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Economic analysis of farm ponds on beneficiary and non-beneficiary farmers for cotton cultivation in Akola Tahasil

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Abstract
The present study entitled, 'Comparative economics of farm ponds beneficiary and non-beneficiary farmers in Akola tahasil'. A farm pond is a large hole dug out in the earth, usually square or rectangular in shape, which harvests rainwater and stores it for future use. Economic evaluation of farm pond is necessary for the effective implementation. The main objective of present study was to assess the impact of farm ponds on productivity of various inputs used by farmers. This study was undertaken in Akola tahasil. The study was based on a sample of 60 beneficiary and 60 non-beneficiary farmers data pertaining the year 2017-18 were collected by survey method from the beneficiary and non-beneficiary farmers. The sample farmers were personally contacted and primary data was collected from them in a specially structured schedule *i.e.*, cost 'A', cost 'B' and cost 'C' was used for the analysis of data. It is observed from the study that output-input ratio of beneficiary farmers was higher as compare to non-beneficiary farmers. It shows that the beneficiary farmers were more profitable than non-beneficiary farmers.

Keywords: Farm pond, productivity, cost A, cost B, cost C, Akola, output-input ratio

Introduction
In recent year India has looked to farm pond as a way to realize its hopes for agricultural development in rainfed, semi-arid areas. These areas were bypassed by the Green Revolution and have experienced little or no growth in agricultural production for several decades. By capturing scarce water resources and improving the management of soil and vegetation, farm pond development has the potential to create conditions conducive to higher agricultural productivity, while conserving natural resources.

Farm pond activity is an adaptive, comprehensive and constructive technique for multi-resource management that seek to balance healthy, economic and social conditions within a watershed. Farm pond serves to integrate planning regarding better utilization of land and water; taking in account to both groundwater as well as surface water flow, so as to create or recognize new and sustainable methods for the interaction of water, plants, animals and human land use found within the physical boundaries of a farm pond.

Farm pond activity basically refers to efficient management and conservation of surface and groundwater resources. It involves prevention of runoff and storage and recharge of groundwater through various methods like percolation tanks, recharge wells, etc. However, in broad sense farm pond management includes conservation, regeneration and judicious use of all resources – natural (like land, water, plants and animals) and human with in a farm pond. Farm pond management aims at bringing about balance between natural resources on the one hand and society on the other. The success of farm pond development largely depends upon community participation. Farm pond management as the tool for sustainable development.

Agriculture is the backbone of Indian economy and society. In Vidarbha region, farmer suicide is serious and current issue. Due to unfavourable climatic and natural conditions such as low rainfall, drought, hailstorms etc., it is difficult to farmers to withstand in such conditions. Day by day percentage of rainfall is decreasing. Groundwater availability is getting very low and available water resources are not fulfil need of farmers. So now a days to create the awareness among the people about farm pond management is very necessary. Farm pond management is done with help of check dams, percolation ponds, stone barriers, slopping lands, bench terracing, etc. In this works, village community play vital role and employment for villagers is also generated.

Methodology
The present study entitled comparative economics of farm ponds beneficiary and non-beneficiary farmers were be conducted for Akola tahasil.

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Economics of production:
For working out the economics of production of the crops, the costs of cultivation were worked out .i.e. cost A, cost B and cost C. The various items included in the cost of cultivation and the methods adopted in their evaluation are presented in the following section.

Human labour
While estimating the cost of human labour, both hired and family labours were taken into consideration. For estimating the cost of hired labour, wages actually paid to the labours were taken to consideration. Family labour was evaluated at the cost of wages paid to the hired labour.

Bullock labour
The appropriate method to estimate the cost of bullock labour is to estimate the net costs of maintenance of bullock pair and divide it by the total numbers of work days of the bullock pair. This method, however, requires more data and time for its estimation. In the alternative, therefore, the bullock labour was valued on the basis of the prevailing rate of bullock pair in the locality for various operations.

Seed
The seeds purchased from the market were evaluated on the basis of price actually paid. The farm produced seeds were evaluated on the basis of market price.

Manure
The manure purchased from outside was evaluated at the price actually paid. While the manure produced on farm was evaluated at the price prevailing in the village.

Fertilizers
The actual cost incurred on the purchase of fertilizer was taken into consideration.

Pesticides
The actual expenditure incurred on the purchase of pesticide was taken into consideration.

Irrigation charge
Irrigation charges included the actual energy bill, depreciation on pump set and maintenance of irrigation machinery. Total irrigation charges were distributed among irrigation crops on the basis of area.

Return
The total return from a crop comprise of value of main produce and by produce. For calculating the value of main product, the harvest price of the crop was considered. In case of by produce the prevailing price in the locality was considered for calculating its value. The total returns from a crop were obtained by multiplying the quantity of main and by product by their respective per unit prices and added together to get total value.

Results and Discussion
The findings of the present study as well as relevant discussion have been presented under following heads:

Per hectare input utilization of Cotton
Results presented in table 1 indicate that at overall level the use of various inputs for cotton on beneficiary farms was slightly higher than non-beneficiary farms. Beneficiary farmers used 20.18 male labour days per hectare against 19.32 male labour days by the non-beneficiary farmers. Use of female labour days was 106.79 days on beneficiary farms and 105.21 days on non-beneficiary farms. Use of seed and farm yard manure per hectare did not vary much among the beneficiary and non-beneficiary farms. Use of chemical fertilizers on beneficiary farms (174.17 kg.) was slightly higher than the non-beneficiary (168.58 kg.) farms. Intergroup comparison of beneficiary and non-beneficiary farms also revealed the same trend.

Table 1: Per hectare input utilization for Cotton for beneficiary and non-beneficiary farmers

Sr. No.	Particular	Unit	Land holding size							
			Small		Medium		Large		Overall	
			B	NB	B	NB	B	NB	B	NB
1	Hired labour									
	i) Male	Days	21.34	20.94	20.65	19.65	18.54	17.36	20.18	19.32
	ii)Female	Days	109.63	108.21	107.20	105.21	103.54	102.21	106.79	105.21
	Total		130.97	129.15	127.85	124.86	122.08	119.57	126.97	124.53
2	Family labour									
	i) Male	Days	20.96	20.11	19.86	18.90	19.12	18.12	19.98	19.04
	ii) Female	Days	15.98	15.30	14.85	14.32	13.54	13.89	14.79	14.50
	Total		36.94	35.41	34.71	33.22	32.66	32.01	34.77	33.55
3	Bullock labour	Pair days	9.82	9.73	8.62	8.25	7.98	7.68	8.81	8.55
4	Machine labour	Hours	31.24	30.21	32.54	31.96	33.56	32.45	32.45	31.54
5	Seed	Kg	3.15	3.20	3.35	3.46	3.40	3.54	3.30	3.40
6	Manure	Qtls	23.40	21.98	24.85	22.40	26.54	25.68	24.93	23.35
7	Irrigation	No.	4.14	0.00	4.72	0.00	5.11	0.00	4.66	0.00
8	Fertilizers	Kg								
	N	Kg	82.34	81.12	87.54	85.64	91.54	87.54	87.14	84.77
	P	Kg	53.15	52.65	56.45	55.35	61.98	56.32	57.19	54.77
	K	Kg	28.01	27.56	29.94	28.75	31.56	30.82	29.84	29.04
	Total	Kg	163.50	161.33	173.93	169.74	185.08	174.68	174.17	168.58
9	Plant protection	Rs.	2284.21	2154.00	2545.30	2354.92	2678.54	2584.43	2502.68	2364.45

Note: (Figures in parentheses indicates the percentages over cost 'C') B=Beneficiary, NB=Non beneficiary

Per hectare cost of cultivation of cotton for beneficiary and non-beneficiary farmers:

Results on the economics of production of cotton are presented in table 2. It could be seen from the table that at the overall level beneficiary farmers incurred an expenditure of Rs. 82,646.96 per hectare in the cultivation of cotton. Human labour was the main item of expenditure i.e. 27.10 per cent hired labour and 8.12 family labour of the total cost. Bullock labour expenditure accounting for 6.39 per cent of total cost. Manures and fertilizers together accounted for about 9.82 per cent of the total cost. Expenditure on plant protection was 3.03 per cent. Intergroup comparison revealed that the highest expenditure of Rs. 86,990.17 was incurred by large farmers. Small and medium farmers incurred an expenditure of Rs. 74,670.72 and Rs. 79,085.67 respectively in the cultivation of cotton.

In non-beneficiary group per hectare expenditure in the cultivation of cotton at overall level was Rs. 70,419.28 Important items of expenditure as per their share total cost were human labour (27.90 per cent hired and 8.12 per cent family labour), bullock labour (7.29 per cent) and manures and fertilizers (11.02 per cent). As in case of beneficiary farmers, highest expenditure in cultivation of cotton was incurred by large farmers (Rs. 77,622.42) in non-beneficiary group also.

Beneficiary farmers, on an average, obtained yield of 19.86 quintals per hectare, while non-beneficiary farmers obtained 16.67 quintals yield per hectare. Thus beneficiary farmers obtained about 3.19 quintals higher yield per hectare than the non-beneficiary farmers.

Gross returns per hectare from cotton cultivation on beneficiary farms was Rs. 81,439.67. Gross return varied from Rs. 69,372 in small group to Rs. 78,802 in medium group to and Rs. 96,145 in large group. In non-beneficiary group gross return per hectare at overall level was Rs. 68,333.33 and it varied from Rs. 54,981 in small group to Rs. 65,764 in medium group and Rs. 84,255 in large group. Gross returns per hectare from cultivation of cotton were higher in all the size group of beneficiary farms than the non-beneficiary farms. This was obviously due to higher per hectare yield of cotton on beneficiary farms.

Comparison of output input ratios over cost 'A' at overall level shows that beneficiary farmers (1.40) obtained higher returns over investment than the non-beneficiary farmers (1.37) from the cultivation of cotton.

Table 2: Per hectare cost of cultivation of cotton for beneficiary and non-beneficiary farmers

Sr. No.	Particulars	Land holding size							
		Small		Medium		Large		Overall	
		B	NB	B	NB	B	NB	B	NB
	Hired labour								
1	i) Male	4268.00	4188.00	4130.00	3930.00	3708.00	3472.00	4506.12	3863.33
		(5.72)	(6.52)	(5.22)	(5.66)	(4.26)	(4.47)	(5.45)	(5.49)
	ii) Female	16444.50	16231.50	16080.00	15781.50	15531.00	15331.50	17887.33	15781.50
		(22.02)	(25.28)	(20.33)	(22.73)	(17.85)	(19.75)	(21.64)	(22.41)
	Total	20712.50	20419.50	20210.00	19711.50	19239.00	18803.50	22393.45	19644.83
		(27.74)	(31.81)	(25.55)	(28.39)	(22.12)	(24.22)	(27.10)	(27.90)
2	Bullock labour	5892.00	5838.00	5172.00	4950.00	4788.00	4608.00	5284.00	5132.00
		(7.89)	(9.09)	(6.54)	(7.13)	(5.50)	(5.94)	(6.39)	(7.29)
3	Machine charges	296.40	269.80	403.75	318.25	422.75	389.50	374.30	325.85
		(0.40)	(0.42)	(0.51)	(0.46)	(0.49)	(0.50)	(0.45)	(0.46)
4	Seed	5462.92	5549.63	5809.77	6000.54	5896.48	6139.28	5723.06	5896.48
		(7.32)	(8.64)	(7.35)	(8.64)	(6.78)	(7.91)	(6.92)	(8.37)
5	Manure	2588.04	2430.99	2748.41	2477.44	2935.32	2840.21	2757.26	2582.88
		(3.47)	(3.79)	(3.48)	(3.57)	(3.37)	(3.66)	(3.34)	(3.67)
6	Irrigation	1904.40	0.00	2171.20	0.00	2350.60	0.00	2142.07	0.00
		(2.55)	0.00	(2.75)	0.00	(2.70)	0.00	(2.59)	0.00
7	Fertilizers	5017.71	4955.34	5335.64	5213.37	5715.83	5349.29	5356.39	5172.67
		(6.72)	(7.72)	(6.75)	(7.51)	(6.57)	(6.89)	(6.48)	(7.35)
8	Plant protection	2284.21	2154.00	2545.30	2354.92	2678.54	2584.43	2502.68	2364.45
		(3.06)	(3.36)	(3.22)	(3.39)	(3.08)	(3.33)	(3.03)	(3.36)
9	Incidental charges	1456.25	1248.60	1798.50	1654.23	1920.15	1845.64	1724.97	1582.82
		(1.95)	(1.94)	(2.27)	(2.38)	(2.21)	(2.38)	(2.09)	(2.25)
10	Repairing charges	562.12	533.45	654.21	654.89	865.49	800.34	693.94	662.89
		(0.75)	(0.83)	(0.83)	(0.94)	(0.99)	(1.03)	(0.84)	(0.94)
	Working capital	46176.55	43399.31	46848.78	43335.14	46812.17	43360.19	48952.11	43364.88
		(61.84)	(58.12)	(62.74)	(58.03)	(62.69)	(58.07)	(65.56)	(58.07)
11	Interest on working capital @ 6 % per annum for crop period	1154.41	1084.98	1171.22	1083.38	1170.30	1084.00	1223.80	1084.12
		(1.55)	(1.69)	(1.48)	(1.56)	(1.35)	(1.40)	(1.48)	(1.54)
12	Depreciation cost	5470.40	2257.95	7130.50	4987.35	10886.60	8541.80	7829.17	5262.37
		(7.33)	(3.52)	(9.02)	(7.18)	(12.51)	(11.00)	(9.47)	(7.47)
13	Land revenue and other taxes	12.20	11.25	26.44	24.95	55.87	52.34	31.50	29.52
		(0.02)	(0.02)	(0.03)	(0.04)	(0.06)	(0.07)	(0.04)	(0.04)
	Cost 'A'	52813.56	46753.49	55176.94	49430.82	58924.94	53038.34	58036.58	49740.88
		(70.73)	(72.83)	(69.77)	(71.19)	(67.74)	(68.33)	(70.22)	(70.64)
14	Interest on fixed capital @ 10 %	4013.22	2258.82	4876.46	3406.05	6493.34	5142.60	5127.67	3602.49
		(5.37)	(3.52)	(6.17)	(4.91)	(7.46)	(6.63)	(6.20)	(5.12)
15	Rental value of land	11549.80	9152.25	13107.22	10935.72	15968.30	13990.16	13541.77	11359.37
		(15.47)	(14.26)	(16.57)	(15.75)	(18.36)	(18.02)	(16.39)	(16.13)

	Cost 'B'	68376.58 (91.57)	58164.56 (90.60)	73160.62 (92.51)	63772.59 (91.84)	81386.58 (93.56)	72171.09 (92.98)	76706.03 (92.81)	64702.75 (91.88)
16 Family labour									
	i) Male	4167.69 (5.58)	3998.67 (6.23)	3948.96 (4.99)	3758.08 (5.41)	3801.82 (4.37)	3602.98 (4.64)	3972.82 (4.81)	3786.58 (5.38)
	ii) Female	2126.46 (2.85)	2035.97 (3.17)	1976.09 (2.50)	1905.56 (2.74)	1801.77 (2.07)	1848.34 (2.38)	1968.11 (2.38)	1929.96 (2.74)
	Total	6294.15 (8.43)	6034.64 (9.40)	5925.05 (7.49)	5663.64 (8.16)	5603.59 (6.44)	5451.32 (7.02)	5940.93 (7.19)	5716.53 (8.12)
	Cost 'C'	74670.72 (100.00)	64199.21 (100.00)	79085.67 (100.00)	69436.22 (100.00)	86990.17 (100.00)	77622.42 (100.00)	82646.96 (100.00)	70419.28 (100.00)
17 Output (Qtls.)									
	i) Main produce	16.92	13.41	19.22	16.04	23.45	20.55	19.86	16.67
	ii) By produce	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	Gross Return (Rs)	69372.00	54981.00	78802.00	65764.00	96145.00	84255.00	81439.67	68333.33
19	Output input ratio at cost 'A'	1.31	1.18	1.43	1.33	1.63	1.59	1.40	1.37

Note: (Figures in parentheses indicates the percentages over cost 'C') B=Beneficiary, NB=Non beneficiary

Conclusions
At overall level family labour, fertilizers and manures was used more in case of beneficiary farmers as compared to non-beneficiary farmers while bullock labour, seed, machinery was more in case non-beneficiary farmers as compared to beneficiary farmers.

At overall level per hectare cost of cultivation i.e. cost C for cotton crop in case of non-beneficiary farmers was Rs. 70,419.28 which was less than cost of Rs. 82,646.96 in case of beneficiary farmers.

In case of beneficiary farms input output ratio on cost A at overall level for cotton crop was 1.40 which was higher than non-beneficiary farms with input output ratio of 1.37.

The impact of farm pond construction on their field increase water level of well and also for their field to provide water during crop season whenever necessary to increase a crop production. Higher regression coefficient and consequently higher factor productivity for beneficiary farms were obviously due to farm pond availability on these farms.

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