C₂ and Cost C₃ are presented in table 3 while, per hectare net returns, total cost and gross return for all the farm size groups are graphically presented in figure 1. It is clearly revealed in the figure 1 that, on an average, all the farmers in the study area were getting net returns of more than ₹ 12000 per hectare over total cost (Cost C₃). Highest return over total cost (Cost C₃) was received by

Table 4: Cost concept wise cost of cultivation of paddy (Zaid) crop

(₹/ha)

Particulars	Farm size groups				
	Semi-Medium	Medium	Large	Overall Average	Weighted Average
(a) Cost A ₁	30653.38 (66.45)	36452.36 (68.75)	39318.24 (70.32)	35474.66 (68.51)	34827.36 (68.30)
(b) Cost A ₂	36903.38 (80.00)	42702.36 (80.54)	45568.24 (81.50)	41724.66 (80.68)	41077.36 (80.56)
(c) Cost B ₁	32998.83 (71.54)	39294.59 (74.12)	42313.69 (75.68)	38202.37 (73.78)	37512.54 (73.57)
(d) Cost B ₂	39248.83 (85.09)	45544.59 (85.90)	48563.69 (86.86)	44452.37 (85.95)	43762.54 (85.83)
(e) Cost C ₁	35683.48 (77.36)	41948.46 (79.12)	44578.87 (79.73)	40736.94 (78.74)	40102.8 (78.65)
(f) Cost C ₂	41933.48 (90.91)	48198.46 (90.91)	50828.87 (90.91)	46986.94 (90.91)	46352.8 (90.91)
(g) Cost C ₂ *	41933.48 (90.91)	48198.46 (90.91)	50828.87 (90.91)	46986.94 (90.91)	46352.8 (90.91)
(h) Cost C ₃	46126.83 (100.00)	53018.31 (100.00)	55911.76 (100.00)	51685.63 (100.00)	50988.09 (100.00)

Note: 1. Figures in parentheses are percentage to the Cost C₃.

2. Last column presents weighted average where weights are in proportion to land holding under different size group of farms in Udham Singh Nagar district

Table 5: Cost of production and returns from paddy (Kharif)

Particulars	Farm size group						
	Marginal	Small	Semi-Medium	Medium	Large	Overall Average	Weighted Average
Yield of main product (Qt/ha)	39.11	40.88	42.75	45.83	49.00	43.51	43.75
Yield of by-product (Qt/ha)	48.28	52.22	55.96	58.78	59.90	55.03	55.73
Price of main product (₹/Qt)	945.13	950.00	1012.00	1048.50	1053.75	1001.88	1009.79
Price of by-product (₹/Qt)	375.00	375.00	375.00	375.00	375.00	375.00	375.00
Return from main product (₹/ha)	36964.03	38836.00	43263.00	48052.76	51633.75	43749.91	44301.64
Return from by-product (₹/ha)	18105.00	19582.50	20985.00	22042.50	22462.50	20635.50	20898.51
Gross return (₹/ha)	55069.03	58418.50	64248.00	70095.26	74096.25	64385.41	65200.16
Net Return (₹/ha) at							
(a) Cost A ₁	35972.22	39156.09	39437.60	38804.76	42243.81	39122.90	39126.84
(b) Cost A ₂	23472.22	26656.09	26937.60	26304.76	29743.81	26622.90	26626.84
(c) Cost B ₁	32816.77	35956.58	36128.76	35377.33	38802.62	35816.41	35802.10
(d) Cost B ₂	20316.77	23456.58	23628.76	22877.33	26302.62	23316.41	23302.10
(e) Cost C ₁	29987.67	32863.93	33622.10	33604.22	37042.75	33424.13	33481.01
(f) Cost C ₂	17487.67	20363.93	21122.10	21104.22	24542.75	20924.13	20981.01
(g) Cost C ₂ *	17487.67	20363.93	21122.10	21104.22	24542.75	20924.13	20981.01
(h) Cost C ₃	13729.53	16558.47	16809.51	16205.12	19587.40	16578.01	16559.10
Cost of Production (₹/Qt)	709.49	680.73	747.23	806.10	775.19	745.75	753.01

Note: Last column presents weighted average where weights are in proportion to land holding under different size group of farms in Udham Singh Nagar district

large farmers.

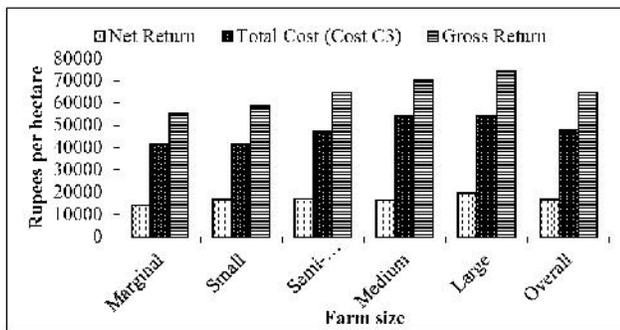


Fig. 1: Net return, total cost and gross return from paddy (Kharif) crop (₹/ha)

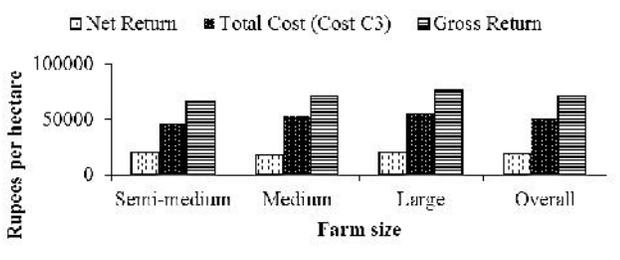


Fig. 2: Net return, total cost and gross return from paddy (Zaid) crop (₹/ha)

It is deduced from the table 5 that the yield of paddy (Kharif) was highest on large farms (49.00 Qt/ha) followed by medium (45.83 Qt/ha), semi-medium (42.75 Qt/ha), small (40.88 Qt/ha) and marginal (39.11 Qt/

ha) farms. Large farmers were harvesting 9.89 Qt more product in comparison to marginal farmers (39.11 Qt/ha). On the overall basis, farmers of the study area were found harvesting 43.51 Qt of paddy from one hectare of land during Kharif season. In the study area, paddy straw was the main by-products of paddy. It was found that per hectare gross return from paddy (Kharif) cultivation was highest on large farms. Moreover, when we see the per quintal cost of production of paddy crop then we found that large farmers were spending relatively more amount of money for producing one quintal of paddy than other categories of farmers. Thus, it can be concluded that although the cost of cultivation and production of paddy was highest on large farms, still they were getting higher returns compared to other categories of farmers in the study area.

It is further revealed from the table 5 that paddy (Kharif) cultivation was beneficial for all the farmers in the study area because, on an average, farmers of the study area were spending ₹ 745.75 (at Cost C₃) for producing one quintal of paddy and getting ₹ 1001.88 for main produce. It implies that farmers were getting the benefit of ₹ 256.13 per quintal of main produce of paddy (Kharif) crop in the study area.

Table 6 shows that the yield of paddy (Zaid) on semi-medium, medium and large farms was 50.98 Qt/ha, 52.67 Qt/ha and 54.27 Qt/ha, respectively. Consequently, gross return from paddy (Zaid) was higher on large farms than the smaller ones. For example, per hectare gross

Table 6: Cost of production and returns from paddy (Zaid)

Particulars	Farm size group				Weighted Average
	Semi-medium	Medium	Large	Overall Average	
Yield of main product (Qt/ha)	50.98	52.67	54.27	52.64	52.34
Yield of by-product (Qt/ha)	62.96	65.78	71.90	66.88	65.90
Price of main product (₹/Qt)	952.50	1012.50	1053.75	1006.25	997.93
Price of by-product (₹/Qt)	375.00	375.00	375.00	375.00	375.00
Return from main product (₹/Qt)	48558.45	53328.38	57187.01	53024.61	52282.10
Return from by-product (₹/ha)	18360.00	18292.50	19462.50	18705.00	18544.14
Gross return (₹/ha)	66918.45	71620.88	76649.51	71729.61	70826.24
Net Return (₹/ha) at					
(a) Cost A ₁	36265.07	35168.51	37331.27	36254.95	35998.88
(b) Cost A ₂	30015.07	28918.51	31081.27	30004.95	29748.88
(c) Cost B ₁	33919.62	32326.28	34335.82	33527.24	33313.70
(d) Cost B ₂	27669.62	26076.28	28085.82	27277.24	27063.70
(e) Cost C ₁	31234.97	29672.41	32070.64	30992.67	30723.44
(f) Cost C ₂	24984.97	23422.41	25820.64	24742.67	24473.44
(g) Cost C ₂ *	24984.97	23422.41	25820.64	24742.67	24473.44
(h) Cost C ₃	20791.62	18602.57	20737.75	20043.98	19838.16
Cost of Production (₹/Qt)	656.56	749.52	768.65	725.63	718.29

Note: 1. Figures in parentheses are percentage to the Cost C₃.

2. Last column presents weighted average size where weights are in proportion to land holding under different size group of farms in Udham Singh Nagar district

return from paddy (Zaid) on large farms was 7.02 per cent higher than that on semi-medium farms. It was observed that the overall average yield per hectare of paddy (Zaid) was 9.13 Qt higher than Kharif paddy. Also, we found that cost incurred in the production of one quintal paddy (Zaid) was 2.70 per cent less than that of Kharif paddy while net return received from summer paddy was 20.91 per cent higher than the returns on Kharif paddy. Thus, it can be concluded that farmers were getting more benefit from paddy grown during Zaid (summer) season than that grown during Kharif season.

Conclusion

The study aimed at to identify the profitability of paddy crops grown in both the season Kharif and Zaid. Among both the paddy crops, in general, cost of cultivation (₹/ha) of Zaid paddy was higher than that of Kharif paddy. It was found that the market wage rate in the study area was usually higher than the statutory minimum wage rate; however, it was also fluctuating from crop to crop and season to season. In general, on an average, farmers in the study area experienced net profit on Kharif paddy and Zaid paddy was ₹ 16578.01 and ₹ 20043.98 per hectare, respectively. Due to availability of rain water in Kharif season, expenditure on irrigation for Kharif paddy was found to be significantly lower than the expenditure on irrigation for Zaid season paddy. It is also found that all the categories of farmers were more conscious about seed and fertilizer use in paddy. Total interest amount on fixed capital of large farmers was found to be higher than that of other categories of farmers, which reveals that farm asset position of large farmers was better than other categories of farmers in the study area. On an average, farmers of the study area had to spend ₹ 745.75 and ₹ 725.63, for producing one quintal of Kharif paddy and

Zaid paddy, respectively, which was less than the average price received by the farmers for these crops. Average price received by the farmers was ₹ 1001.88 and ₹ 1006.25 per quintal for Kharif paddy and Zaid paddy, respectively. Thus, it can be concluded that cultivating paddy grown in Kharif and Zaid was profitable for the farmers in the study area. This is true not only for average sample farmer but also for all categories of farmers in the study area.

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