

Comparative Study on Cost of Cultivation and Economic Returns from Major Crops in Eastern Region of Uttar Pradesh

Pushpa¹, S.K. Srivastava² and Punit Kumar Agarwal³

¹Division of Dairy Economics Statistics & Management (NDRI), Karnal, Haryana, India

²Department of Agriculture Economics, G.B. Pant University of Agriculture & Technology, Pantnagar, Uttarakhand, India

³Department of Agriculture Economics, College of Agriculture Science, Banaras Hindu University (BHU), Uttar Pradesh, India

Corresponding author: pushpayadvndri@gmail.com

Paper No. 593

Received: 14-2-2017

Accepted: 18-5-2017

ABSTRACT

An investigation was done to work out the cost of production, cost of cultivation, returns and profitability from Sugarcane, Wheat and Paddy crops in order to identify which crop is more profitable and economic for the farmers of Uttar Pradesh. On an average, the cost of production was ₹ 78.29 per quintal and the net return per hectare after subtracting the total cost (Cost C₁) from the gross return was ₹ 54956.01 per hectare. Whereas, production and returns from wheat and paddy crop were ₹ 714.13 per quintal, ₹ 8614.32 per hectare and ₹ 614.93 per quintal, ₹ 10870.71 per hectare respectively. The observations indicated that per quintal cost of production for sugarcane crop was less than wheat and paddy crop, on the other hand per hectare net return was the highest for sugarcane when compared to wheat and paddy crop. All the major crops viz., paddy, wheat and sugarcane were profitable for the farmers, but sugarcane was the most profitable crop when compared to the rest, because the per quintal cost of production as well as the per hectare return were more economic than wheat and paddy crops.

Highlights

- Wheat emerged as the main foodgrain crop with its percentage share of 28.87% in the gross cropped area.
- Per hectare net return was found to be higher for sugarcane crop (₹ 54956.01/ha) when compared to wheat (₹ 8614.32/ha) and paddy (₹ 10870.71/ha) crops.
- Sugarcane was found to be the most profitable crop with the net return of ₹ 54956.01/ha, which was more and double of profit earned from wheat and rice crops.
- Per hectare cost of cultivation was found to be the highest for the large farms and the per hectare net return also seemed to be the highest for the large farms.

Keywords: Production, productivity, return, profitability, cropping pattern, cost concepts

Agriculture has been a way of life and continues to be the single most important livelihood of the masses in India. During 2011-12, there was a record for the production of foodgrains at 259.32 million tonnes, of which 131.27 million tonnes was during *Kharif* season and 128.05 million tonnes during the *Rabi* season. Of the total foodgrains production, the production of cereals was 242.23 million tonnes and pulses 17.09 million tonnes. As per the 2nd advance estimates for 2012-13, total food grains production was estimated 251.42 million tonnes (124.68 million

tonnes during *Kharif* and 125.47 million tonnes during *Rabi* seasons). The 6.59 million tonnes (about 5.02%) decline in *kharif* production was the account of late onset of monsoon and the deficient rainfall in several states such as Andhra Pradesh, Bihar, Gujarat, Haryana, Karnataka, Maharashtra, Rajasthan, Tamil Nadu and West Bengal. The production of rice (both *kharif* and *rabi*) is estimated at 101.8 million tonnes, pulses at 17.58 million tonnes, oilseeds at 29.46 million tonnes, sugarcane at 334.54 million tonnes and cotton at 33.80 million



bales (of 170 kg. each). Though, the production of rice, sugarcane and cotton during *kharif* 2012-13 has been lower than that of the last year, it seems to be better than the average production during the last five years. The increased volume of the crop output, which resulted from the intensification of agriculture after the introduction of green revolution during the mid-sixties, has helped to increase the wage rate and generate more employment opportunities in the rural areas particularly for the landless labourers (Dev and Ranade, 1998; Saleth, *et al.*, 2003; Narayanamoorthy and Deshpande, 2003). The incidence of rural poverty has also reduced considerably from 56.44% during 1972-73 to 28.33% in 2004-05 mainly because of the improved production of agricultural commodities, as proved by a number of studies (Ahluwalia, 1978; Narayanamoorthy, 2001; Saleth *et al.*, 2003; Hussain and Hanjra, 2003; 2004). These achievements would not have been possible without the incisive role of Indian farmers (Swaminathan, 2008). Despite these achievements, there are no recent great news from the farm sector since the early 1990s. Farmers' suicides, indebtedness, crop failures, unremunerative prices for crops and poor returns over cost of cultivation are the prominent features of India's agriculture today. Farmers committing suicides were not common before the early 1990s, but it has become a widespread phenomenon today in many states of India. Over two lakh farmers committed suicides in India between 1990-91 and 2009-10 and the proportion is alarmingly high in states like Maharashtra, Andhra Pradesh and Karnataka (Sainath, 2010). Why is this happening in India? Is it because of the poor returns from crop cultivation? Or due to failures caused by vagaries of monsoons? Could the increased indebtedness be the reason? A large number of studies have been analysing these issues since mid-nineties when the problem of farmers committing suicides assumed serious proportions. Some studies reported that the inadequate supply of institutional credit, decline in productivity of crops and imperfect market conditions were the major reasons for this phenomenon (Deshpande, 2002; Deshpande and Prabhu, 2005; Reddy and Galab, 2006; Mishra, 2006; Vaidyanathan, 2008).

Some researchers have blamed the green revolution for the farmers' suicides without paying adequate

attention to the benefits that the green revolution brought to the farmers and to the country as a whole (Vasavi, 2010). Though the farmers' suicides started mostly from the early nineties in India, some researchers have attributed this phenomenon to behavioural and social factors (Mohanty, 2001; Mohanty and Shroff, 2004; Gyanmudra, 2010). But, they do not explain how the behavioural and social problems could occur suddenly in the farming community. Alagh (2006) gives a contrary view to the assertion that farmers are committing suicides due to behavioural and social problems. He underlines the exact reality that "The idea that social workers and agricultural specialists, so-called Krushi Mitras, can visit rural households to mitigate suicidal tendencies by themselves is truly bizarre. It is true that a person taking the final step out must be terribly stressed, but the notion that the problem is largely that of mental pressure is wrong. The prevalence of schizophrenia as a genetic phenomenon is almost a constant across societies. But suicides amongst men – particularly farmers – in rural areas have been increasing so rapidly as not to be explained by a behavioral context. The families ravaged by this experience are not the poorest of poor, as romantically stated sometimes. They own assets in rural areas, use the better available technologies, diversify into new crops and expect to do well. This is not the phenomenon of subsistence farming. These are farmers, generally educated, who go after what they see as profitable opportunities by investing a lot – generally from high-cost borrowings – and then lose out"?

Returns from crop cultivation are essential not only for the survival of the farmers but also to facilitate reinvestment in agriculture. If the flow of income from crop cultivation is not regular and is inadequate, farmers may not be able to repay their debts which would lead to increased indebtedness (Darling, 1925; NSSO, 2005b; Narayanamoorthy and Kalamkar, 2005; Government of India, 2007; Reddy and Mishra, 2009; Deshpande and Arora, 2010). Not many studies have detailed analysis of the profitability of different crops in relation to the cost of cultivation over a period of time. Without using temporal data on the cost of cultivation, some recent studies have observed that stagnation in real income and relatively higher rise in input prices, than the prices of the agricultural produce could



be the reasons for farmers suicides (Kalamkar and Narayanamoorthy, 2003; Narayanamoorthy 2006; 2007; Deshpande and Arora, 2010; Sainath, 2010). The National Commission on Farmers (NCF) has also recognised that inadequate return from the crop cultivation is the main reason for the present agrarian crisis and farm suicides (NCF, 2006).

Given the widespread indebtedness of farmers and severe agrarian crisis, several policy initiatives were taken. Besides the state specific incentive programmes, the Government of India announced a national level massive farm loan waiver scheme worth over ₹ 70,000 crore during 2008-09. It benefited a large number of farmers who had defaulted in the repayment of their debts, but it does not have any perceptible impact on solving the agrarian crisis so far. Sainath (2010), who studied extensively the farm suicides in Maharashtra and the other states writes that the farm suicides increased in most states after the announcement of the loan waiver scheme. This was probably because the one time support programme (loan waiver) alone would not be sufficient to solve the problem of the farmers who require increased income from the crop cultivation (Vaidyanathan, 2008).

Indebtedness and other related problems occur mainly due to poor returns from crop cultivation. Therefore, one should study the issue of profitability in different crops in an in-depth manner using larger coverage of data to find out whether farmers reap any profit from crop cultivation. Dev and Rao (2010) have recently analysed the issue of profitability utilising temporal data, but focusing only on paddy and wheat crops. Except for this study, there are not many other studies available, which utilises the cost of cultivation data covering different crops and longer period with a specific focus on profitability. Cost of cultivation survey data published by the Commission for Agricultural Costs and Prices (CACPC) contains rich information on the cost and the output of various crops on a temporal basis (see; Rao, 2001; Sen and Bhatia, 2004). An attempt is made in this study to find out the trends in the profitability of major crops i.e. wheat, rice and sugarcane.

To search the answers to the above questions, the study has focused upon the following objectives. The very first one is to find out the cost of production and returns of sugarcane, wheat and paddy crops,

in order to estimate the profitability of the selected crops. The second objective is to find out the most economic and profitable crop for the farmers.

MATERIALS AND METHODS

Source of Data

The study was conducted in Deoria district which is situated in the eastern region of Uttar Pradesh. The district is located between 26°6' north to 27°8' north latitude and 83°29' east to 84°26' east longitude. The study area is surrounded by the district Kushinagar in North, district Gopalganj and Siwan (Bihar state) in east, district Mau and district Ballia in south and district Gorakhpur in west. The headquarters of Deoria city is situated at 53 Km. milestone from Gorakhpur towards east.

Keeping in mind the objectives of the study, multi stage stratified random sampling technique was used. Firstly a list of all (16 developmental blocks) the developmental blocks of the district was prepared and two blocks namely *Gauri bazaar* and *Rudrapur* were selected randomly. In the second stage one village from each selected block i.e. Pananha village from Gauri bazaar and Dharauli from Rudrapur block were selected randomly. Then two adjoining villages of Pananha and Dharauli namely Surajpur, Khairabanwa and Gahila, Tarasara were selected respectively. Thus in this way a cluster of three villages was formed in each selected block. In the third stage, the farmers were classified into different categories of marginals (less than 1 ha of land), small (1-2 ha) medium (2-4 ha) and large (more than 4 ha). Then 20 farmers from each category were selected on the basis of probability proportion to their size from both the clusters of the villages, respectively. Thus a total of 80 farmers were surveyed who were raising sugarcane, wheat and paddy crops in their field for the year 2009-10.

Modeling

To fulfill this objective, the cost of production and returns were worked out on per hectare basis for different major crops in each category for the farmers. Return from the crop was estimated by calculating the gross return from each selected crop. While formulating the price policy, the Commission considers the weighed average Cost of Production of different crops. If the costs are to be normally



distributed, about 50% of production of a particular commodity will have the Cost of Production less than the weighed average, while the other half will have cost higher than this weighed average (CACP Dept. of Agriculture and cooperation, 2011-12).

$$GR_j = MP_j \times MPP_j + BP_j \times BPP_j$$

$$NR_j^* = GR_j - COP_j^*$$

Where,

GR_j = Gross returns from j^{th} crop (₹/ha).

MP_j = Main products of j^{th} crop (Qt/ha).

BP_j = By products of j^{th} crop (Qt/ha).

MPP_j = Price of main product of j^{th} crop (₹/Qt).

BPP_j = Price of by-product of j^{th} crop (₹/Qt).

NR_j = Net returns from j^{th} crop (₹/ha).

COP_j = Cost of production of j^{th} crop.

j = Selected crop (1, 2 and 3)

(* denotes cost levels i.e. Cost A_1 , Cost B_1 , Cost C_1 , C_2 , C_2^* , C_3)

Cost A1 : All variable cost excluding family labours cost and including land revenue, depreciation and Interest on working capital.

Cost A2 : Cost A1 + Rent paid for the leased land.

Cost B1 : Cost A1 + Interest on value of owned capital assets (excluding Land).

Cost B2 : Cost B1 + imputed rental value of owned land, (net of land revenue) + Rent paid for leased land.

Cost C1 : Cost B1 + Imputed value of family labour.

Cost C2 : Cost B2 + Imputed value of family labour.

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

Cost C3 : Cost C_2^* + 10% of cost C_2^* on account of the managerial function performed by the farmers.

Cost of Production: Cost of production was calculated by estimating all the costs which are incurred in producing one quintal of produce or output. On the cost structure, a fertilizer constitutes just 5% in the total cost of the production. Lower

prices of urea (due to control and subsidy) in relation to other fertilizers have led to its heavy use at the expense of P&K (CACP Dept. of Agriculture and cooperation, 2011-12).

Cost of cultivation: It includes operational costs, material costs and other costs in crop production. In operational costs, the cost of hiring human labour, machine power, bullock charges have been estimated by prevailing the rate at that particular period of time in the study area. Hired labour charge at the actual wage paid in cash and other kind of payments were also converted into monetary terms at the prevailing price. Imputed value of the family labour was also calculated using the prevailing wage rate in the study area. In case of bullock, tractor and other machinery and hiring charges were applied to these as the cost for those who don't own them, whereas the cost of fuel, repairing and maintenance cost were calculated for those who own them.

In case of material costs; cost of seeds, manure, chemicals, fertilizers irrigation charges were calculated at prevailing price at the time of application per hectare basis for different categories of farmers. Owned seed was priced as the prevailing seed price in the study area. Other costs includes land revenue, interests on fixed assets, interest on working capital, depreciation and rental value of the land. Simple interest was calculated on the working capital at a flat rate of 7% per annum as it prevailed at the time of investigation. Rental value of the land prevailed in the study area during study period was taken. Depreciation on the fixed asset per hectare was calculated on the basis of hours used for the crop.

RESULTS AND DISCUSSION

Cropping pattern on sample farms: Table 1 represents the cropping pattern adopted on the sample farms in the study area. It is evident from the table that wheat was the major cereal crop in the study area, on the basis of the share of gross cropped area. Wheat crop alone shared 28.87% of the farm gross cropped area on the overall basis. Paddy appeared as the second major crop after wheat which constituted 23.92% of the gross cropped area.

Sugarcane was the third major annual crop in the study area. On an average, sugarcane shared 21.70% of the gross cropped area across the farm size

Table 1: Cropping pattern of the sample farms (Ha/farm)

Categories Crops	Marginal	Small	Medium	Large	Overall
Paddy	0.60 (37.59)	0.90(22.33)	1.80(30.87)	2.50(19.54)	1.45(23.92)
Maize	0.002(0.13)	0.002(0.049)	0.05(0.86)	0.15(1.16)	0.05(0.82)
Groundnut	0.0010(0.06)	1.015(25.16)	0.023(0.39)	0.19(1.47)	0.31(4.95)
Wheat	0.65(40.73)	1.20(29.74)	2.05(35.16)	3.10(23.94)	1.75(28.87)
Mustard	0.065 (4.07)	0.12 (2.97)	0.75(12.86)	1.25(9.67)	0.54(8.91)
Potato	0.012(0.76)	0.02(0.49)	0.061(1.03)	1.95(15.09)	0.51(8.42)
Sugarcane	0.235(14.72)	0.736(18.25)	1.046(17.91)	3.28(25.37)	1.32 (21.70)
Other crops	0.031(1.94)	0.041(1.02)	0.059(1.01)	0.50(3.85)	0.15 (2.41)
Gross cropped area	1.59	4.034	5.83	12.92	6.06
Net sown area	0.90	1.95	3.98	9.92	4.18
Cropping intensity	177.33	206.87	146.70	130.24	144.97

Note: Figures in parentheses indicates percentage of gross cropped area

Table 2: Concept wise cost of cultivation of paddy crop (₹/ha)

Particulars	Farm size groups				
	Marginal	Small	Medium	Large	Overall
(a) Cost A ₁	9091.87 (38.32)	12447.97 (46.25)	15859.04 (54.07)	17990.52 (57.63)	14027.8 (50.11)
(b) Cost A ₂	17562.27 (74.03)	20918.37 (77.72)	24329.44 (82.95)	26460.92 (84.77)	22498.2 (80.37)
(c) Cost B ₁	10153.91 (42.82)	13517.2 (50.22)	16930.49 (57.73)	19069.8 (61.09)	15097.0 (53.93)
(d) Cost B ₂	18624.31 (78.51)	21987.6 (81.69)	25400.89 (86.61)	27535.2 (88.21)	23567.4 (84.22)
(e) Cost C ₁	13093.91 (55.20)	15995.2 (59.43)	18190.49 (62.02)	19904.8 (70.14)	16976.5 (60.64)
(f) Cost C ₂	21564.31 (90.89)	24466.6 (90.89)	26660.89 (90.90)	28375.2 (90.90)	25446.9 (90.89)
(g) Cost C ₂ *	21564.31 (90.89)	24466.6 (90.89)	26660.89 (90.90)	28375.2 (90.90)	25446.9 (90.89)
(h) Cost C ₃	23720.74 (100.00)	26913.26 (100.00)	29326.97 (100.00)	31212.72 (100.00)	27991.59 (100.00)

Note: Figures in parentheses indicates the percentage of total cost

groups. These three crops viz., wheat, sugarcane and paddy together shared more than 74% of the gross cropped area on the sample farms in the study area. Whereas, on the basis of information on the cropping pattern at the district level, these three crops together constituted more than 90% to the gross cropped area, and hence, are selected as the major crops for the study.

Cost of cultivation of paddy crop: In the study

area paddy was planted predominantly during the *kharif* season. The table 2 depicts the cost of cultivation of paddy crop in the study area. Due to the scarcity of labour in the peak period, wage of labour was high (₹ 120/man day) and for this reason expenditure incurred on hired labour was high enough. The overall average expenditure worked out for human labour was ₹ 10344.5 per ha. While the expenditures made on hired labour for one

Table 3: Cost of production and returns from paddy crop

Particulars	Farm size group				
	Marginal	Small	Medium	Large	Overall
Yield of main product (qt/ha)	32.75	35.06	38.9	40.83	36.88
Yield of by product (qt/ha)	32.75	35.06	38.9	40.83	36.88
Price of main product (₹/qt)	820	830	852.5	912.5	853.75
Price of by product (₹/qt)	200	200	200	200	200
Return from main product (₹/ha)	26855	29099.8	33142.8	37236.96	31486.3
Return from by-product (₹/ha)	6550	7012	7780	8166	7376
Gross return (₹/ha)	33405	36111.8	40922.8	45402.96	38862.3
Net Return (₹/ha) at					
(a) Cost A ₁	24313.13	23663.83	25063.76	27912.44	24834.5
(b) Cost A ₂	15842.73	15193.43	16593.36	18942.04	16364.1
(c) Cost B ₁	23251.09	22594.6	23992.31	26338.16	23765.3
(d) Cost B ₂	14780.69	14124.2	15521.91	17867.76	15294.9
(e) Cost C ₁	20311.09	20116.6	22732.31	25498.16	21885.8
(f) Cost C ₂	11840.69	11645.2	14261.91	17027.76	9682.27
(g) Cost C ₂ *	4709.62	3843.73	14261.91	17027.76	9682.27
(h) Cost C ₃	9684.26	9198.54	11595.83	14190.24	10870.71
Cost of production at Cost C ₃ (₹/qt)	582.2	618	610.57	626.96	614.93

hectare were ₹ 5075, ₹ 7525, ₹ 10010 and ₹ 11250 in case of marginal, small, medium and large farms, respectively. Overall average expenditure on bullock labour and machinery was ₹ 1558.75 per ha. From the table it is also clear that in paddy cultivation the farmers of the study area had made very less expenditure on irrigation due to sufficient rain. If the total expenditure on human labour of different categories of farmers are compared, it is clear that the marginal farmers used less hired labour than other categories of farmers because they spent only 21.39% of the total cost (Cost C₃) on hired human labour while small, medium and large farmers had spent 27.96, 34.13 and 36.04% of total cost (Cost C₃), respectively. Similar observations were made by Singh *et al.* (2008).

However, per hectare Cost A₁ on marginal, small, medium and large farms were found to be ₹ 9091.87, ₹ 12447.98, ₹ 15859.04 and ₹ 17990.52, respectively. It was found that the actual wage rate (₹ 120/man day) was higher than the minimum statutory wage rate (₹ 104/man day) thus the Cost C₂ and Cost C₂* were same for all the farms size groups in the study area. Per hectare cost C₃ is the total cost of cultivation of paddy crop which includes the managerial cost of

farmers also. Large farmers were found to spend the highest on paddy cultivation (₹ 31212.72), which was 1.3 times more than that of the marginal farmers (₹ 23720.74). The average cost of cultivating on one hectare of paddy was ₹ 27991.57 for all the farms in the study area. The average total cost of cultivation per hectare was ₹ 40,266.59. The findings of Maheshwarappa *et al.* (1998) was that the variable cost and the fixed cost accounted for 87.68 and 12.32% of the total cost of cultivation respectively.

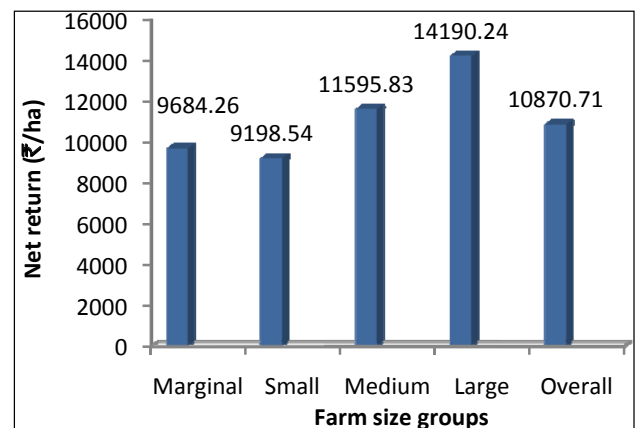


Fig. 1: Net returns from paddy crop (₹/ha)

The variable cost mainly comprised of the cost of human labour, seed material and chemical fertilizers

Table 4: Concept wise cost of cultivation of wheat crop (₹/ha)

Particulars	Farm size groups				
	Marginal	Small	Medium	Large	Overall
(a) Cost A ₁	8957.8 (42.33)	11746.8 (48.46)	15478.84 (55.74)	18561.9 (60.49)	14545.35 (54.05)
(b) Cost A ₂	16428.2 (77.6)	19217.2 (79.28)	22949.24 (82.64)	26032.3 (84.84)	22015.75 (81.810)
(c) Cost B ₁	9894.97 (46.76)	12703.2 (52.41)	16452.5 (59.25)	19544.02 (63.69)	15508.92 (57.63)
(d) Cost B ₂	17365.37 (82.06)	20173.6 (83.23)	23922.95 (86.155)	27014.42 (88.04)	22979.32 (85.39)
(e) Cost C ₁	11766.97 (55.60)	14563.2 (60.07)	17772.55 (64.005)	20424.02 (66.56)	16991.92 (63.14)
(f) Cost C ₂	19237.37 (90.90)	22033.6 (90.90)	25242.95 (90.89)	27894.4 (90.90)	24462.32 (90.90)
(g) Cost C ₂ *	19237.37 (90.90)	22033.6 (90.90)	25242.95 (90.89)	27894.4 (90.90)	24462.32 (90.90)
(h) Cost C ₃	21161.10 (100.00)	24236.96 (100.00)	27767.3 (100.00)	30683.8 (100.00)	26908.55 (100.00)

Note: Figures in parentheses indicate percentage of total cost (cost C₃)

Table 5: Cost of production and returns from wheat crop

Particulars	Farm size group				
	Marginal	Small	Medium	Large	Overall
Yield of main product (qt/ha)	32.95	37.08	39.44	41.28	37.68
Yield of by product (qt/ha)	32.95	37.08	39.44	41.28	37.68
Price of main product (₹/qt)	900	935.5	940.5	995.0	942.75
Price of by product (₹/qt)	—	—	—	—	—
Return from main product (₹/ha)	29655	34669.8	37093.32	43085.24	35522.82
Return from by product (₹/ha)	0	0	0	0	0
Gross return (₹/ha)	29655	34669.8	37093.32	43085.24	35522.82
Net Return (₹/ha) at					
(a) Cost A ₁	20697.2	22923	21614.48	24523.34	20977.47
(b) Cost A ₂	13226.8	15452.6	14144.08	1052.94	13507.07
(c) Cost B ₁	19760.03	21966.6	20740.77	23541.22	20013.9
(d) Cost B ₂	12289.63	14496.2	13170.37	16070.82	12543.5
(e) Cost C ₁	17888.03	20106.6	19320.77	22661.22	18530.9
(f) Cost C ₂	10417.65	12636.2	11850.37	15190.82	11060.5
(g) Cost C ₂ *	10417.65	12636.2	11850.37	15190.82	11060.5
(h) Cost C ₃	8493.9	10432.8	9326.08	12401.38	8614.32
Cost of production (₹/qt)	642.2	653.6	704.03	743.31	714.13

accounting for 24.02, 17.19 and 14.10% of the total cost of cultivation respectively. Among the fixed costs, the rental value of the owned land was the major cost accounting for 12.28% of the total cost of cultivation.

It is clearly presented in the figure that on an average, all the farmers in the study area were getting net returns of more than ₹ 10000/ ha over total cost (Cost C₃). Highest return over total cost (Cost C₃) was received by the large farmers. It is deduced from the figure that the yield of paddy was



highest on the large farms (40.83qt/ha) followed by medium, small and marginal farms.

It was noticed that the total cost (Cost C_3) in wheat cultivation was lower than paddy cultivation. Per hectare cost A_1 was found to be ₹ 14545.35 (54.04%) in aggregate level. Large farmers have the highest cost A_1 compared to the other categories of farmers in the study area. Cost A_1 was also observed to increase with increase in the size of holding (and also with increase in area under wheat cultivation). Both Cost B_1 and Cost B_2 also showed the increasing trend, in other words the positive relationship was observed between the magnitudes of per hectare cost and the operational size of the holdings. As far as the Cost C_1 and Cost C_2 were concerned, it was found that in terms of per hectare; these two costs were sharing a larger proportion to the total cost (Cost C_3).

The total cost of cultivation (Cost C_3) came out to be ₹ 21161.10, ₹ 24236.96, ₹ 27767.3 and ₹ 30683.8 on marginal, small, medium and large farms, respectively. It was found that per hectare cost of cultivation for the wheat crop was less than the paddy cultivation.

The table reveals that the per hectare productivity of wheat crop was marginally higher (8.33 quintals) on large farms compared to marginal farms. Table further reveals that per hectare gross returns for

wheat crop on marginal, small, medium and large farms were ₹ 29655, ₹ 34669.8, ₹ 37093.32 and ₹ 43085.24, respectively. The net return per hectare after subtracting the total cost (Cost C_3) from the gross return were found to be ₹ 8493.9, ₹ 10432.8, ₹ 9326.08 and ₹ 12401.38 on marginal, small, medium and large farms, respectively.

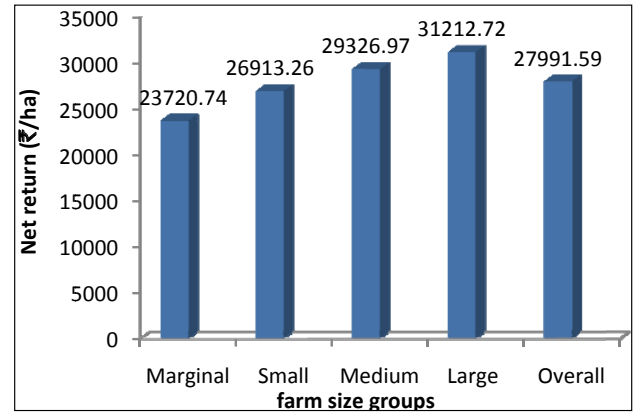


Fig. 2: Net returns from wheat crop (₹/ha)

And on the other hand when we see the per quintal cost of production of wheat crop, it is seen that the large farmers were spending relatively large amount of money for producing one quintal of wheat than the other categories of farmer.

Cost A_1 was found to be ₹ 21573.82 for the overall

Table 6: Concept wise cost of cultivation of sugarcane crop (₹/ha)

Particulars	Farm size group				
	Marginal	Small	Medium	Large	Overall
(a) Cost A_1	13022.14 (37.99)	18441.81 (46.19)	23635.86 (52.63)	32014.88 (59.77)	21573.82 (50.24)
(b) Cost A_2	26822.41	32242.08	37436.13	45815.15	35374.09
(c) Cost B_1	14713.99 (42.93)	20180.71 (50.55)	25376.02 (56.50)	33786.95 (63.08)	23311.36 (54.28)
(d) Cost B_2	28514.16 (83.20)	33980.98 (85.12)	39176.29 (87.23)	47587.22 (88.85)	37111.63 (86.42)
(e) Cost C_1	17353.99 (50.63)	22491.51 (56.34)	27026.02 (60.17)	34887.04 (65.14)	25236.58 (58.77)
(f) Cost C_2	31154.18 (90.89)	36291.51 (90.89)	40826.29 (90.89)	48687.31 (90.89)	39036.85 (90.86)
(g) Cost C_2^*	31154.18 (90.89)	36291.51 (90.89)	40826.29 (90.89)	48687.31 (90.89)	39036.85 (90.86)
(h) Cost C_3	34269.57 (100.00)	39920.66 (100.00)	44908.91 (100.00)	53556.04 (100.00)	42940.53 (100.00)

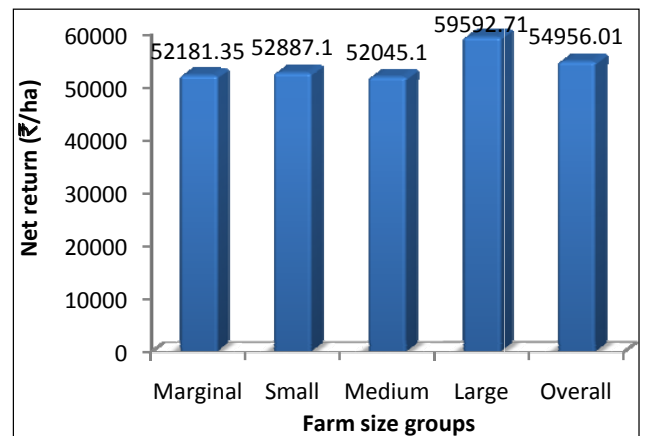
Note: Figures in parentheses indicate percentage of total cost (cost C)

Table 7: Cost of production and returns from sugarcane crop

Particulars	Farm size group				
	Marginal	Small	Medium	Large	Overall
Yield of main product (qt/ha)	432.75	480.92	542.80	632.01	522.12
Yield of by product (qt/ha)	129.82	144.27	162.84	189.60	156.60
Price of main product (₹/qt)	190.75	183.98	169.25	170.03	178.50
Price of by product (₹/qt)	30	30	30	30	30
Return from main product (₹/qt)	82547.06	88479.66	91868.9	107460.66	93198.42
Return from by product (₹/ha)	3903.86	4328.1	5085.2	5688.09	4698.00
Gross return (₹/ha)	86450.92	92807.76	96954.1	113148.75	97896.54
Net Return (₹/ha) at					
(a) Cost A ₁	73428.78	74365.95	73318.24	81133.87	76322.72
(b) Cost A ₂	59628.51	60565.68	59517.97	67333.6	62522.45
(c) Cost B ₁	71736.93	72627.05	71578.08	79361.8	74585.18
(d) Cost B ₂	57936.76	58826.78	57777.81	65561.53	60784.51
(e) Cost C ₁	69096.93	70316.25	69928.08	78261.71	72659.96
(f) Cost C ₂	55296.76	56516.25	56127.81	64461.44	58859.69
(g) Cost C ₂ *	55296.76	56516.25	56127.81	64461.44	58859.69
(h) Cost C ₃	52181.35	52887.1	52045.10	59592.71	54956.01
Cost of production (₹/qt)	75.23	79.13	78.39	80.47	78.29

size group of farms. However, per hectare Cost A₁ on marginal, small, medium and large farms were found to be ₹ 13022.14, ₹ 18441.81, ₹ 23635.86 and ₹ 32014.88, respectively. Expenditure on the operational cost was highest for large farmers and it has been observed that as the land holding size increases, the Cost A₁ also increases, employing direct relationship between the two. It was also found that Cost A₂, Cost B₁, Cost B₂, Cost C₁ and Cost C₂ also showed the increasing trend with the increase in area operated by the farmer. It was found that actual wage rate (₹ 120/man day) was higher than the minimum statutory wage rate (₹ 104/man day) thus the Cost C₂ and Cost C₂* were same for all the farms size groups in the study area. Per hectare cost C₃ is the total cost of cultivation of paddy crop which includes the managerial cost of farmers also. Large farmers were found to spend highest on sugarcane cultivation (₹ 53556.04), which was 1.5 times more than that of marginal farmers (₹ 34269.57). The average cost of cultivating on one hectare of sugarcane was ₹ 42940.53 for all the farms in the study area. On an average the sugar cane crop required 98.46 men per acre. The most labour consuming operations were planting, manuring, weeding, inter culturing and harvesting. Harvesting

of sugar cane consumed more labour than any other operation (Chinnappa (1998).

**Fig. 3:** Net returns from sugarcane crop (₹/ha)

The figure reveals that the per hectare productivity of sugarcane crop was higher (1.44 times) on the large farms compared to the marginal farms. The table further reveals that the per hectare gross returns for sugarcane crop on marginal, small, medium and large farms were ₹ 43085.24, ₹ 37093.32, ₹ 34669.8 and ₹ 113148.75, respectively. The net return per hectare after subtracting the total cost (Cost C₃) from gross return were found to be

Table 7: Net Return Obtain from Wheat, Paddy and Sugarcane crops (₹/ha)

Crops	Farm size group				
	Marginal	Small	Medium	Large	Overall
Paddy	9684.26	9198.54	11595.83	14190.24	10870.71
Wheat	8493.9	10432.8	9326.08	12401.38	8614.32
Sugarcane	52181.35	52887.1	52045.10	59592.71	54956.01

₹ 52181.35, ₹ 52887.1, ₹ 52045.10 and ₹ 59592.71 on marginal, small, medium and large farms, respectively. And on the other hand when we see the per quintal cost of production of sugarcane crop then it is clear that the large farmers were spending relatively large amount of money for producing one quintal of sugarcane than other categories of farmer. The table further reveals that the cost of per quintal production of sugarcane was much lower than paddy and wheat crop production.

Thus it can be concluded that all the major crops viz., paddy, wheat and sugarcane were profitable for the farmers of the study area, but sugarcane was the more profitable crop when compared to the other crops, because the per quintal cost of production for sugarcane was the lowest in comparison to wheat and paddy crops.

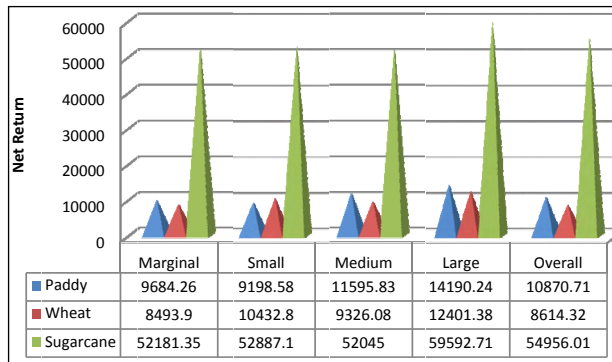


Fig. 4: Net Return Obtain from Wheat, Paddy and Sugarcane crops (₹/ha)

Comparison of Net Return Obtain from Wheat, Paddy and Sugarcane crops

The net return per hectare after subtracting total cost (Cost C_3) from gross return were found to be ₹ 52181.35, ₹ 52887.1, ₹ 52045.10 and ₹ 59592.71 on marginal, small, medium and large farms, respectively. And on the other hand when we see the per quintal cost of production of sugarcane crop then we found that the large farmers were spending relatively large amount of money for producing

one quintal of sugarcane than other categories of farmers. The table further reveals that the cost of per quintal production of sugarcane was much lower than paddy and wheat crop production.

It is clearly depicted from the figures that the net return obtained from sugarcane is almost five times higher than the net returns obtained from paddy and wheat crops. Similar results were reported by Rajkumar (2007).

CONCLUSION

The study was confined to three major crops of the district, namely, paddy, wheat and sugarcane. The selected crops that were taken together accounted for more than 90% of the gross cropped area of the district. The study is based on the information available by both primary and secondary sources and has made use of the farm level cross-sectional data collected from 80 sample farmers of different farm size groups (marginal, Small, medium and large). Wheat emerged as the main foodgrain crop in the study area with its percentage share of 28.87% in the gross cropped area.

While paddy (23.92%) and sugarcane (21.78%) crop were the second and third major crops in the study area, respectively. The cost of cultivation (₹/ha) of wheat was less than that of paddy and sugarcane crops whereas, the cost of production of sugarcane (₹/qt) was lowest among all the three crops on the overall basis. Per hectare net return was found to be higher for sugarcane crop (₹ 54956.01/ha) when compared to wheat (₹ 8614.32/ha) and paddy (₹ 10870.71/ha) crops, as sugarcane is an annual crop while wheat and paddy are half yearly crops but still when planted together (paddy +wheat) they were not meeting out the net returns obtained from sugarcane crop alone, as the combined net return from wheat +paddy obtained from the same piece of land is ₹ 19485.14, while sugarcane alone gave ₹ 54956.01/ha.



ACKNOWLEDGMENTS

Authoress sincerely thanks Dr. S.K. Srivastava, Associate Professor in department of Agricultural Economics, G.B.P.U.A. & T. Pantnagar, Uttarakhand and Chairman of my advisory committee, for his valuable suggestions, constant encouragement, inspiring suggestions and all meticulous counseling during the investigation and preparation of this manuscript.

REFERENCES

- Ahluwalia, M.S. 1978. "Rural Poverty and Agricultural Performance in India", *Journal of Development Studies*, **14**(2): 298-323.
- Alagh, Y.K. 2006. "Autopsy of a Farmer Suicide", *The Indian Express*, May 12, p.13.
- Ali, M. and Byerlee, D. (Eds.), 1999. Technological change and productivity in Pakistan's Punjab: Econometric evidence. In: *Sustaining Rice-Wheat Production Systems: Socio-Economic and Policy Issues: Rice-Wheat Consortium, Paper Series 5*. New Delhi, India: Rice-Wheat Consortium for the Indo-Gangetic Plains, p. 99.
- Atibudhi, H.N. 1993. 'An Economic Analysis of Rice Based Cropping System', *Agricultural Situation in India*, **47**(12): 897-902.
- Bhalla, G.S. and Singh, G. 2009. "Economic Liberalisation and Indian Agriculture: A State-wise Analysis", *Economic and Political Weekly*, **44**(52): 34-44.
- Birthal, Pratap, S. and Jha, Awadesh, K. 2009. 'Linking Farmers to Market for High-Value Agricultural Commodities', *Agricultural Economics Research Review*, **22**(7): 221-229.
- Biswas, B.C. and Tewatia, R. K. 1990. 'Wheat Production in India: Strategies for Nineties'. *Fertilizer News*, **35**(12): 71-77.
- Burman, R.R. and Singh, A.K. 2005. 'Profitability of Pulse Based Cropping System in Uttar Pradesh', *Farm Science Journal*, **14**(2):55-58.
- Business Line 2010. "Fix MSP for Crops 50% over actual Cost of Cultivation", *The Hindu Business Line*, December 16 (www.thehindubusinessline.com).
- Canavari M. *et al.*, 2007. A comparative profitability analysis of organic and conventional farms in Emilia-Romagna and in Minnesota. In: Canavari M. and Olson K.D., 2007. *Organic Food Consumers' Choices and Farmers' Opportunities*. Springer New York 10.1007/978-0-387-39582-1.
- Commission for Agricultural Costs and Prices (CACP) (various years), Report of the Commission for Agricultural Costs and Prices, Ministry of Agriculture, Government of India, New Delhi.
- Chand, Ramesh, P.A. Lakshmi Prasanna & Aruna Singh, 2011, "Farm Size and Productivity: Understanding the strengths of smallholders and improving their livelihoods", *Economic and Political Weekly*, June 25, pp. 5-11.
- Chinnappa, B. 1998. Resource use, cost structure and marketing of sugarcane: A case study of Karnataka. *The Bihar Journal of Agricultural Marketing*, **6**(1): 75-79.
- Christensen, L.R. 1975. Concepts and measurement of agricultural productivity *American Journal of Agricultural Economics*, **57**: 910-15.
- Darling, M.L. 1925. *The Punjab Peasant in Prosperity and Debt*, Oxford University Press, Delhi.
- Dash, J. K., Singh, R.P. and Pandey, R.K. 1995. 'Economic Analysis of Summer Rice Production in Bhangra Block of Singhbhum District of Bihar- a Case Study', *Journal of Research, Birsa Agriculture University*, **7**(2): 131-135.
- Deshpande, R.S. 2002. "Suicide by Farmers in Karnataka: Agrarian Distress and Possible Alleviatory Steps", *Economic and Political Weekly*, **37**(26): 2610-2610.
- Deshpande, R.S. and Prabhu, N. 2005. "Farmers Distress: Proof beyond Question", *Economic and Political Weekly*, **40**(44-45): 4663-65.
- Deshpande, R.S. and Arora (Ed.) 2010. *Agrarian Crisis and Farmers Suicides*, Sage Publications, New Delhi.
- Dev, S. Mohindra & Chandrasekhara Rao 2010. 'Agricultural Price Policy, Farm Profitability and Food Security' Review of Agriculture, *Economic and Political Weekly*, June 26, page 174-182.
2009. 'Structural Reforms and Agriculture: Issues and Policies' Keynote paper on Agriculture, 92nd Annual conference of the Indian Economic Association 27th-29th December, Bhubaneswar, Orissa.
- Dhillon, B.S., Poonam Kataria and Dhillon, P.K. 2010. 'National Food Security vis-à-vis Sustainability of Agriculture in High Crop Productivity Regions', *Current Science*, **98**(1): 33-36.
- Deomampo, Narciso 2004. Review of Cost of Production Data, Collection, Analysis and Dissemination. Paper presented in a Workshop, Food and Agricultural Organisation of the United Nations, Rome.
- FAO 1991. 'A Comparison of the Cost of Producing Rice in Selected Countries', Economic and Social Development Paper 101, Food & Agriculture Organization of the United Nations, Rome.
- FAO 2004. *Uses and Design of Cost of Production Surveys in Agriculture- A New Approach*. Food & Agriculture Organization of the United Nations, Rom.
- Fox, G. *et al.* 1991. Comparative Economics of Alternative Agricultural Production Systems: A Review. *Northeastern Journal of Agricultural and Resource Economics*. **20**.
- Gandhi and Vasant, P. 1997. 'Technology, Cost Reduction, and Returns in Agriculture A: Study of Wheat and Rice in Punjab', *Vikalpa*, **22**(2). April-June.
- Gaurav, S. and Srijit Mishra, 2011, Size Class and Returns to Cultivation in India: A Cold Case Reopened, IGIDR Working paper, WP-2011-027.
- Gaytancioilu, O. and Surek, H. 2001. 'Input Use and Production Cost in Rice Cultivation in Turkey' <http://www.resources.ciheam.org>



- Gill, Anita and Lakhwinder Singh 2006. 'Farmers' Suicides and Response of Public Policy: Evidence, Diagnosis and Alternatives from Punjab' <http://mpr.ub.uni-muenchen.de/146/> Nov., 07.
- Gyanmudra 2010. "Farmers Suicides: Behavioral and social dimensions", Sage publication New Delhi, pp. 374-392.
- Hossain, S.K.M. 2007 'Economic Analysis of rice Production in Bardhaman District of West Bengal', *M.Sc. thesis* of department of Agricultural Economics, G.B.P.U.A. & T. Pantnagar.
- Hussain, I. and Hanjra, M.A. 2003. "Does Irrigation Water Matter for Rural Poverty Alleviation? Evidence from South and South-East Asia", *Water Policy*, 5(5-6): 429-442.
- Hussain, I. and Hanjra, M.A. 2004. "Irrigation and Poverty Alleviation: Review of the Empirical Evidence", *Irrigation and Drainage*, 53(1): 1-15.
- Kalamkar, S.S. and Narayanamoorthy, A. 2003. "Impact of Liberalisation on Domestic Agricultural Prices and Farm Income", *Indian Journal of Agricultural Economics*, 53(3): 353-364.
- Kallummal, M. and Srinivasan, K.S. 2007. The Dynamics of Farmers Market: A Case of 'Uzhavar Sandhai' of Tamil Nadu, Make Trade Fair Campaign, CENTAD, New Delhi.
- Kumbhar, Vijay 2011. 'Impact of MSP on Area under Cultivation and Level of Production: A Study of Selected Crops in India' <http://ssrn.com/abstract=1748342>.
- Maheshwarappa, B.O., Kunnal, L.B. and Patil, S.M. 1998. Economics of production and marketing of sugarcane in Karnataka. *The Bihar Journal of Agricultural Marketing*, 6(2): 238- 244.
- Mishra, S. 2006. "Farmers Suicides in Maharashtra", *Economic and Political Weekly*, 41(16): 1538-1545.
- Minhas, B.S. and Vaidyanathan, A. 1965. Growth of crop output in India, 1951-54 to 1958-61: An analysis by component elements, *Journal of the Indian Society of Agricultural Statistics*, 17(2): 230-252.
- Mittal, Surabhi and Lal, R.C. 2001. Productivity and sources of growth for wheat in India. *Agricultural Economic Research Review*, 14(Conference No.): 109-120.
- Mohanty, B.B. and Shroff, S. 2004. "Farmers' Suicides in Maharashtra", *Economic and Political Weekly*, December 25, pp. 5599-5606.
- Mohanty, B.B. 2001. "Suicides of Farmers in Maharashtra: A Socio-Economic Analysis", *Review of Development and Change*, 6(2): 146-189.
- Murgai, Rinku, 1999. 'The Green Revolution and The Productivity Paradox: Evidence from the Indian Punjab', The World Bank Development Research Group Rural Development (November).
- Nadkarni, M.V. 1988. 'Crisis of Increasing Costs in Agriculture: Is there a Way out?' Review of Agriculture, *Economic and Political Weekly*.
- NSSO 2005. Situation Assessment Survey of Farmers: Some Aspects of Farming, Report No. 496, 59th Round (January-December, 2003), National Sample Survey Organisation, Ministry of Statistics and Programme Implementation, Government of India, New Delhi, July.
- NSSO 2005a. Situation Assessment Survey of Farmers: Income, Expenditure and Productive Assets of Farmer Households, Report No. 497, National Sample Survey Organisation, Ministry of Statistics and Programme Implementation, Government of India, New Delhi.
- NSSO 2005b. Situation Assessment Survey of Farmers: Indebtedness of Farmer Households, Report No. 498, 59th Round (January-December, 2003), National Sample Survey Organisation, Ministry of Statistics and Programme Implementation, Government of India, New Delhi, May.
- Rajkumar, B. 2007. Economics of Redgram based Cropping System in Bidar District, M.Sc. (Agri.) thesis, Univ. Agri. Sci. Dharwad.
- Rao, V.M. 2001. "The Making of Agricultural Price Policy: A Review of CACP Reports", *Journal of Indian School of Political Economy*, 13(1): 1-28.
- Raghavan, M. 2008. 'Changing Pattern of Input Use and Cost of Cultivation', Review of Agriculture, *Economic and Political Weekly*, June 28, Page 123-129.
- Reddy, V.R. and Galab, S. 2006. "Agrarian Crisis: Looking beyond the Debt Trap", *Economic and Political Weekly*, 41(19): 1838-1841.
- Reddy, D.N. and Mishra, S. (Ed.) 2009. Agrarian Crisis in India, Oxford University Press, New Delhi.
- Rosegrant, M.W. and Evenson, R.E. 1992. Agricultural productivity and sources of growth in South Asia. *American Journal of Agricultural Economics*, 74(3): 757-61.
- Sainath, P. 2010. "Farm Suicides – A 12 year Saga", The Hindu, January 25.
- Saleth, M.R., Samad, M., Molden, D. and Hussain, I. 2003. "Water, Poverty and Gender: A Review of Issues and Policies", *Water Policy*, 5(5-6): 385-98.
- Saleth, M.R., Samad, M., Molden, D. and Hussain, I. 2003. "Water, Poverty and Gender: A Review of Issues and Policies", *Water Policy*, 5(5-6): 385-98.
- Sen, Abhijit and Bhatia, M.S. 2004. Cost of Cultivation and Farm Income in India, Academic Foundation, New Delhi.
- Sergill, H.S. 2005. 'Wheat and Paddy Cultivation and Question of Optimal Cropping Pattern in Punjab', *Journal of Punjab studies, Special No on Agriculture and Rural Economy of Indian Punjab*, 12(2): 239-251.
- Singh, S.P. and Gangwar, B. 2008. 'Economics of Sugarcane Based Farming System in Western Uttar Pradesh', *Agricultural Economics Research Review*, 21(1): 170-176.
- Surjeet, V. 2008. 'Evolution of the Study of Cost of Cultivation in India', Draft Paper, Presented in Conference Held in December 21-24.
- Swaminathan, M.S. 2008. "Ending the Debt Trap and Attaining Food Security", The Hindu, March 3, p. 12.
- Swaminathan, M.S. 2010. 'Do or Die Year on the Farm Front' Convocation Address, Punjab Agricultural University, Ludhiana, 10 February 2010.



- Swaminathan, Madhura and Vikas Rawal, 2011. "Are there Benefits from the Cultivation of Bt Cotton? A Comment Based on Data from a Vidarbha Village" with Vikas Rawal, *Review of Agrarian Studies*, 1(1). Available at (<http://www.ras.org.in/index.php?Article=ed519dacc89b2bead3f453b0b05a4a8b>)
- Vaidyanathan, A. 2006. "Farmers' Suicides and the Agrarian Crisis", *Economic and Political Weekly*, 4(38): 4009-13.
- Vaidyanathan, A. 2008. "Farm Loan Waiver: A Closer Look and Critique", *The Hindu*, March 6, p. 11.
- Vasavi, A.R. 2010. "Contextualising the Agrarian Suicides" in R.S. Deshpande and S. Arora (ed.) (2010), *Agrarian Crisis and Farmer Suicides*, Sage Publications, New Delhi, pp. 70-85.
- Vyas, V.S. 2004. "Agrarian Crisis: Strategies to Protect Vulnerable Sections", *Economic and Political Weekly*, 39(52): 5576-81.
- Vaidyanathan, A. 2000. India's Agricultural Development Policy' *Economic and Political Weekly*, 13: 1735-1741.
- Verma, S.R. 2008. 'Impact of Agricultural Mechanisation on Production, Productivity, Cropping Intensity Income Generation and Employment of Labour', [http:// www. agricoop.nic.in](http://www.agricoop.nic.in)
- Vyas, V.S. 1994. 'Agricultural Policies for the Nineties: Issues and Approaches', *Economic and Political Weekly*, June 25, Page 54-63.
2009. 'Cost of Cultivation of Principal Crops, in India', Directorate of Economic and Statistics, Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India.
2010. 'Land Use Statistics At a Glance', Directorate of Economic and Statistics, Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India.
2011. 'Agricultural Statistics At a Glance', Directorate of Economic and Statistics, Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India.

