

## Whether Cultivations of Foodgrain Crops are Profitable in Maharashtra State? Facts from Cost of Cultivation Data

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**ABSTRACT:** This paper examines the profitability of major foodgrain crops over farm harvest price and minimum support price. The cost of cultivation data reported by Government of Maharashtra was analysed for the year 1980-81 to 2009-10. The important foodgrain crops examined were Kharif sorghum, wheat, Bajra, Pigeonpea, chickpea and greengram. The results showed that, all foodgrain crops have recorded negative profit over Cost-C when output was valued over Minimum Support Price. The Minimum Support Price is able to covers only paid out cost. The cultivation of pigeonpea and chickpea (for some initial year) was found remunerative when profitability was judged on Farm Harvest Price. These two crops have earned super normal profit. Rest of the crops recorded negative profit. Cost of cultivation of all the crops was increased over the year, but abnormal increase in cost of cultivation was recoded after TE 1999-00.

**Key words:** Foodgrains, Growth rate, Instability, Profitability, Cost of cultivation.

### INTRODUCTION

Agriculture in Maharashtra continues to be dominated by foodgrain crops. The major foodgrain crops cultivated in the state are jowar, bajra, maize, tur, gram, moong and udid etc. The foodgrains area which was 70 per cent of the gross cropped area during 1980-81 was declined to 60 per cent during TE 2000-01 and much more decline in is expected in recent time as cropping pattern of the state is shifting towards commercial crops. The area share of cash crops like oilseeds, cotton, fruits and vegetable, sugarcane etc. is increasing in gross crop area. (Anonymous, 2007)

There were genral perceptions that, cultivation of some of the foodgrain crops are not profitable and therefore farmers are shifting their cropping pattern to alternative crops. Kalamkar, 2003 reported that, profitability of some important crops in Maharashtra was declined due to increase in fixed cost, over capitalization of farm operations, an increase in rent and decrease in subsidies.

Not many studies have did the analysis of the profitability of different crops in relation to cost of cultivation and over a period of time. With out using temporal data of cost of cultivation, some scientist did the profitability analysis and correlated their finding

either to crop diversification or suicidal problem (Kalamkar and Narayanamoorthy, 2003; Narayanamoorthy, 2007; Narayanamoorthy, 2007) . Dev and Rao, 2010 and Narayanamoorthy, 2013 have recently analysed the profitability utilising temporial data but both these studies have addressed profitability issue using national level cost data. As their are vast differences in cost and returns data inbetween two data sets collected under two different cost of cultivation scheme i.e Centrely sponsored Vs State sponsored, an attemp was made to analysie the issue of profitability in foodgrain crops from state perspectives with the following objectves.

### OBJECTIVES

1. To examine the changes in cost of cultivation of major foodgrain crops in the state.
2. To examine the profitability of major foodgrain crops over FHP and MSP in the state.

### DATABASE AND METHODOLOGY

Cost of Cultivation survey data published by CACP, New Delhi contain rich information on the cost and output on various crops on temporal basis (see; Rao,

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2001; Sen and Bhatia, 2004). On similar line Government of Maharashtra also made available these data in to its various price policy reports. Hence study has used the state level cost of cultivation data from 1980-81 to 2010-11 compiled from various reports of state agriculture price commission cell, Department of Agriculture and Cooperation, Mumbai. Six major foodgrain crops namely *kharif* Sorghum, Wheat, Bajra, Pigeonpea, Greengram and Chickpea were selected to study the economics and profitability. To find whether the profitability is increased or decreased over time, trend analysis was performed and compound growth rate were worked out using functional analysis.

The exponential model was used.

$$Y_t = b_0 * b_1^t * e_t \quad \dots [1]$$

A non-linear estimation technique for solving exponential model assuming additive error terms were used to estimate the compound growth rates.

$$y_t = \text{constant} * (1 + \text{CGR})^t + e_t \quad \dots [2]$$

Where,

$y_t$  is the time series data for area/ production/ yield for year  $t$ ,

$t$  is the time trends for years of interest,

$e_t$  is the error term and

CGR is compound growth rate for the period under consideration.

The Marquardt algorithm were used to estimate the parameters of equation [2]. The data were smoothened with the help of three year moving average techniques to remove bias if any induced by the outliers. The significance of regression coefficient 'b' (slope coefficient) was tested by applying standard 't' test procedure. (Gujarati & Sangeetha, 2007)

Cuddy-Della Valle index was used as a measure of variability (Deb *et al.*, 2004) This index is a modification of coefficient of variation [CV] to accommodate for trend, which is commonly present in time series economic data.

The APC cell uses different cost concepts (A1, A2, B1, B2, C1, C2, C2\* etc) for estimating cost. In the

present study the cost C2 was considered for computing profitability. The C2 in APC data covers all the variables and fixed costs. The profit was calculated as gross value of output minus cost C2. Two profit series were estimated; one over farm harvest price and another over minimum support price. The nominal data of cost and returns were deflated by consumer price index for agriculture labour (CPIAL) with 1986-87 base year. (Narayanamoorthy *et al.* 2014)

## RESULTS AND DISCUSSIONS

There is general perception that cultivation of foodgrain crops in Maharashtra does not earn super normal profit. Farmers of the state are cultivating these crops as part of substantial farming. This need to be investigated on long term bases especially when agriculture and economic environment in the country is changing. Profitability of six major foodgrain crops was estimated and results were presented in table number 01 to 06.

### *Kharif* Sorghum

The cost-C of crop was Rs. 1651.56 per ha during TE 1984-85. It was increased consentaneously over the time and reached to Rs. 20961.51 per ha during TE 2009-10. The sharp increase in cost-C was observed in most recent period i.e TE 2009-10. Considering the TE 1984-85 as base year, cost-C was increased 183 per cent during TE 1989-90, 685 per cent during TE 1999-00 and 1269 per cent during TE 2009-10 over the base year. Total increase in cost - C was very high i.e.1296 per cent. The yield of *kharif* sorghum was enhanced more than double during TE 2009-10 over the base year. The farm harvest price was always lied higher than minimum support price; subsequently the value of the product. Both the profit series i.e profit over FHP and MSP recorded negative value, which means that, cost of cultivation lies higher than gross income at every period of time. During TE 1984-85 profit over FHP was Rs. - 488.56 per ha which was rosed to Rs. - 6732.57 per ha during TE 2009-10. The value of product over FHP was just enough to cover the direct

**Table 1**  
**Profitability of *kharif* Sorghum cultivation in Maharashtra State**

Year	Cost-A [Rs./ha.]	Cost-B [Rs./ha.]	Cost-C [Rs./ha.]	Output [Qtls/ha.]	VOP Over FHP	VOP over MSP	Profit over FHP	Profit over MSP
TE 1984-85	1110.19 (100)	1453.98 (100)	1651.56 (100)	7.49 (100)	1163 (100)	923.77 (100)	-488.56 (100)	-727.79 (100)
TE 1989-90	1709.91 (154)	2688.46 (185)	3023.12 (183)	12.14 (162)	2357 (203)	1826.25 (198)	-666.12 (136)	-1196.88 (164)
TE 1994-95	2920.77 (263)	4252.04 (292)	5977.26 (362)	16.36 (218)	5537 (476)	4259.87 (461)	-440.26 (90)	-1717.40 (236)
TE 1999-00	5809.89 (523)	9727.00 (669)	11309.81 (685)	17.97 (240)	9032 (777)	7004.35 (758)	-2277.81 (466)	-4305.46 (592)
TE 2004-05	7839.61 (706)	10515.97 (723)	12759.61 (773)	16.11 (215)	9227 (794)	7978.95 (864)	-3532.61 (723)	-4780.66 (657)
TE 2009-10	14502.74 (1306)	18111.94 (1246)	20961.57 (1269)	16.03 (214)	14229 (1224)	13688.80 (1482)	-6732.57 (1378)	-7272.77 (999)

TE: Tri-annum ending; VOP: Value of Produce; FHP: Farm Harvest Price; MSP: Minimum Support Price.

cost or paid out cost, which was reflected in cost-A series. In recent year minimum support price was not sufficient to cover even the paid out cost i.e cost-A. The growth and instability presented in Table 7 showed that, the rate of increase in cost item was more than price i.e., FHP and MSP. The cost-C was increased at rate of 8.66 per cent whereas MSP and FHP were increased at a speed of 7.44 and 6.51 per cent, respectively.

**Wheat**

The average cost-A, cost-B and cost-C were 1591.09, 2139.55 and 2422.26 Rs. per ha., respectively. It was steadily increased up to TE 1999-00. After that i.e during TE 2004-05 and TE 2009-10 it was increased at galloping rate. The per cent increase in cost-C was 1321 during TE 2009-10 over base year 1984-85. Double productivity gain was recorded in wheat. It was 10.28 qtls per ha during TE 1984-85 and reached to 22.64 qtls per ha in recent time. Farm harvest price of wheat remain higher over minimum support price. During the entire period of study, cultivation of wheat crop was never profitable over cost-C. The value of wheat over FHP and MSP is just sufficient to cover the direct cost, so there is no question of normal and super normal profit. The growth recorded in cost-A, cost-B and cost-C during study period were 11.29, 9.86 and 9.72 per cent, respectively. Minimum support price (7.67%) was increased at a higher rate compared to FHP (6.29%). Yield was increased at a compound growth rate of 2.48 per cent.

**Bajra**

The productivity of bajra crop was rised to 13.44 qtls per ha from 7.23 qtls per ha during last thirty years. This crop was never being considered as profitable crop, which was proved by the results. The cost of cultivation of bajra was Rs. 2611.67 per ha during TE 1984-85 which was increased to Rs. 17421.66 per ha during TE 2009-10. In last four to five year of study period, huge increase in cost - C was recorded.

**Pigeonpea**

This is one of the important pulse crop grown in the state. Maharashtra rank second after Madhya Pradesh in Pigeonpea cultivation. The yield was slightly enhancement in pigeonpea. It was 8.34 qtls per ha during TE 2009-10. The cost of cultivation i.e cost-C was Rs 1938.33 per ha during TE 1984-85 and was increased to Rs 24133.68 per ha during TE 2009-10. The value of product was recorded to be Rs. 2723.02 during TE 1984-85 was amplified to Rs. 25573.34 per ha. Among all foodgrain crops, pigeonpea was the only crop, which has recorded normal and super normal profit. It was Rs. 748.69 per ha during TE 1984-85 and improved to Rs.2471.57 per ha during TE 1994-95 and then after it decreased to Rs.1439.66 per ha during TE 2009-10. This crop become profitable crop over the time, even though there is no significant improvement in the yield, this is because of remunerative farm harvest price for the crop. The growth in Cost-A, Cost-B and Cost-C were 10.42, 8.95 and 8.69 per cent per annum, respectively. The MSP

**Table 2**  
**Profitability of Wheat cultivation in Maharashtra State**

Year	Cost-A [Rs./ha]	Cost-B [Rs./ha.]	Cost-C [Rs/ha.]	Output [Qtls/ha.]	VOP Over FHP	VOP over MSP	Profit over FHP	Profit over MSP
TE 1984-85	1591.09 (100)	2139.55 (100)	2422.26 (100)	10.28 (100)	2247 (100)	1514.57 (100)	-175.26 (100)	-907.69 (100)
TE 1989-90	2188.96 (138)	2831.59 (132)	3522.14 (145)	10.21 (99)	2904 (129)	1769.57 (117)	-618.14 (353)	-1752.57 (193)
TE 1994-95	3704.38 (233)	5535.40 (259)	6561.82 (271)	12.25 (119)	5244 (233)	9354 (3927.87 (259)	-1317.82 (752)	-2633.96 (290)
TE 1999-00	5946.50 (374)	9999.51 (467)	11966.99 (494)	15.09 (147)	9354 (416)	6752.62 (446)	-2612.99 (1491)	-5214.37 (476)
TE 2004-05	10362.39 (651)	13577.31 (635)	16947.48 (700)	17.40 (169)	12570 (559)	10852.10 (717)	-4377.48 (2498)	-6095.38 (672)
TE 2009-10	21447.74 (1348)	27542.86 (1287)	31993.50 (1321)	22.64 (220)	26099 (1161)	24022.87 (1586)	-5894.50 (3363)	-7970.64 (878)

TE: Tri-annum ending; VOP: Value of Produce; FHP: Farm Harvest Price; MSP: Minimum Support Price.

**Table 3**  
**Profitability of Bajra cultivation in Maharashtra State**

Year	Cost-A [Rs./ha]	Cost-B [Rs./ha.]	Cost-C [Rs/ha.]	Output [Qtls/ha.]	VOP Over FHP	VOP over MSP	Profit over FHP	Profit over MSP
TE 1984-85	-	-	-	-	-	-	-	-
TE 1989-90	1513.67 (100)	2160.67 (100)	2611.67 (100)	7.23 (100)	1401 (100)	1082.30 (100)	-1210.67 (100)	-1529.37 (100)
TE 1994-95	2532.67 (167)	3961.67 (183)	4758.00 (182)	9.69 (134)	2909 (208)	2527.80 (234)	-1849.00 (153)	-2230.20 (146)
TE 1999-00	4449.33 (294)	6974.67 (323)	8516.67 (326)	10.97 (152)	5099 (364)	4258.83 (393)	-3417 (282)	-4257.83 (278)
TE 2004-05	6604.67 (436)	8443.33 (391)	10861.33 (416)	12.22 (169)	6443 (460)	6049.82 (559)	-4418.33 (365)	-4811.52 (315)
TE 2009-10	13503.44 (892)	15647.25 (724)	17421.46 (667)	13.44 (186)	11386 (813)	12096.78 (1118)	-6035.46 (499)	-5323.70 (348)

TE: Tri-annum ending; VOP: Value of Produce; FHP: Farm Harvest Price; MSP: Minimum Support Price.

**Table 4**  
**Profitability of Pigeonpea cultivation in Maharashtra State**

Year	Cost-A [Rs./ha.]	Cost-B [Rs./ha.]	Cost-C [Rs./ha.]	Output [Qtls/ha.]	VOP Over FHP	VOP over MSP	Profit over FHP	Profit over MSP
TE 1984-85	1071.65 (100)	1730.43 (100)	1938.33 (100)	6.11 (100)	2723.02 (100)	1496.95 (100)	784.69 (100)	-441.38 (100)
TE 1989-90	1385.46 (129)	2171.33 (125)	2684.13 (138)	5.76 (94)	4237.27 (156)	2122.02 (142)	1553.14 (198)	-562.12 (127)
TE 1994-95	3238.33 (302)	4985.82 (288)	5940.22 (306)	5.72 (94)	8411.79 (309)	4013.60 (268)	2471.57 (315)	-1926.62 (436)
TE 1999-00	5926.47 (553)	10057.63 (581)	12018.94 (620)	6.72 (110)	13587.45 (499)	6685.47 (447)	1568.51 (200)	-5333.48 (1208)
TE 2004-05	9666.17 (902)	12990.90 (751)	16154.89 (833)	9.43 (154)	18055.92 (663)	12669.97 (846)	1901.03 (242)	-3484.92 (790)
TE 2009-10	15978.95 (1491)	21144.95 (1222)	24133.68 (1245)	8.34 (136)	25573.34 (939)	20090.67 (1342)	1439.66 (183)	-4043.02 (916)

TE: Tri-annum ending; VOP: Value of Produce; FHP: Farm Harvest Price; MSP: Minimum Support Price.

**Table 5**  
**Profitability of Chickpea cultivation in Maharashtra State**

Year	Cost-A [Rs./ha.]	Cost-B [Rs./ha.]	Cost-C [Rs./ha.]	Output [Qtls/ha.]	VOP Over FHP	VOP over MSP	Profit over FHP	Profit over MSP
TE 1984-85	1107.55 (100)	1379.41 (100)	1626.14 (100)	3.89 (100)	1337.29 (100)	588.69 (100)	-288.85 (100)	-1037.45 (100)
TE 1989-90	1326.91 (120)	2263.56 (164)	2269.48 (140)	4.32 (111)	2199.00 (164)	1298.52 (221)	-70.48 (24)	-970.96 (94)
TE 1994-95	2470.32 (223)	3905.43 (283)	4657.86 (286)	6.41 (165)	5311.19 (397)	3767.67 (640)	653.33 (-226)	-890.19 (86)
TE 1999-00	4685.68 (423)	7730.21 (560)	9076.62 (558)	6.63 (170)	8097.92 (606)	5421.95 (921)	-978.7 (339)	-3654.67 (352)
TE 2004-05	5993.93 (541)	8994.05 (652)	11063.93 (680)	6.86 (176)	9220.59 (689)	8720.67 (1481)	-1843.34 (638)	-2343.26 (226)
TE 2009-10	13616.67 (1229)	17321.39 (1256)	19645.18 (1208)	7.97 (205)	16074.97 (1202)	13539.47 (2300)	-3570.21 (1236)	-6105.71 (589)

TE: Tri-annum ending; VOP: Value of Produce; FHP: Farm Harvest Price; MSP: Minimum Support Price.

**Table 6**  
**Profitability of Greengram cultivation in Maharashtra State**

Year	Cost-A [Rs./ha.]	Cost-B [Rs./ha.]	Cost-C [Rs./ha.]	Output [Qtls/ha.]	VOP Over FHP	VOP over MSP	Profit over FHP	Profit over MSP
TE 1984-85	884.55 (100)	1442.72 (100)	1703.78 (100)	4.73 (100)	-	1206.15 (100)	-	-497.63 (100)
TE 1989-90	1247.45 (141)	1954.46 (135)	2214.07 (130)	3.99 (84)	-	1457.82 (121)	-	-756.25 (152)
TE 1994-95	1589.15 (180)	2295.53 (159)	2615.63 (154)	3.72 (79)	-	2611.20 (216)	-	-4.43 (1)
TE 1999-00	3646.51 (412)	5721.21 (397)	6770.87 (397)	4.04 (85)	-	3978.58 (330)	-	-2792.29 (561)
TE 2004-05	5971.87 (675)	8008.01 (555)	9883.84 (580)	5.02 (106)	-	6821.57 (566)	-	-3062.27 (615)
TE 2009-10	12435.65 (1406)	15920.38 (1103)	18180.08 (1067)	5.86 (124)	-	16463.63 (1365)	-	-1716.45 (345)

TE: Tri-annum ending; VOP: Value of Produce; FHP: Farm Harvest Price; MSP: Minimum Support Price.

and FHP was increased at a speed of 7.91 and 5.79 per cent. Yield was increased at very slow speed of 1.11 per cent per annum.

### Chickpea

Chickpea is the important rabi season pulse crop cultivated in rainfed area of the state. The yield of the crop was 3.89 qtls per ha during TE 1984-85. It was increased up to 7 qtls per ha and then become stagnated in-between 7 to 8 qtls per ha in recent period. The cost-C of Chickpea was rised to 19645.18 from just 1626.14 Rs per ha. During first fifteen years of the study, this crop has earned normal and super normal profit. But after TE 1999-00, this crop has recorded negative profit. The main reason seems to be stagnation in the yield and increase in the cost of cultivation due to increase in the input use and input

prices. The value of output over FHP was just sufficient to cover cost-B, which include variable cost plus fixed cost. The Cost-C, yield, FHP and MSP was increased at a speed of 8.42, 1.14, 7.92 and 6.55 per cent per annum, respectively.

### Greengram

Greengram which is mainly grown as filler crop in kharif season, improve the fertility of soil and provide some income to the farmers. The cost-A, cost-B and cost-C was recorded to Rs.18180.08 per ha during TE 2009-10, respectively. The yield was 5.86 qtls per ha during TE 2009-10. The MSP of the crop is able to covers only the variable cost. The low productivity level was the main probable reason for negative profit. The growth in yield, MSP and cost-C was 1.38, 8.96 and 9.90 per cent, respectively.

**Table 7**  
**Growth and Instability in cost, yield, minimum support price and farm harvest price of major foodgrain crops**

[1980-81 to 2011-12]

Crop		Cost-A	Cost-B	Cost-C	Output	MSP	FHP
Kharif	CGR	10.40**	8.81**	8.66**	2.85*	7.44**	6.51
Sorghum	Instability	35	28	23	17	21	20
Wheat	CGR	11.29**	9.86**	9.72**	2.48*	7.67**	6.24
	Instability	41	33	30	16	23	17
Pigeonpea	CGR	10.42**	8.95**	8.69**	1.11*	7.91**	5.79
	Instability	31	24	21	22	27	22
Chickpea	CGR	10.05**	8.50**	8.42**	1.74*	7.92**	6.55
	Instability	44	31	27	16	13	14
Greengram	CGR	11.51**	9.99**	9.90**	1.30*	8.96**	-
	Instability	43	35	32	18	32	-
Bajra	CGR	9.97	8.31	8.82	3.18	7.44	6.15
	Instability	09	08	08	08	21	19

**CONCLUSIONS**

During last ten year of the study period, cost of cultivation of all foodgrain crops was increased especially after TE 2004-05 the increase was abnormal. Cultivation of the foodgrain crops, except pigeonpea and for some initial year chickpea, recorded negative profit. This may be the probable reason why area under kharif sorghum has reduced and farmers are shifting their cropping pattern towards commercial crops. Cultivation of Pigeonpea was only remunerative and provided some super normal profit to the farmers during all the study period.

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