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Profitability in Crops Cultivation in India: Some Evidence from Cost of Cultivation Survey Data

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I

INTRODUCTION

Indian agriculture has achieved tremendous growth in production and productivity of crops after Independence. Between 1950-51 and 2009-10, production of foodgrains increased from 51 million tonnes (mt) to 233 mt, while oilseeds production increased from 5.16 mt to 29.76 mt. Similar growth has also been achieved in sugarcane, cotton, fruits, vegetables and other crops (Government of India, 2009). Per capita availability of these commodities has also increased. The increased volume of crop output, which resulted from the intensification of agriculture after the introduction of green revolution during the mid-sixties, 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 per cent during 1972-73 to 28.33 per cent 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 not great news from the farm sector since the early 1990s. Farmers' suicides, indebtedness, crop failures, un-remunerative 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 became a widespread phenomenon today in many States in 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 poor returns from crop cultivation? Or due to failures caused by vagaries of monsoons?

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This is a revised version of the paper presented at MIDS-ICSSR National Seminar on 'Indian Economy in Transition' organised in honour of Prof. C.T. Kurien, at the Madras Institute of Development Studies, Chennai, during February 10-11, 2011. The author is thankful to V.M. Rao, S. Neelakantan, Judith Heyer, an anonymous referee of the paper and the participants of the seminar for their useful comments. However, the author takes full responsibility for the errors remaining in the paper.

Could the increased indebtedness be the reason? A large number of studies have analysed these issues since mid-nineties when the problem of farmers committing suicides assumed serious proportions. Some studies reported inadequate supply of institutional credit, decline in productivity of crops and imperfect market conditions as 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 farmers but also facilitate reinvestment in agriculture. If the flow of income from crop cultivation is not regular and 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). Why do farmers fall into indebtedness? What are the main reasons for the increased indebtedness? Is reduced farm income the main reason for indebtedness? etc., are some of the important questions repeatedly asked in relation to indebtedness. Detailed answers to these questions along with remedial measures to be introduced to alleviate unprecedented indebtedness are explained by the Expert group on agricultural indebtedness under the Chairmanship of R. Radhakrishna (Government of India, 2007).

Not many studies have detailed analysis of the profitability of different crops in relation to cost of cultivation over a period of time. Without using temporal data on 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 State specific incentive programmes, the Government of India announced a national level massive farm loan waiver scheme worth over Rs. 70,000 crore during 2008-09. It benefited a large number of farmers who had defaulted in repayment of debt, but did not have any perceptible impact on solving the agrarian crisis so far. Sainath (2010), who studied extensively the farm suicides in Maharashtra and other States, writes that the farm suicides increased in most States after the announcement of loan waiver scheme. This was probably because the one time support programme (loan waiver) would alone not be sufficient to solve the problem of farmers who require increased income from 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 only focusing on paddy and wheat crops. Except this study, there are not many studies available utilising 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 (CACP) contains rich information on the cost and output on 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 profitability of different crops over a period utilising the data from cost of cultivation survey on six important crops covering period from 1975-76 to 2006-07.

II

DATA AND METHOD

This study utilises the data on cost of cultivation survey compiled from the various reports of the CACP.¹ It covers data of seven points of time, starting from 1975-76 and ending with 2006-07 for which latest published data is available from CACP. Our aim is to find out the profitability of six different crops. The six crops chosen are paddy (rice), wheat, gram, groundnut, sugarcane and cotton. These have

been selected from different States which are having major share either in area or production of the selected crops. Andhra Pradesh State has been selected for paddy crop, Punjab for wheat, Madhya Pradesh for gram, Gujarat for groundnut and Maharashtra for both sugarcane and cotton. The share of area and production of the selected State in each crop at the national level in 2006-07 is presented in Table 1.

TABLE 1. SHARE OF AREA AND PRODUCTION IN EACH CROP BY THE STATES
SELECTED FOR THE ANALYSIS, 2006-07

Crop (selected states) (1)	India (Total)		Share (per cent) of selected states	
	Area (mha) (2)	Production (mt) (3)	Area (4)	Production (5)
Paddy (Andhra Pradesh)	43.81	93.36	9.08	12.71
Wheat (Punjab)	27.99	75.81	12.40	19.26
Gram (Madhya Pradesh)	7.49	6.33	32.84	38.07
Groundnut (Gujarat)	5.62	4.86	31.49	29.63
Sugarcane (Maharashtra)	5.15	355.52	20.39	22.10
Cotton (Maharashtra)	9.14	22.63*	34.03	20.42

Source: Computed from Government of India (2009).

Notes: mha – million hectares; mt – million tonnes; * - refers to million bales.

CACP has been using nine different cost concepts. These are the followings:

- Cost A1 = All actual expenses in cash and kind incurred in production by owner.
- Cost A2 = Cost A1 + rent paid for leased-in land.
- Cost A2+ FL = Cost A2 + imputed value of family labour.
- Cost B1 = Cost A1 + interest on value of owned capital assets (excluding land).
- Cost B2 = Cost B1 + rental value of owned land (net of land revenue) and rent paid for leased-in land.
- Cost C1 = Cost B1 + imputed value of family labour.
- Cost C2 = Cost B2 + imputed value of family labour.
- Cost C2* = Cost C2 estimated by taking into account statutory minimum or actual wage whichever is higher.
- Cost C3 = Cost C2* + 10 per cent of cost C2* on account of managerial functions performed by farmer.

Which is the appropriate cost that should be considered to calculate profitability of crops? Many scholars have considered cost A2 for calculating profit despite the fact that cost A2 does not cover interest on value of owned capital assets and rent for land, which would form substantial share in modern agriculture today. Moreover, there is also a growing concern that farmers should also get income for performing managerial functions in agriculture, as has been followed in other professions where managing director or CEO gets hefty salary for performing managerial operations.

The cost A2 also does not include the cost for performing managerial operations in agriculture (See the definition of CACP).

In this study, we work with two cost concepts namely cost C2 and cost C3 to find out the profitability (returns over cost of cultivation) of different crops selected for the analysis. Cost C2 covers actual expenses in cash and kind incurred in production by owner, rent paid for leased-in land, imputed value of family labour and the interest on value of owned capital assets (excluding land). Cost C3 includes all the components of cost C2 and adds 10 percent of cost C2 on account of managerial functions performed by the farmer. C3 in this paper is little different from the definition of CACP. Since cost C2 and C3 cover all the costs incurred by the farmers, we have appropriately considered these two costs for calculating profitability of different crops. Profit of the crop is calculated by deducting cost C2 and C3 from the value of crop output. While commenting on the earlier version of the paper, Prof. V.M. Rao (former member of CACP) suggested that the profit which is calculated using cost C2 and cost C3 should be called as 'supernormal profit' as they include imputed costs of various items, zero profit would mean that the farmer receives wages for family labour etc. at the norm specified for this purpose. This is a correct viewpoint and profit above this level would correspond to the concept of quasi rent. This is recognised by the author.

III

ANALYSIS ON PROFITABILITY OF CROPS

We have selected six crops for analysis of profitability. Cost required for and income generated from each crop varies significantly on account of various reasons. Cost of cultivation and the value of output are generally found to be higher for irrigated crops as compared to less-irrigated or crops that are cultivated under rainfed condition. For instance, the cost required for cultivating one hectare of gram is substantially less than the same required for cultivating sugarcane. We analysed the profitability of each crop separately.

Profitability in Paddy Crop:

Paddy is an important foodgrain crops cultivated predominantly in all parts of the country. After the introduction of green revolution, paddy's area share increased in the total foodgrains area, when many foodgrain crops have lost the area.² India's total area under paddy increased from 30.81 mha in 1950-51 to 45.35 mha in 2008-09. Presently, area under paddy accounts for about 35 per cent in total foodgrains area and close to 43 per cent in the total foodgrains production in India. Paddy is cultivated throughout India in all seasons. The major cultivating States are West Bengal, Andhra Pradesh, Uttar Pradesh and Orissa, which together accounted for over 45 per cent of India's total area in 2007-08.

Andhra Pradesh, historically a major paddy growing State accounting for close to 10 per cent of India's total area during 2007-08, is selected for studying the profitability of paddy crop. Table 2 presents the details of cost of cultivation, value of output (VOP) and profit for paddy crop for seven time points from 1975-76 to 2006-07. Profit of the crop is estimated by deducting the value of crop output with the cost of cultivation under two scenarios, namely (a) relating value of output with cost C2, and (b) with cost C3 from VOP. Andhra Pradesh is one of the leading States in terms of productivity of paddy and is also efficient in terms of cost of production (Dev and Rao, 2010). It was expected that the farmers must be reaping high profit from paddy cultivation. But, this is not borne out from the analysis of CACP data. Of the seven time points taken for analysis, the farmers were able to make some margin of profit only in two time points and in the remaining five time points, the cost C2 was found to be higher than value of crop output. The farmers were therefore not able to recover the cost of cultivation from the value of output of paddy in five out of seven time points. Even in the two time points, the profit realised by the farmers was also not substantial; it varied only from Rs. 63 – Rs. 1532/ha. Predictably, the profitability of paddy worsened when the profit in relation to cost C3 was estimated which is 10 per cent more than the cost C2. In this scenario, farmers were making losses in all seven time points considered for the analysis.

TABLE 2. COST OF CULTIVATION, VALUE OF OUTPUT AND PROFIT IN PADDY

Year (1)	India's area (mha) (2)	Cost of cultivation (Rs./ha)		VOP (Rs./ha) (5)	Profit (Rs./ha)		Ratio	
		Cost C2 (3)	Cost C3 (4)		VOP-C2 (6)	VOP-C3 (7)	VOP/C2 (8)	VOP/C3 (9)
1975-76	39.48	2193	2413	1879	-314	-534	0.86	0.78
1980-81	40.15	3895	4284	3785	-110	-499	0.97	0.88
1985-86	41.14	5291	5820	4913	-379	-908	0.93	0.84
1991-92	42.65	10258	11284	10321	63	-963	1.01	0.91
1995-96	42.84	17980	19778	17592	-388	-2186	0.98	0.89
2001-02	44.90	27043	29748	25408	-1636	-4340	0.94	0.85
2006-07	43.81	30492	33541	32024	1532	-1517	1.05	0.95

Source: Computed from CACP (various years).

Notes: mha – million hectares; VOP – value of output; Due to non-availability of data for some specified years, data from the nearest point is used for the analysis.

Agrarian distress and farmers' suicides have taken place on a large scale after the early 1990s in India. Therefore, apart from looking at the overall profitability of the crops selected for the analysis, we have specifically looked into whether any perceptible change is taking place in the profitability of paddy cultivation after 1991-92. Though no significant change was found in the trends in profitability of paddy crop before and after 1991-92, the magnitude of loss incurred by the farmers in relation to cost C3 was found to be large especially after 1995-96. For instance, in relation to cost C3 at current prices, the loss was only Rs. 963/ha during 1991-92, but had increased to Rs. 4340/ha in 2001-02. This is something unexpected result as we

were expecting that the profit from paddy cultivation will be large because of the following three reasons. First, paddy is cultivated predominantly under irrigated condition where crop failure seldom occurs. Second, unlike for many other crops, the support price scheme (MSP) is effectively implemented for paddy crop. Third, Andhra Pradesh is also a high productivity State in paddy crop. Paddy cultivation therefore is not profitable. The condition of the farmers cultivating paddy in less efficient States would presumably be worse.

Profitability in Wheat Crop:

Wheat is an important foodgrain crop cultivated predominantly in the northern and western parts of India and benefited substantially in terms of area expansion and productivity due to the introduction of green revolution in India. The area under wheat increased from 9.75 mha in 1950-51 to 28.04 mha in 2007-08 and the production from 6.46 mt to 78.57 mt. Wheat is the second most important foodgrain crop after paddy accounting for over 27 per cent of the country's foodgrains area. The major wheat cultivating States are Uttar Pradesh, Punjab, Haryana, Rajasthan and Madhya Pradesh. These five States together accounted about 76 per cent of area and over 82 per cent of wheat production in India during 2007-08 (Table 3).

TABLE 3. COST OF CULTIVATION, VALUE OF OUTPUT AND PROFIT IN WHEAT

Year (1)	India's area (mha) (2)	Cost of cultivation (Rs./ha)		VOP (Rs./ha) (5)	Profit (Rs./ha)		Ratio	
		Cost C2 (3)	Cost C3 (4)		VOP-C2 (6)	VOP-C3 (7)	VOP/C2 (8)	VOP/C3 (9)
1975-76	20.45	2632	2896	2400	-232	-496	0.91	0.83
1980-81	22.28	3439	3783	3283	-157	-501	0.95	0.87
1985-86	23.00	5388	5927	5782	394	-145	1.07	0.98
1991-92	23.26	9275	10202	10824	1549	621	1.17	1.06
1995-96	25.01	14311	15742	13704	-608	-2039	0.96	0.87
2001-02	26.34	22931	25224	28314	5383	3090	1.23	1.12
2006-07	27.99	29947	32942	35800	5853	2858	1.20	1.09

Source and Notes: Same as in Table 2.

Punjab has been selected for studying the profitability of wheat crop because it is one of the major wheat cultivating States in India. Though we do not see any uniform trend over the years in terms of profitability of wheat, farmers were able to reap moderate profits in four out of seven time points when cost C2 is considered for calculation. The profit over cost C2 varied from Rs. 5300 to Rs. 5800/ha during 2001-02 and 2006-07. If cost C3 is used for calculating profit, the loss incurred by the farmers increased to five out of seven times. The extent of profitability is also reduced substantially in the last two time periods.

Has the profitability of wheat remained same during pre and post-1990s? The cost of cultivation has generally increased at relatively faster rate during the 1990s.

But, contrary to expectation, profit earned by the farmers from wheat crop was found to be better under both cost C2 and cost C3 conditions during post-1990s. This increased profit from wheat possibly because of the steep increase in MSP announced by the government (see; Dev and Rao, 2010).³

Profitability of Gram Crop:

We selected one important pulse crop, namely, gram (Bengal gram). Gram is a major crop in the group of pulse crops, accounting nearly 32 per cent of India's total area under pulses. Gram is cultivated predominantly in six States namely Madhya Pradesh, Maharashtra, Andhra Pradesh, Rajasthan, Uttar Pradesh and Karnataka, which together accounted for about 89 per cent of its area in 2007-08. Madhya Pradesh is a major gram growing State accounting for about 38 per cent of India's total area in 2007-08. We selected Madhya Pradesh to study the profitability of gram crop. Of the seven time points considered for analysis, farmers have made some margin of profits in all other time points, except in 1995-96. However, the profit earned by the farmers was very low in most time periods except 2006-07. Gram cultivation seems to be better in terms of profitability as compared to paddy and wheat.

TABLE 4. COST OF CULTIVATION, VALUE OF OUTPUT AND PROFIT IN GRAM

Year (1)	India's area (mha) (2)	Cost of cultivation (Rs./ha)		VOP (Rs./ha) (5)	Profit (Rs./ha)		Ratio	
		Cost C2 (3)	Cost C3 (4)		VOP-C2 (6)	VOP-C3 (7)	VOP/C2 (8)	VOP/C3 (9)
1975-76	8.32	906	997	1003	97	6	1.11	1.01
1980-81	6.58	1571	1728	1874	303	146	1.19	1.08
1985-86	7.80	1998	2198	2683	685	485	1.34	1.22
1991-92	5.58	5018	5520	5667	648	147	1.13	1.03
1995-96	7.12	6283	6911	6184	-99	-727	0.98	0.89
2001-02	6.42	11722	12894	15043	3321	2149	1.28	1.17
2006-07	7.49	15323	16855	21044	5721	4189	1.37	1.25

Source and Notes: Same as in Table 2.

Profitability in Groundnut Crop:

The area under oilseed crops has increased substantially from 10.73 mha in 1950-51 to 27.46 mha in 2008-09, an increase of about 155 per cent. Though nine major oilseed crops are cultivated in India, groundnut accounts for a major share in the total area under oilseeds over the years. The area under groundnut has increased from 4.49 mha in 1950-51 to 8.32 mha in 1993-94, but declined sharply to 6.22 mha in 2008-09. Despite sharp reduction in area under groundnut in the recent years, it still accounted for close to 23 per cent in India's total area under oilseed crops in 2008-09. We have selected groundnut crop for the study in view of its major share in the total oilseeds. Gujarat, Andhra Pradesh, Tamil Nadu and Karnataka are the major groundnut

cultivating States in India. These four States together accounted for about 81 per cent of its total area in 2007-08 and Gujarat alone accounted for close to 30 per cent of area. Therefore, Gujarat became our obvious choice for studying the profitability in groundnut.

Table 5 shows no clear cut trend in the profitability of groundnut which varies substantially across different years over cost C2. The farmers were getting a small profit in five of the time points. During the years 1995-96 and 2006-07, farmers incurred a loss of about Rs. 2031/ha and Rs. 831/ha respectively. Using cost C3 for profit calculation, farmers have incurred losses in four out of seven time points. In fact, the losses are found in more number of times during the post-1990s as compared to the pre-1990s situation. This could be because of the import of low value edible oils from other countries during post-1990s. One does not notice any appreciable profit from groundnut cultivation in the State.

TABLE 5. COST OF CULTIVATION, VALUE OF OUTPUT AND PROFIT IN GROUNDNUT

Year (1)	India's area (mha) (2)	Cost of cultivation (Rs./ha)		VOP (Rs./ha) (5)	Profit (Rs./ha)		Ratio	
		Cost C2 (3)	Cost C3 (4)		VOP-C2 (6)	VOP-C3 (7)	VOP/C2 (8)	VOP/C3 (9)
1975-76	7.22	1463	1609	1861	399	252	1.27	1.16
1980-81	6.80	2161	2377	2302	141	-75	1.07	0.97
1985-86	7.12	4334	4767	5043	709	275	1.16	1.06
1991-92	8.67	7192	7911	7606	415	-305	1.06	0.96
1995-96	7.52	10363	11399	8332	-2031	-3067	0.80	0.73
2001-02	6.24	15974	17572	20464	4490	2892	1.28	1.16
2006-07	5.62	18079	19887	17266	-813	-2621	0.96	0.87

Source and Notes: Same as in Table 2.

Profitability in Sugarcane Crop:

Sugarcane is a high value and water-intensive commercial crop cultivated traditionally in most part of India. The area under sugarcane cultivation increased substantially from 1.71 mha in 1950-51 to 5.06 mha in 2007-08. The major sugarcane growing States are Uttar Pradesh, Maharashtra, Tamil Nadu, Karnataka, Andhra Pradesh and Gujarat. These six states together accounted for about 86 per cent of India's total area in 2007-08. Of these six States, Maharashtra alone accounted for about 22 per cent of area in 2007-08. Maharashtra has been selected for studying the profitability of sugarcane crop.

There is a popular notion that the farmers cultivating sugarcane earn substantial profit because of the following three reasons. First, it is cultivated completely under irrigated conditions and therefore, crop failures due to vagaries of monsoon normally do not occur. Second, since the government fixes statutory minimum support (SMP) price that is linked with the sugar recovery, farmers get assured price for their produce without facing any price volatility. Third, since sugarcane is cultivated

mostly under the model of contract farming with a guarantee of purchase of cane from the sugar industries, farmers are assured of institutional credit and marketing facilities, which are seldom available to the cultivators of most crops in India. With this background, let us now analyse the data to find out whether the farmers cultivating sugarcane harvest any profit or not.

TABLE 6. COST OF CULTIVATION, VALUE OF OUTPUT AND PROFIT IN SUGARCANE

Year (1)	India's area (mha) (2)	Cost of Cultivation (Rs./ha)		VOP (Rs./ha) (5)	Profit		Ratio	
		Cost C2 (3)	Cost C3 (4)		VOP-C2 (6)	VOP-C3 (7)	VOP/C2 (8)	VOP/C2 (9)
1975-76	2.76	6581	7239	10337	3756	3098	1.57	1.43
1980-81	2.67	11201	12321	15886	4685	3565	1.42	1.29
1985-86	2.85	14196	15615	18076	3880	2461	1.27	1.16
1991-92	3.84	22468	24715	24744	2276	29	1.10	1.00
1995-96	4.15	28890	31779	32511	3621	732	1.13	1.02
2001-02	4.41	53493	58842	49582	-3912	-9261	0.93	0.84
2006-07	5.15	75102	82612	78294	3192	-4318	1.04	0.95

Source and Notes: Same as in Table 2.

Table 6 shows that farmers were able to make profit in five time periods. But, except in 2001-02 and 2006-07, farmers have incurred huge losses amounting Rs. 4300-9200/ha respectively in relation to cost C3. Unlike the other crops analysed so far, we see a clear cut trend in the profitability of sugarcane. The share of profit over the cost C2 and C3 in sugarcane has been declining consistently over the years. The profit margin was in the range of 43-57 per cent over the cost of cultivation during 1975-76; but this margin reduced substantially over the years. In fact, the cost of cultivation and VOP were almost same during 1991-92 and 1995-96, suggesting that farmers were not gaining any return from the cultivation of sugarcane. Table 6 shows that the post-1990s profitability is very poor as compared to pre-1990s situation. Farmers have incurred huge losses or the cost of cultivation was almost equivalent to VOP during the post-1990s. Clearly, farmers are unable to reap any profit in the recent time even in the high value commercial crops like sugarcane.

Profitability in Cotton Crop:

Cotton, a very important non-foodgrain crop, is predominantly cultivated in rainfed regions utilising the monsoon rainfall during *kharif* season. The area under cotton cultivation has increased from 5.88 mha in 1950-51 to 9.41 mha in 2007-08 in India. The large cotton growing States are Gujarat, Maharashtra, Andhra Pradesh and Punjab, together accounting for about 78 per cent of India's cotton area. In 2007-08, Maharashtra is the largest cotton cultivating State accounting for about 34 per cent of India's cotton area. Therefore, we selected Maharashtra for studying the profitability of cotton.

TABLE 7. COST OF CULTIVATION, VALUE OF OUTPUT AND PROFIT IN COTTON

Year (1)	India's area (mha) (2)	Cost of cultivation (Rs./ha)		VOP (Rs./ha) (5)	Profit (Rs./ha)		Ratio	
		Cost C2 (3)	Cost C3 (4)		VOP-C2 (6)	VOP-C2 (7)	VOP/C2 (8)	VOP/C3 (9)
1975-76	7.35	1047	1152	1252	205	100	1.20	1.09
1980-81	7.82	2144	2358	2246	103	-112	1.05	0.95
1985-86	7.53	1916	2108	2475	559	367	1.29	1.17
1991-92	7.66	3267	3594	3862	595	268	1.18	1.07
1995-96	9.04	10375	11412	12358	1983	946	1.19	1.08
2001-02	9.13	17234	18958	13775	-3459	-5183	0.80	0.73
2006-07	9.14	21669	23836	19870	-1799	-3966	0.92	0.83

Source and Notes: Same as in Table 2.

Table 7 clearly shows that the profitability of cotton crop has been declining over the years. During the mid-seventies and mid-eighties farmers were able to reap 20-29 per cent of profit margin over cost C2. But this setting changed thereafter. In fact, farmers have suffered heavy losses amounting Rs.3459/ha in 2001-02 and Rs.1799/ha in 2006-07 over cost C2. If we take into account cost C3 for computation, this amount of loss also increased to Rs. 3966 to Rs. 5183/ha during 2001-02 and 2006-07 respectively. The information on cost of cultivation and VOP of different years also indicates that the farmers have suffered heavy losses during post-1990s as compared to the situation of pre-1990s. A steep rise in the cost of cultivation over the rate of increase in the value of production during post-1990s appeared to be the main reason for the huge loss suffered by the cotton farmers in Maharashtra State. This increased loss from the cotton cultivation might be the main reason for the high proportion of farmers' suicides in Maharashtra.

IV

CAUSE FOR DECLINING PROFIT: COST OR OUTPUT?

The analysis of different crops presented above shows that the farmers have either realised very little profit or suffered huge losses in cultivating most of the investigated crops (see, Table 8). In order to find out whether cost is increasing faster than VOP, we measured the rate of increase (number of times) in cost of cultivation and value of output by dividing the period of study into two; pre-1990s (1975-76 to 1985-86) and post-1990s (1991-92 to 2006-07).

Cost of cultivation of crops has been increasing over the years because of rise in wage rate of labour, input prices and other managerial costs (CACP, various reports). When the cost of cultivation increases faster than the increase in the value of output, farmers may not be inclined to adopt the required inputs for crop cultivation. In fact, the growth in adoption of various inputs in agriculture has substantially decelerated in India after 1990-91 (see, Table 9).

TABLE 8. NUMBER OF TIMES PROFIT REAPED OR LOSS FACED BY THE FARMERS IN EACH CROP DURING THE STUDY PERIOD

Crop (1)	Cost Type (2)	Profit level		Loss (5)	Total time points
		>30 per cent (3)	<30 per cent (4)		
Paddy	Cost C2	--	2	5	7
	Cost C3	--	--	7	7
Wheat	Cost C2	--	4	3	7
	Cost C3	--	3	4	7
Gram	Cost C2	2	4	1	7
	Cost C3	--	6	1	7
Groundnut	Cost C2	--	5	2	7
	Cost C3	--	3	4	7
Sugarcane	Cost C2	2	4	1	7
	Cost C3	1	4	2	7
Cotton	Cost C2	--	5	2	7
	Cost C3	--	4	3	7

Sources: Computed using the data presented in Tables 2 to 7.

TABLE 9. TREND GROWTH RATE (PERCENT/YEAR) IN AREA, INPUT USE, CREDIT AND CAPITAL STOCK IN AGRICULTURE DURING 1980-81 TO 2005-06

Particulars (1)	1980-81 to 1990-91 (2)	1990-91 to 1996-97 (3)	1996-97 to 2005-06 (5)
Technology ^a	3.3	2.8	0.0
Public sector net fixed capital stock	3.9	1.9	1.4 ^b
Gross irrigated area	2.3	2.6	0.5 ^b
Electricity consumption in agriculture	14.1	9.4	-0.5 ^c
Area under fruit and vegetables	5.6	5.6	2.7 ^c
Private sector net fixed capital stock	0.6	2.2	1.2 ^b
Terms of trade	0.2	1.0	-1.7 ^b
Total net fixed capital stock	2.0	2.1	1.3 ^b
NPK use	8.2	2.5	2.3
Credit supply	3.7	7.5	14.4 ^b
Total cropped area	0.4	0.4	-0.1
Net sown area	-0.1	0.0	-0.2
Cropping intensity	0.5	0.4	0.1

Source: Government of India (2008), *Economic Survey: 2008-09*.

Notes: a – yield potential of new varieties of paddy, rapeseed/mustard, groundnut, wheat and maize; b – upto 2003-04; c – upto 2004-05.

Reduction in the use of various yield-increasing inputs obviously would lead to decline in crop productivity as well. Therefore, the policy makers must keep watch on the movements of both cost and value of output so as to fix the prices for different crops in consonance with the cost of cultivation. Has this happened in India? Between 1975-76 and 1985-86, the increase in cost of cultivation (C2) in most of the crops was relatively lower or almost the same as the increase in value of output, suggesting that the farmers were able to get back their cost of cultivation they spent on crop cultivation (see, Table 10).

The situation with respect to rate of increase in cost and VOP has changed during 1991-92 to 2006-07 (Bhalla and Singh, 2009). The cost C2 has increased substantially in most crops considered for the analysis during this period. In crops

like cotton, which is also appropriately called as 'killer crop', the cost C2 increased close to seven times between 1991-92 and 2006-07, whereas VOP increased only around five times. Though the value of output also increased at a relatively high rate as compared to the pre-1990s situation, the rise in cost of cultivation was much higher than that of the value of output in many crops. This has made a significant impact on the profit margin of various crops. The ratio of value of output to cost of cultivation estimated for different crops has been fluctuating widely since mid-eighties. However, during 2006-07, for which we have the latest information for different crops from CACP, this ratio became less than one or marginally above one in crops like paddy, wheat, groundnut, sugarcane and cotton. Gram is the only crop where the farmers have realised a profit margin of 25-37 per cent over cost C2 and C3 because of increased value of output realised by the farmers. Over the whole period, it appears that the steep rise in the cost of cultivation is one of the main reasons for the low profit margin or loss in crop cultivation. This is true especially in the recent years (see, Bhalla and Singh, 2009).

TABLE 10. INCREASE IN COST OF CULTIVATION AND VOP OF SIX SELECTED CROPS DURING PRE- AND POST-1990S

		<i>(No. of times)</i>		
Crop Name (1)	Parameters (2)	Increase in number of times during		
		Pre-1990s (1975-76 to 1985-86) (3)	Post-1990s (1991-92 to 2006-07) (4)	All Period (1975-76 to 2006-07) (5)
1. Paddy	Cost C2	2.41	2.97	13.90
	VOP	2.61	3.10	17.04
2. Wheat	Cost C2	2.05	3.23	11.38
	VOP	2.41	3.31	14.92
3. Gram	Cost C2	2.20	3.05	16.90
	VOP	2.67	3.71	20.98
4. Groundnut	Cost C2	2.96	2.51	12.36
	VOP	2.71	2.27	9.28
5. Sugarcane	Cost C2	2.16	3.34	11.41
	VOP	1.75	3.16	7.57
6. Cotton	Cost C2	1.83	6.63	20.69
	VOP	1.98	5.15	15.87

Source: Computed using CACP (various years).

V

CONCLUSION AND THE WAY FORWARD

Farmers have suffered substantial losses by cultivating different crops most of the time considered for the analysis. When profits were earned by the farmers, it was found in majority cases to be less than 30 per cent over the cost of cultivation. Except in wheat and gram, the returns over the cost of cultivation had also worsened in all other crops especially during post-1990s. Importantly, the quantum of loss incurred by the farmers in crops like cotton, groundnut and sugarcane was also large in recent years as compared to the pre-1990s situation. It is found that the farmers

have suffered losses both due to increased cost of cultivation in some crops and due to reduction in value of output in some other crops. Continued suffering of losses or earning only a low margin of profit from crop cultivation would definitely discourage farmers from engaging in agriculture (see, Swaminathan, 2008). This is also reflected from the data on Situation Assessment Survey (SAS), where 40 per cent of the farmers have reported their longing to quit agriculture citing poor remuneration as the reason (NSSO, 2005a). The agrarian crisis, which the country has been confronting with for more than a decade now, cannot be solved without providing incentives to the farmers in the form of higher profitability for crops. The unabating farm suicides reported from various parts of country in recent years also suggest that one time support like farm loan waiver will not help to solve the problems faced by the farmers. Farmers need sustained support in the form of increased returns for their crop cultivation. The main reason for farmers' suicides/distress is that the agriculture is no longer a profitable enterprise. In most of the States, the income from crop cultivation is not even enough to meet the annual cultivation expenditure, which is also proved beyond doubt by SAS data (see, NSSO, 2005b). Therefore, since reasonable profit margin is essential to solve the present agrarian crisis and to alleviate the indebtedness among the farmers' households, the prices for the crops should be fixed in consonance with the cost of cultivation. The National Commission on Farmers and very recently by the Working Group on Agriculture Production headed by Haryana Chief Minister Shri Bhupinder Singh Hooda (Business Line, 2010) have suggested that the government should announce the minimum support price (MSP) for crops at 50 per cent more than the actual cost of production (Cost C3). Minimum support prices announced every year for various crops should also be linked with the wholesale price index so as to protect the farmers from the possible inflationary pressure. To protect the farmers from the distress sale, there is also a need to closely watch the price behaviour of sensitive commodities especially during the glut periods for making swift intervention through the 'Market Intervention Scheme' (MIS).

Apart from price incentives, government should also focus on the non-price incentives to increase the productivity of crops and also to reduce the cost of cultivation.⁴ It is well known that fixed capital formation is essential for sustaining the growth of agriculture as it reduces the transaction cost for private farmers besides reducing the operational cost of cultivation. But, fixed capital formation by public sector in agriculture has been continuously declining both in absolute terms and also in relation to the agricultural GDP. Despite appreciating the fact that there is a close complementarity between the public and private investment in agriculture, the policy makers appear to have not made any concerted effort to step up the public investment in agriculture. Since reduction in public investment in agriculture increases the private cost to farmers which results in increased cost of cultivation. However, since 2004 fixed capital formation in agriculture as a share of agricultural GDP has been rising substantially.

Another non-price incentive is institutional credit. Lack of access to institutional credit on time has forced the farmers to rely on non-institutional sources to meet their credit requirements for crop cultivation in most places in India, though the situation has been improving in the recent years. Since the rate of interest charged by the moneylenders is exorbitant and the returns from crop cultivation is also very low, farmers are unable to repay the loan in time, which reportedly in many cases led to suicides of farmers. With poor remuneration from crop cultivation, farmers may not be able to repay the loan with high rate of interest particularly when yield falls on account of poor weather or failure of seeds. Therefore, it is recommended that the farm loans must be adequately provided to the farmers at 4 per cent rate of interest as is done in Karnataka.

Irrigation facility is the paramount factor that determines the performance of agriculture, but the expansion of publicly supported programmes of surface irrigation has been poor since the mid-1990s because of inadequate allocation of funds required for completing the on-going projects and poor use of funds of irrigation projects by State agencies (see, Vaidyanathan, 2006). This poor growth in surface irrigation has compelled the farmers to heavily rely on groundwater irrigation for crop cultivation, which also increased the cost of cultivation. In many places in peninsular India, the increased dependence on groundwater has depleted the water level and has also increased the rate of well failures.

In addition, there is also a need to regulate both input and output markets in an effective manner to facilitate improvement in the income level of the farmer households. It is reported that the use of spurious inputs (seeds, fertilisers and pesticides) in cultivation is one of the major reasons for the crop failure or low output. The sale of spurious inputs must be stopped by all possible means. Another reason for the low income of farmer households could be the dominant role played by the middlemen in the market. Studies show that farmers are not able to get even 40 per cent of the consumer rupee for various agricultural commodities in the market. The role of middlemen can be controlled to a large extent by directly involving producers in the market activities extensively. The experience of farmers' market (Uzhavar Sandhai) from Tamil Nadu and other parts of the country is very encouraging (see; Kallummal and Srinivasan, 2007). Therefore, as underlined in the National Agricultural Policy: 2000, producers markets on the lines of *Ryatu Bazars* should be encouraged throughout the country to improve the income level of the farmers and to break the hold of middlemen (Government of India, 2000).

Farmers in most of the regions in India are struggling under severe stress because of poor returns from crop cultivation. Given this farmers' condition, there is no guarantee that the agricultural growth can be raised to over 4 per cent as is envisaged by the policy makers in recent years. Without proper incentives in the form of increased profitability, farmers may not be willing to adopt the recommended inputs at the right time to increase the productivity of crops. Pursuing the policy of doubling the flow of institutional credit to agricultural sector by itself may not accelerate the

growth of agriculture. What is needed is a strategy to make agriculture a profitable enterprise by adjusting the minimum support prices of various crops in consonance with their cost of cultivation. Unless the issue of profitability of crops is addressed immediately, we may not be able to rescue the agriculture from its current mire. Finally, it is appropriate to end the paper with a quote from the National Commission on Farmers: "Economic growth which bypasses a large population is joyless growth and not sustainable in the long run. We cannot be silent onlookers to a situation where 30 per cent of India is shining and 70 per cent is weeping, 40 per cent of the farmers wish to quit farming".

Received March 2012.

Revision accepted February 2013.

NOTES

1. Cost of cultivation survey data is generated through the cost of cultivation scheme controlled by the Directorate of Economics and Statistics, Ministry of Agriculture. It contains detailed information on costs and its components and the income for different crops. This data is collected annually from 9000 farmers covering different regions in India and is used for deciding minimum support prices for different crops. Unfortunately, not many scholars have analysed this rich source of information in the context of agrarian crisis. The importance of cost of cultivation survey data has also been highlighted by Rao, 2001; Sen and Bhatia, 2004 and Dev and Rao, 2010.

2. Area under paddy and wheat has increased substantially after the introduction of green revolution in India, but the area under coarse cereals has declined sharply from 44.34 mha in 1964-65 to 27.62 mha in 2008-09. Coarse cereals are the major victims of green revolution technology in India.

3. Utilising temporal data from cost of cultivation survey, an excellent analysis on the returns over cost of cultivation in paddy and wheat is presented in Dev and Rao (2010).

4. Similar to the expert group on agricultural indebtedness headed by Prof. R. Radhakrishna (Government of India, 2007), Vyas (2004) also underlines the importance of non-price factors for removing the present agrarian crisis. Enhancing investment to strengthen the resource base of agriculture, devising suitable instruments to compensate small and marginal producers for losses from natural calamities, designing organisational interventions to impart strength to their economy, lightening the interest burden from non-formal sources of credit, and encouraging rural financial institutions to take over the debts of the farmers from usurious sources are some of his important suggestions for alleviating the present agrarian crisis.

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