E-ISSN: 2706-8927
P-ISSN: 2706-8919
www.allstudyjournal.com
IJAAS 2023; 5(2): 37-44
Received: 30-01-2023
Accepted: 08-02-2023

Dr. Anuj Kumar
Associate Professor,
Department of Economics,
Govt. Collage, Dholpur,
Rajasthan, India

Krishn Pal Singh
Assistant Professor,
Department of Geography,
MSJ Govt. Collage, Bharatpur,
Rajasthan, India

Corresponding Author:
Dr. Anuj Kumar
Associate Professor,
Department of Economics,
Govt. Collage, Dholpur,
Rajasthan, India

A comparative analysis of cost structure and farm business income: A case study of western Uttar Pradesh

Dr. Anuj Kumar and Krishn Pal Singh

DOI: https://doi.org/10.33545/27068919.2023.v5.i2a.936

Abstract
Sugarcane is an important agricultural crop in India, which plays an important role in the national economy, contributing 1.9 percent to the GDP. The crop is cultivated on 5.03 million hectares producing over 384 million tonnes with a productivity of about 75.5 tonnes per hectare. In India, Uttar Pradesh contributes about 47 percent of the area (2.22 million hectares) and production (179.71 million tons) with 47.36 percent of the total sugarcane production. In Western Uttar Pradesh, two cropping systems mainly rice-wheat and sugarcane-wheat cover a large area under different irrigation systems. This study attempts to examine the trends in the production, cost of cultivation, benefits and profitability from sugarcane, wheat and paddy crops to investigate which crop for the farmers of western Uttar Pradesh is more profitable and economical. On an average, the cost of cultivation for sugarcane crop was Rs. 190.42 per quintal and the net return per hectare after subtracting the total cost (Cost C3) from the gross income was Rs. 138278.80. While the cost of production and returns from wheat, paddy and wheat + paddy crops was Rs. 1268.73 per quintal, Rs. 35825.40 per hectare, Rs 1645.32 per quintal, Rs. 34876.60 per hectare and Rs. 1457.02 per quintal and Rs. 70702.00 per hectare respectively. The study indicated that the cost of production per quintal for sugarcane crop was lower than that of wheat and paddy crop, on the other hand net income per hectare was highest in sugarcane crop as compared to wheat and paddy crop. Percent profit and farm business income was also getting higher from sugarcane as compared to wheat and paddy crop. All major crops like paddy, wheat and sugarcane were beneficial to the farmers under the study area, but sugarcane was the more profitable crop as compared to the rest. As the cost per quintal of production as well as returns per hectare sugarcane crop was more economical than wheat and paddy crop.

Keywords: Cost and return, benefit cost ratio, cost of production, gross income, family labour income, net income, percent profit

Introductions
Agriculture has been and will continue to be the life line of the Indian economy. As the largest private enterprise in India agriculture contributes nearly one fourth of the national GDP, Sustains livelihood. Despite its low contribution to the nation's gross domestic product, agriculture is the mainstay of the Indian economy due to its high share in employment and livelihood. The share of agriculture in gross domestic product has registered a steady decline from 36.4 percent in 1982-83 to 20 percent in March 2020-2021. Yet this sector continues to more than half a billion people providing employment to 52 percent of the workforce. India inhabits 16.87 percent of the total population of the world, whereas it has only 2.4 percent of the world surface area. Rice and Wheat being the first and second most important staple food of the country, after rice deserves the due attention for it production. India produces around 95 million tonnes of wheat every year. The wheat production in India contributes to about 16 percent of the global wheat production. Nearly 60 percent of the total production of wheat in India is contributed by North- West India which includes Punjab, Haryana, Rajasthan and Western Uttar Pradesh.
Sugarcane, paddy and wheat are the main crops of Western Uttar Pradesh and more than 65 percent of the gross cropped area covered by them altogether. India has witnessed unprecedented growth in production and productivity of wheat and rice during the period after the Green Revolution. Due to technological break-through under green revolution, Rice production has increased from 21 million tonnes (1950-51) to nearly 110 million tonnes in

2016-17, Wheat increased from 6.5 million tonnes to 98.38 million tonnes, and sugarcane increase from about 57.65 Million tonnes to 362 million tonnes during the reported period, similar trend was also observed for other crops. India is the second largest producer of sugarcane after Brazil which signifies that sugarcane is an important commercial crop of India. Sugarcane is the only raw material for all major sweeteners in the country. Sugarcane is an important crop that is a major and rich source of food, fibre, chemicals and fodder for livestock. The by-products of sugarcane are also playing an important role in the national economy. Sugarcane production and its processing is a major source of employment and livelihood in India. About 50 million farmers and 3-5 lakhs skilled and unskilled workers are engaged in cultivation of sugarcane and sugar industries and its allied industries. Sugarcane crop is an important cash crop of Western Uttar Pradesh and this area is considered as sugarcane heart land of the state. Socio financial situation of the western Uttar Pradesh is essentially depend on sugarcane production. Western part of the state forms the core of sugarcane production in the country. It has dominated the farming system in this region for a long time. Therefore, to explore the possibilities of raising farm production and farm income in this region, there is a need to understand sugarcane-based cropping systems and their economics.

The increase in the production of crops was not due to expansion of agricultural land area but it was due to improvement in agricultural activities of the major crops grown. The factor responsible for increase in yield growth was irrigation facilities, high yield variety, use of chemical fertilizers, insecticide, and the application of modern package of practices changed. The inputs use pattern of farmers for the production of different crops has also changed and depends on the price of inputs and their easy availability, which directly or indirectly affect the cost of production and profit margin of the farme Rs. This study also discussed the use of various important inputs in farming of major crops in Western Uttar Pradesh. In this investigation profit margins have been discussed by estimating the cost and income measures of the sugarcane, wheat and paddy crop. The cost and return structure of these crops have also been compared to get information about which crop provide more benefits in the study area.

Materials and Methods

Objectives of the Study

- To calculate the cost and return value of sugarcane, wheat and paddy crops on various types of farms.
- To analyze the farm business income of sugarcane, wheat and paddy crops.
- To comparing the cost and return value of sugarcane, wheat and paddy crops on different irrigated farms.

Sampling Structure

Since the study was confined to the Buland Shahr and Ghaziabad District of Western Uttar Pradesh, the data were collected for the year of 2018-19. The primary data were collected from the selected farmers relating physical input-output of the sugarcane, wheat and paddy crops and their prices for the agriculture year 2018-19 by interviewing the farmers personally with the help of a set of schedules specially prepared for this purpose. Besides, secondary data, the data related to the canal water, tubewell water, land resource, human labour, farm power, agro- chemicals, working capital etc. were also collected. A four stage sampling technique is used for selecting the sample farms. Ghaziabad and Buland Shahr district were selected from Western Uttar Pradesh. From the above two district 4 tehsils (two from each) were selected on the basis of highest operation holdings. Out of these 4 tehsils, 20 villages (5 from each tehsils) and 8 farmers from each village were randomly selected (160 farmers). In all 160 (randomly selected) farmers were interviewed with 32 farmers in each irrigation system situation.

1. Canal Irrigated Farms
2. Electric Tubewell Irrigated Farms
3. Diesel Tubewell Irrigated Farms
4. Canal + Electric Tubewell Irrigated Farms 5- Canal + Diesel Tubewell Irrigated Farms

The farms were also classified under different categories i.e. small, medium and large sized farms according to their operational holdings in the study area. Under this classification, small farmers are those who are farming on land less than 2.0 hectares, medium farmers are farming on land between 2.1 to 4.0 hectares and farmers farming on land more than 4.0 hectares are considered large farme Rs. The farmers were selected randomly within each category. The number of farmers selected from various categories was 20 small, 7 medium and 5 large.

The data were subjected to tabular analysis to examine the resource endowment and their use, productivity, employment generation and fertilizer consumption in growing major crops on the various farms under different irrigation systems. Various cost and income concepts were also employed to examine cost and returns on farms due to change in irrigation potential. To fulfill the objectives of the study, the cost of production and returns were worked out on per hectare basis for different major crops in each category for the farme Rs. Return from the crop was estimated by calculating the gross return from each selected crop.

Estimation of Cost and Returns

Cost Concepts

Cost A1 = value of hired human labour + value of farm power + value of seed (both farm seed and purchased) + value of agro-chemicals + depreciation + irrigation cost + land revenue + interest on working capital

Cost A2 = Cost A1 + Rent paid for leased-in land

Cost B = Cost A2 + Interest on value of owned fixed capital assets (excluding land) + rental value of owned land

Cost C = Cost B + Imputed value of family labour

Income Concepts

Gross Income = (Main Product X Price per unit) + (By Product X Price)

Net Income = Gross income - Cost C3

Family Labour Income = Gross Income – Cost B

Farm Business Income = Gross Income – Cost A1

Farm Investment Income = Net Income + Rental value of owned land + Interest on fixed

Capital Benefit Cost Ratio = Gross Income/ Cost C3

$$\text{Percent Profit} = \frac{\text{Gross Income-Total Cost}}{\text{Total Cost}} \times 100$$

Result and Discussion

We analyzed this section under three sub heads:

A. Cost of Cultivation

Sugarcane Crop

Based on the portion of the gross cropped area, the sugarcane crop covered about 22 percent areas in the study area. Sugarcane is an annual crop and the study included both the planted and ratoon sugarcane crop during the sampling of the investigation. The table no.1 is a survey and examination of breakup of total cost of cultivation per hectare and different input used in cultivation process of sugarcane crop under different categories of farms like Canal Irrigated Farms, Electric Tubewell Irrigated Farms, Diesel Tubewell Irrigated Farms, Canal + Electric Tubewell Irrigated Farms and Canal + Diesel Tubewell Irrigated Farms. Table No. 1 shows that the highest total cost (Rs. 212461) was received on canal + diesel tubewell farms while lowest (Rs. 186237) on canal irrigated farms. When in total cost, the share of individual input has been examined; it is found that the rental value of land had the highest share in total cost is accounted to be 33.27, 29.68, 27.48, 29.01 and 35.91 percent on the Irrigated Farm by all means. The share of human labour and agrochemicals was received after the rental value of land in the total cost which was observed increasing with the progress of Irrigation assuredness. It is also known by the results of the Investigation that the per quintal cost of production of sugarcane crop in contrast to the cost- A, cost- B and cost- C was decreasing along with the certainty of irrigations water which was Rs. 196.96, Rs. 191.48, Rs. 185.27, Rs. 192.50 and Rs. 185.88 respectively on Canal Irrigated Farms, Electric Tubewell Irrigated Farms, Diesel Tubewell Irrigated Farms, Canal + Electric Tubewell Irrigated Farms and Canal + Diesel Tubewell Irrigated Farms.

Wheat Crop

The Table No-2 is a survey and examination of breakup of total cost of cultivation per hectare and different input used in cultivation process of wheat crop under different categories of farms. It is shown in the table No. 2 that cost C (total cost of cultivation) is calculated to be Rs. 89105 per hectare of net sown area is the highest for Canal + Diesel Tubewell Irrigated farms, while the lowest cost Rs. 81562 is estimated by the canal irrigated farms. A direct relationship of all the costs namely, Cost A, Cost B, Cost C have clearly been seen with the irrigation facilities, indicating thereby close association of inputs use in accordance with the levels of irrigation facility, that is, the increase in irrigation facilities boosts up the farmers just to increase the input use in crop cultivation per unit of land. When in total cost, the share of individual input has been examined; it is found that the rental value of land had the highest share in total cost is accounted to be 38.94, 40.39, 36.43, 37.83 and 35.91 percent under Canal Irrigated Farms, Electric Tubewell Irrigated Farms, Diesel Tubewell Irrigated Farms, Canal + Electric Tubewell Irrigated Farms and Canal + Diesel Tubewell Irrigated Farms respectively. It was followed by human labour, farm power and agro-chemicals. It was also observed that the higher cost of cultivation per hectare on Canal + Diesel Tubewell Irrigated Farms and, Canal + Electric Tubewell Irrigated Farms was, therefore, on account of higher level use of modern inputs other than high rental value of land.

Table 1: Analysis of Total Cost of Cultivation of Sugarcane Crop under Different Irrigation Systems (Rs. per Hectare)

Items	Categories of Farms				
	Canal Irrigated Farms	Electric Tubewell Irrigated Farms	Diesel Tubewell Irrigated Farms	Canal + Electric Tubewell Irrigated Farms	Canal+ Diesel Tubewell Irrigated Farms
Rental Value of Land	62000 (33.27)	58600 (29.68)	56000 (27.48)	60150 (29.01)	57750 (27.18)
Interest on Fixed Capital	4990 (2.68)	5820 (2.95)	6170 (3.03)	5700 (2.75)	6350 (2.99)
Depreciation on Fixed Capital	5425 (2.91)	7100 (3.60)	7880 (3.87)	7455 (3.59)	7720 (3.63)
Interest on Working Capital	3720 (2.00)	4490 (2.27)	4875 (2.39)	4670 (2.25)	5300 (2.49)
Human Labour A- Family B- Hired	12613 (6.77) 26809 (14.39)	14248 (7.22) 30537 (15.47)	12972 (6.36) 33358 (16.37)	14410 (6.95) 34290 (16.54)	15120 (7.12) 36101 (16.99)
Farm Power	23600 (12.66)	24824 (12.57)	24200 (11.87)	26000 (12.54)	26000 (12.24)
Seed	16550 (8.88)	16000 (8.10)	14700 (7.21)	15545 (7.50)	15000 (7.06)
Agro Chemicals	27120 (14.55)	29000 (14.69)	31725 (15.57)	32100 (15.48)	33220 (15.63)
Irrigation	3500 (1.88)	6800 (3.44)	11920 (5.85)	7000 (3.38)	9900 (4.66)
Cost A	103004	114261	123783	122390	127941
Cost B	173714	183171	190828	192910	197341
Cost C	186327	197419	203800	207320	212461
Cost per Quintal	196.96	191.48	185.27	192.50	185.88

Table 2: Analysis of Total Cost of Cultivation of Wheat Crop under Different Irrigation Systems (Rs. per Hectare)

Items	Categories of Farms				
	Canal Irrigated Farms	**Electric Tubewell Irrigated Farms**	**Diesel Tubewell Irrigated Farms**	**Canal + Electric Tubewell Irrigated Farms**	**Canal+ Diesel Tubewell Irrigated Farms**
Rental Value of	31760	33250	30600	32760	32000
Land	(38.94)	(40.39)	(36.43)	(37.83)	(35.91)
Interest on Fixed	2278	2150	2320	2400	2450
Capital	(2.79)	(2.61)	(2.76)	(2.77)	(2.75)
Depreciation on	2849	3000	3180	3360	3500
Fixed Capital	(3.49)	(3.64)	(3.78)	(3.88)	(3.93)
Interest on Working	1900	1865	1810	2215	2200
Capital	(2.33)	(2.26)	(2.15)	(2.56)	(2.47)
Human Labour A: Family B: Hired	5568 (6.83) 11832	4740 (5.76) 11060	4400 (5.24) 11040	4553 (5.26) 11147	4760 (5.34) 12240
	(14.51)	(13.43)	(13.14)	(12.87)	(13.74)
Farm Power	11170	10660	12300	13750	13120
	(13.69)	(12.95)	(14.64)	(15.88)	(14.72)
Seed	3680	4120	3800	3975	4000
	(4.51)	(5.00)	(4.52)	(4.59)	(4.49)
Agro Chemicals	7800	7800	8325	9200	9835
	(9.56)	(9.47)	(9.91)	(10.62)	(11.04)
Irrigation	2725	3685	6225	3240	5000
	(3.34)	(4.47)	(7.41)	(3.74)	(5.61)
Cost A	40056	40325	44870	44672	47695
Cost B	75994	77590	79600	82047	84345
Cost C	81562	82330	84000	86600	89105
Cost per Quintal	1362.40	1292.50	1235.30	1237.00	1216.45

Table 3: Analysis of Total Cost of Cultivation of Paddy Crop under Different Irrigation Systems (Rs. per Hectare)

Items	Categories of Farms				
	Canal Irrigated Farms	**Electric Tubewell Irrigated Farms**	**Diesel Tubewell Irrigated Farms**	**Canal + Electric Tubewell Irrigated Farms**	**Canal+ Diesel Tubewell Irrigated Farms**
Rental Value of	32200	31800	29600	31900	30000
Land	(33.78)	(31.04)	(28.42)	(31.25)	(27.97)
Interest on Fixed	1920	2220	2500	2000	2475
Capital	(2.01)	(2.17)	(2.40)	(1.96)	(2.31)
Depreciation on	2640	2600	2680	2470	2500
Fixed Capital	(2.77)	(2.54)	(2.48)	(2.42)	(2.33)
Interest on	1925	2170	2220	2080	2185
Working Capital	(2.02)	(2.12)	(2.13)	(2.04)	(2.04)
Human Labour A: Family B: Hired	8360 (8.77) 20840	9610 (9.38) 21390	8100 (7.78) 21900	9465 (9.27) 21555	8820 (8.22) 23380
	(21.86)	(20.88)	(21.03)	(21.12)	(21.80)
Farm Power	9000	10240	11000	10650	11400
	(9.44)	(9.99)	(10.56)	(10.43)	(10.63)
Seed	2800	3000	3150	3000	3300
	(2.94)	(2.93)	(3.02)	(2.94)	(3.08)
Agro Chemicals	11800	12000	13000	12775	14920
	(12.38)	(11.71)	(12.48)	(12.52)	(13.91)
Irrigation	3840	7400	10000	6170	8270
	(4.03)	(7.22)	(9.60)	(6.04)	(7.71)
Cost A	50920	56630	61730	56620	63770
Cost B	86965	92820	96050	92600	98430
Cost C	95325	102430	104150	102065	107250
Cost per Quintal	1798.50	1728.75	1614.75	1547.00	1537.60

Paddy Crop

The Table No-3 is a survey and examination of breakup of total cost of cultivation of per hectare and different input used in cultivation process of paddy crop under different irrigation systems. It is shown in the table No. 3 that Cost- C (total cost of cultivation) is estimated to be Rs. 107250 per hectare of net sown area is the highest for Canal + Diesel Tubewell Irrigated farms, while the lowest cost Rs. 95325 is estimated by the canal irrigated farms. A direct relationship of all the costs namely, Cost A, Cost B and Cost C have clearly been seen with the irrigation facilities, indicating thereby close association of inputs use in accordance with the levels of irrigation facility, that is, the increase in irrigation facilities boosts up the farmers just to increase the input use in crop cultivation per unit of land. When in total cost, the share of individual input has been examined; it is

found that the rental value of land had the almost highest share in total cost is accounted to be 33.78, 31.04, 28.42, 31.25 and 27.97 percent under Canal Irrigated Farms, Electric Tubewell Irrigated Farms, Diesel Tubewell Irrigated Farms, Canal + Electric Tubewell Irrigated Farms and Canal + Diesel Tubewell Irrigated Farms respectively. It was followed by human labour, farm power and agro-chemicals It was also seen that the higher expense of cultivation per hectare on Canal + Diesel Tubewell Irrigated Farms and, Diesel Tubewell Irrigated Farms was, therefore, by virtue of higher level use of modern inputs other than high rental worth of land.

B. Income Measures

Sugarcane Crop

The main basis for the success of farm business income is how much returns the farm is getting from producing the crop. The table No. 4 shows a close assessment of various income measures under different categories of farms. A reasonable picture is drawn from the tabular examination that the per hectare net returns (Gross income - Cost C) are observed highest (Rs. 40871) on Canal + Diesel Tubewell irrigated farms, Canal + Electric Tubewell irrigated farms (Rs. 37465), Diesel Tubewell (Rs. 37587), Electric Tubewell irrigated farms (Rs. 35412) and the lowest remained up to Rs. 27792 Canal irrigated farms. Further the table also reveals that the gross income (value of product and by-product) is also observed maximum (Rs. 129976) on Canal + Diesel Tubewell irrigated farms, and it is least (Rs. 109354) on Canal irrigated farms. The percent profit was 34.07% on Canal irrigated farms, 43.01% on Electric Tubewell irrigated farms, 44.75% on Diesel Tubewell, 43.26% on Canal + Electric Tubewell irrigated and 45.87% estimated on Canal + diesel Tubewell irrigated farms. Average output input ratios from sugarcane crop were also obtained in the same sequence as 2.63, 2.55, 2.58, 2.53 and2.57 in the study area. Again, on an average the farm business income (gross income- cost A) on different farms are Rs. 69298, Rs. 77417, Rs. 76717, Rs. 79393 and Rs. 82281 respectively. Family labour income is also seen in the same manner.

Table 4: Gross Income, Net Income, Family Labour Income and Farm Business Income of Sugarcane Crop under Different Categories of Farms (Rs. per hectare)

Categories of farms	Gross income	Net income	Family labour income	Farm business income	Output/Input Ratio
Canal Irrigated Farms	304000	117673	130286	200996	2.63
Electric Tubewell Irrigated Farms	327858	130439	144687	213597	2.55
Diesel Tubewell Irrigated Farms	353100	149300	162272	229317	2.58
Canal + Electric Tubewell Irrigated Farms	345717	138397	152807	223327	2.53
Canal+ Diesel Tubewell Irrigated Farms	368046	155585	170705	240105	2.57

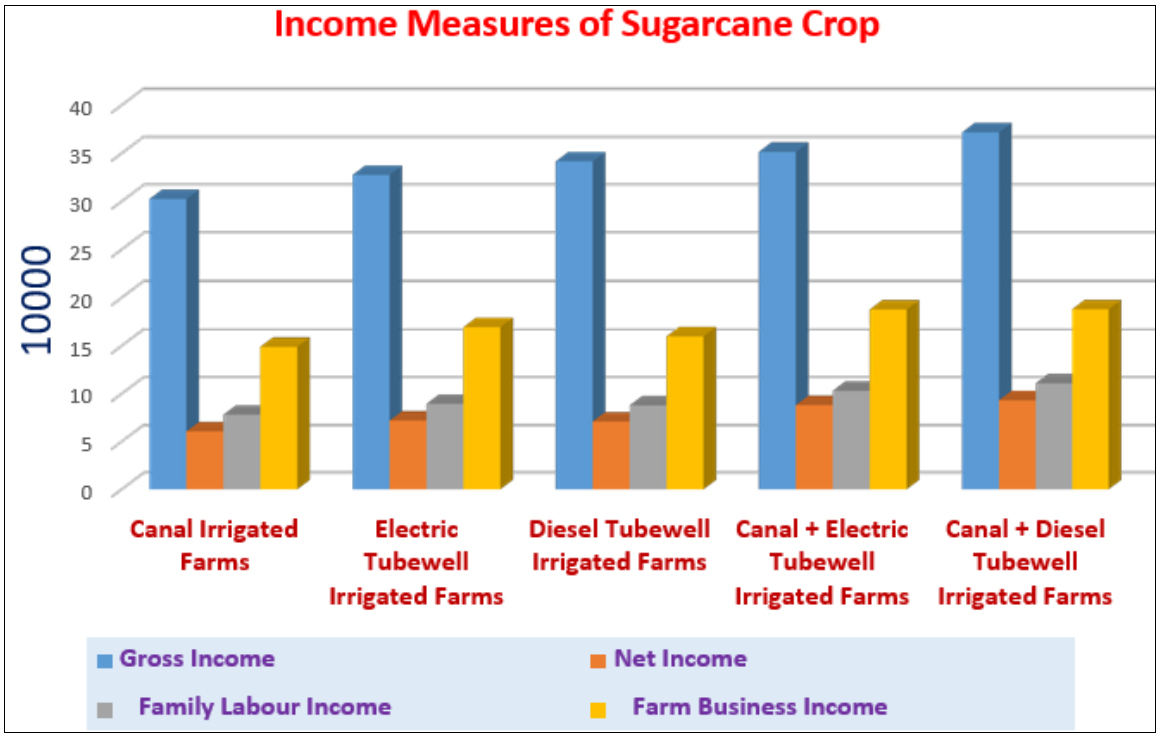

Fig 1: Income measures of sugarcane crop

Table 5: Gross Income, Net Income, Family Labour Income and Farm Business Income of Wheat Crop under Different Categories of Farms (Rs. per hectare)

Categories of farms	Gross Income	Net Income	Family Labour Income	Farm Business Income	Output/ Input Ratio
Canal Irrigated Farms	109354	27792	33360	69298	2.39
Electric Tubewell Irrigated Farms	117742	35412	40152	77417	2.61
Diesel Tubewell Irrigated Farms	121587	37587	41987	76717	2.47
Canal + Electric Tubewell Irrigated Farms	124065	37465	42018	79393	2.52
Canal+ Diesel Tubewell Irrigated Farms	129976	40871	45631	82281	2.48

Wheat Crop

The table No. 5 shows a close examination of farm income measures under different categories of farms. A clear picture is drawn from the tabular analysis that the per hectare net returns (Gross income - Cost C) are observed highest (Rs. 40871) on Canal + Diesel Tubewell irrigated farms, Canal + Electric Tubewell irrigated farms (Rs. 37465), Diesel Tubewell (Rs. 37587), Electric Tubewell irrigated farms (Rs. 35412) and the lowest remained up to Rs. 27792 Canal irrigated farms. Further the table also reveals that the gross income (value of product and by-product) is also observed maximum (Rs. 129976) on Canal + Diesel Tubewell irrigated farms, and it is least (Rs. 109354) on Canal irrigated farms. The percent profit was 34.07% on Canal irrigated farms, 43.01% on Electric Tubewell irrigated farms, 44.75% on Diesel Tubewell, 43.26% on Canal + Electric Tubewell irrigated and 45.87% estimated on Canal + diesel Tubewell irrigated farms. Again, on an average the farm business income (gross income- cost A) on different farms are Rs. 69298, Rs. 77417, Rs. 76717, Rs. 79393 and Rs. 82281 respectively. In wheat crop production the average output input ratio which are 2.39, 2.61, 2.47, 2.52 and 2.48 were obtained in the same sequence.

Paddy Crop

The table No. 6 shows a close examination of farm income measures under different categories of farms. A clear picture is drawn from the tabular analysis that the per hectare net income (Gross income - Cost C) are observed highest (Rs. 46650) on Canal + Diesel Tubewell irrigated farms, Canal + Electric Tubewell irrigated farms (Rs. 42920), Diesel.

Table 6: Gross Income, Net Income, Family Labour Income and Farm Business Income of Paddy Crop under Different Categories of Farms (Rs. per hectare)

Categories of farms	Gross Income	Net Income	Family Labour Income	Farm Business Income	Output/ Input Ratio
Canal Irrigated Farms	114419	19094	27452	63499	1.93
Electric Tubewell Irrigated Farms	130519	28089	37699	73889	1.97
Diesel Tubewell Irrigated Farms	141780	37630	45730	80050	2.03
Canal + Electric Tubewell Irrigated Farms	144985	42920	52385	88365	2.19
Canal+ Diesel Tubewell Irrigated Farms	153900	46650	55470	90130	2.12

Tubewell (Rs. 37630), Electric Tubewell irrigated farms (Rs. 28089) and the lowest remained up to Rs. 19094 on Canal irrigated farms. Further the table also reveals that the gross income (value of product and by-product) is also observed maximum (Rs. 153900) on Canal + Diesel Tubewell irrigated farms, and it is least (Rs. 114419) on Canal irrigated farms. The percent profit was 20.03% on Canal irrigated farms, 27.42% on Electric Tubewell irrigated farms,

36.13% on Diesel Tubewell, 42.05% on Canal + Electric Tubewell irrigated and 43.50% estimated on Canal + diesel Tubewell irrigated farms. Again, on an average the farm business income (gross income- cost A) on different farms are Rs. 63499, Rs. 73889, Rs. 80050, Rs. 88365 and Rs. 90130 respectively. Family labour income is also seen in the same manner. It gives an idea that the farmers have gained the most per unit of net sown area because of the fact that the farmers have get an assured and adequate irrigation facility.

C. Comparison

Table 7: Comparison of Percent Profit under Different Irrigation Situation

Categories of farms	Net Income Sugarcane Crop (Rs.)	Percent Profit Sugarcane Crop (%)	Net Income Wheat Crop (Rs.)	Percent Profit Wheat Crop (%)	Net Income Paddy Crop (Rs.)	Percent Profit Paddy Crop (%)	Net Income Wheat + Paddy Crop (Rs.)	Percent Profit Wheat + Paddy Crop (%)
Canal Irrigated Farms	117673	63.15	27792	34.07	19094	20.03	46886	26.51
Electric Tubewell Irrigated Farms	130439	66.07	35412	43.01	28089	27.42	63501	34.37
Diesel Tubewell Irrigated Farms	149300	73.26	37587	44.75	37630	36.13	75217	39.98
Canal + Electric Tubewell Irrigated Farms	138397	66.75	37465	43.26	42920	42.05	80385	42.61
Canal+ Diesel Tubewell Irrigated Farms	155585	73.23	40871	45.87	46650	43.50	87521	44.57

The three important crops of the study area, sugarcane, wheat and paddy, were compared in terms of cost and various aspects of income. While collecting the sugarcane crop data, it was also kept in mind that the average of both the crops planted and the ratoon of sugarcane were included in the investigation. Since sugarcane is an annual crop whereas both wheat and paddy are almost half yearly crops, a new category wheat plus paddy was also included to study them throughout the year. In the investigation, comparison of cost and income conditions of sugarcane crop with wheat and paddy crop, as well as comparison of collective cost and income measures of wheat plus paddy crops were also done. Comparative study of all the three crops, wheat, sugarcane and paddy in the study area is shown by table no. 7 and profit percentage diagram along with other cost and income tables. It is clear from the income table of the investigation that in comparison to wheat and paddy, the net income (Gross Income- Cost C) received from sugarcane crop was getting more on all category of farms. Along with this, the net average income from sugarcane crop was getting higher (Rs. 138278.80) as compared to net income received from wheat plus paddy crops (Rs. 70702).

It is clear from the income tables that the average net income received by sugarcane was about 50% more than the average income of the other two crops wheat plus paddy.

It is clear from the income tables of the investigation that the farm business income was also 30% less for wheat+ paddy crops than for sugarcane crop, while it was Rs

156207.60 for wheat +paddy crop whereas Rs. 221 468.40 getting for sugarcane crop. Table no. 7 clearly shows that the percentage profit obtained for the wheat +paddy crops, which was 26.51, 34.37, 39.98 42.61and 44.57 percent on the farm irrigated by various means, but in comparison, the percentage profit obtained from sugarcane crop was higher on all the farms (63.15, 66.07, 73.26, 66.75 and 73.23 percent). This investigation also highlights that the percentage of net income in reference to the average operational cost for wheat, paddy and wheat plus paddy crops was significantly lower for wheat it was 74.13 percent for paddy, 52.21% and for wheat + paddy it observed 61.41%, while it was 104.64% for sugarcane crop. It was also estimated from the income tables of the investigation that relative to Sugarcane, the percentage of net income (Gross Income-Cost C) received from wheat, paddy and wheat + paddy was 25.91%, 25.22% and 51.13% respectively, which was very low.

Comparison of the net income of all three major crops of the study area, wheat, paddy and sugarcane was also compared with another approach, which is shown in Table No.7. According to the table the net income from sugarcane was 3.68 to 4.23 times more than wheat on all categories of farms. If this comparison is done on an average, the net income obtained from sugarcane was 3.86 times as compared to wheat, whereas in paddy crop it was more than 4 times. Similar comparison of net income was done between the net income received from wheat + paddy and sugarcane and it was found that the net income received on sugarcane farm was almost 2 times more than that on wheat+ paddy farms. These differences in the net incomes of the three major crops of the study area were obtained mainly due to the difference in the cost of production of all the three crops. This difference in net income was also obtained due to the difference in productivity of all three crops and prices per unit of production.

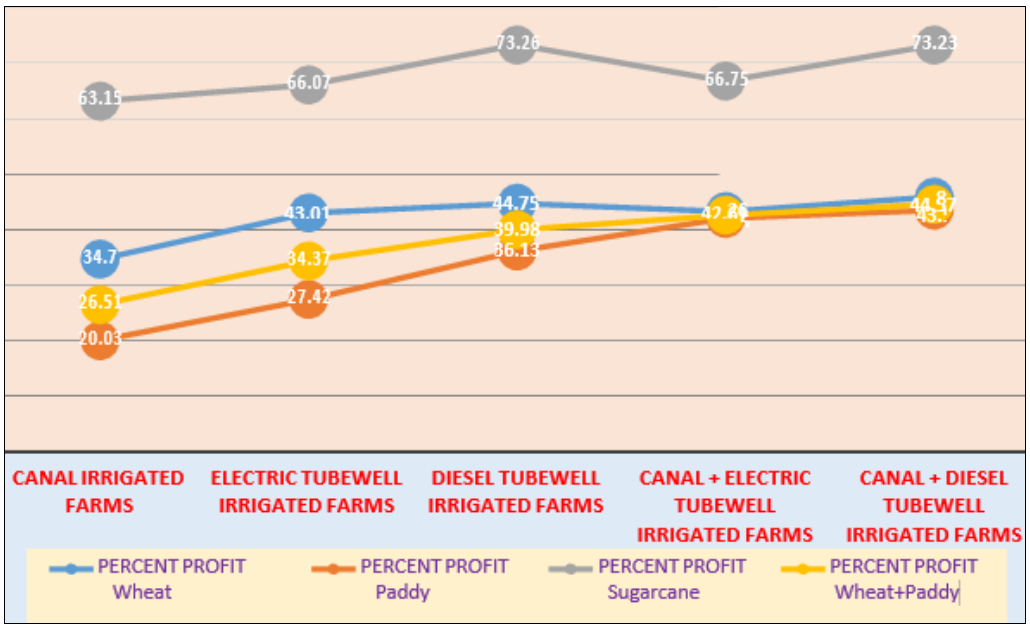

Fig 2: Comparison of percent profit

Conclusion

In the present study, gents were investigated in different types of cost concepts and income measures in the production of wheat, paddy and sugarcane, all three major crops of western Uttar Pradesh. The three selected crops covered more than 72.83% of the gross cropped area of the study area. The study was based on data available from both primary and secondary sources and studied irrigated farms using different means of irrigation. For this investigation, 2 districts of Western Uttar Pradesh, Bulandshahr and Ghaziabad were selected, out of which four tehsils were selected and randomly selected 160 farmers and cross section data was used at the farm level. While selecting the agriculture farm, special attention was also paid to the size of agriculture holdings in the study area.

It was clear from the results of the study that the total cost per hectare of wheat and paddy was higher in comparison to sugar cane. On the irrigated farms by various means like Canal Irrigated Farms, Electric Tubewell Irrigated Farms, Diesel Tubewell Irrigated Farms, Canal + Electric Tubewell Irrigated Farms and Canal + Diesel Tubewell Irrigated Farms per hectare More net income and farm business income was being generated by sugarcane crop relative to wheat, paddy and wheat + paddy crop. Percent profit on all the above farms was also getting more by sugarcane than wheat, paddy and wheat + paddy. Because sugarcane is an annual crop whereas wheat and paddy are six months crop, but even after taking wheat and paddy together, the average net returns were getting less as compared to sugarcane crop. On taking wheat and paddy together, average net returns of Rs. 7070 2.00 while sugarcane was getting Rs. 138278.80 per hectares. Therefore, the investigation makes it clear that the per hectare profit was getting more by sugarcane crop than wheat crop, paddy crop and wheat plus paddy crop. In conclusion, it can be said as a suggestion that wheat and Paddy are the main food crops of the study area, therefore, to increase the net returns per hectare in these crops, along with reducing the cost of production, the minimum support price should be increased further by the government.

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