Economics of Apple Production in Himachal Pradesh: A Comparative Study of Different Blocks of District Shimla

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ABSTRACT

The study was conducted in order to understand apple productivity of the different blocks of district Shimla and from the study one tries to reveales the resource efficiency of different blocks. For the study one has taken land as the main and principle resource and data of 10 years (2008-2018) for 10 Blocks being collected from the secondary source which is analyzed with the help of regression and percentage method to found the efficiency and resource performance in different blocks of Shimla District. It was observed that blocks which are showing highest average and per hectare productivity actually their coefficient value of land is going down and showing decreasing returns and blocks with low average and per hectare production are showing positive coefficient value of land hence determining their resource efficiency. The study gives us knowledge about the production and efficiency difference among different blocks.

Key words: Coefficient value, Efficiency, Land, Productivity, Resource.

INTRODUCTION

Himachal Pradesh has been endowed with a wide range of Agro climatic conditions due to which a large number of horticulture commodities like fruit crops (from temperate to sub-tropical), flowers, vegetables, mushrooms, hops, tea, medicinal and aromatic plants etc. are successfully grown here. Amongst the fruit crops, perhaps all kind of fruits grown in the country, except those which are grown in the warm humid coastal regions, can be produced in the State (Department of Horticulture Himachal Pradesh).

This rich diversity of Agro-climatic conditions, topographical variations and altitudinal differences coupled with fertile, deep and well drained soils (favor the cultivation of temperate to sub-tropical fruits in Himachal) has resulted in shifting of land use pattern from agriculture to fruit crops in the past few decades. The area under fruits, which was 792 hectares in 1950-51 with total production of 1,200 tones increased to 2,30,852 hectares during 2017-18. The total fruit production in 2017-18 was 5.65 lakh tones, while during 2018-19 up to December, 2018 has been reported as 4.06 lakh tones. During 2018-19, against the target of 2,004 hectares of additional area under fruit plants 2,351 hectares of area has actually been brought under the plantations and in the process 6.50 lakh different fruit plants distributed up to December, 2018 during the year 2018-19. However, when it comes to apple production which is important fruit crop of Himachal Pradesh and constitutes about 49 percent of the total area under fruit crops and about 79 percent of the total fruit production. Area under apple has increased from 400 hectares in 1950-51 to 3,025 hectares in 1960-61 and 1,12,634 hectares in 2017-18. Apple production in Himachal Pradesh in (2018-19) was 368603 (M.T) with 112634 hectares (2017-18) area under cultivation and 359000.00 (M.T) till December 2018, whereas in district Shimla the production of apple (2017-18) is 251897 (M.T) and is highest among all the 12 districts of Himachal Pradesh. (Himachal Economic Survey Report 2018-19).

Shimla lies on the south-western ranges of the Himalayas with area of 5,131 sq. kms and is divided into 10 blocks administratively. As Shimla plays a dominate role in overall apple production of the state hence becomes important for us to identify the performance of different blocks of district and their contribution in district apple production. The present study is conducted in order to understand the productivity and resource efficiency of different blocks. (Bhat,1989) analyzed the resource use efficiency of Apple cultivation in Jammu & Kashmir and found the regression coefficient of land 0.3262 significant at 5 percent level which specifies the role of land in output. Masoodi, 2003 stated the apple cultivation in Jammu & Kashmir and shows that area under production increased from 7000 hectares to more than 90 thousand hectares but production has increased from just 6000 metric tonnes in 1950-51 to more than 9 lakh tones in 2001-02 with average yield of 10.09 tonnes per hectare hence specifies low productivity of land due to drought like conditions that engulfed the state, which

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specifies that land is principle and important resource in agriculture production, therefore current research will try to found the relation between land and apple production which gives us information about resource efficiency of different blocks.

MATERIALS AND METHODS

The Study was conducted for 10 years (2008-2018) of district Shimla which is divided into ten blocks (Mashobra, Basantpur, Jubbal and Kotkhai, Chiragon, Theog, Nankhari, Rohru, Chopal, Narkanda, Rampur). As land is main factor of production in agriculture production and has big role in productivity hence land (Hectares) has been taken as independent variable and production (M.T) dependent variable. Secondary data for every block has been collected for both the variables for the year (2008-2018) which has been put in tabulation form. After putting data in tabulation form one has analyzed the inputs with the help of Average, CAGR and regression method. As average, CAGR is simple method cannot explain the relation between two variables hence regression method has been used in order to understand and found the relation between both variables.

RESULTS AND DISCUSSION

Productivity and resource efficiency of Mashobra Block

Table 1.1 explains the productivity analysis of the Mashobra block and it can be revealed from the Table that the average per hectare productivity and average production of apple for the ten years is 1.5661(M.T) and 2501 (M.T) whereas, CAGR for apple production and Per hectare productivity is concern it is showing negative results with -1.65 and -4.47 percent growth rate. As far as production area is concern it is showing growth rate of 2.96 percent annually which is fourth highest however in average per hectare productivity and average production of apple (M.T) block is last and second last among all the other blocks. When one look towards the resource efficiency it came to the picture from the Graph 1.1 that land and output are showing positive trends with elasticity coefficient of 1.61 therefore explaining that with increase in 1.00 percent land output is increasing by 1.61 per cent which is less but looks average when compare to four blocks which is showing negative results hence putting a block in sixth position among all.

Productivity and resource efficiency of Basantpur Block

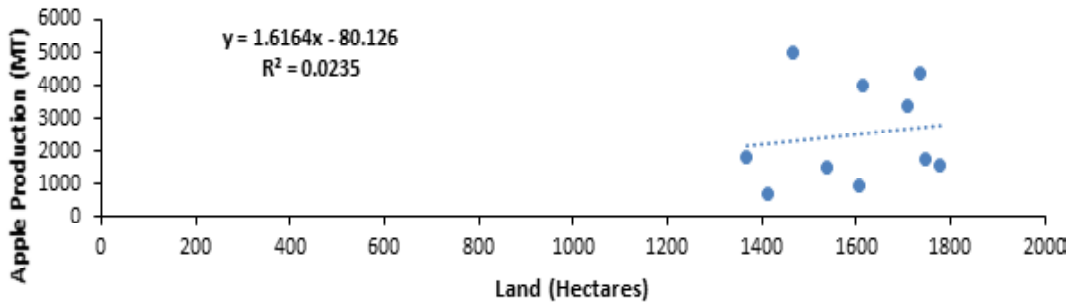
Apple productivity of Basantpur can be observed from the

Table 1.1: Block Mashobra Input-Output Status.

Year	Block Mashobra Apple Production (MT)	Block Mashobra Apple Production Area (Hectares)	Block Mashobra Apple Per Hectare Productivity (M.T)
2008-2009	1800	1367.76	1.3160
2009-2010	687	1413.28	0.4861
2010-2011	5000	1466.62	3.4092
2011-2012	1500	1536.74	0.9761
2012-2013	946	1605.66	0.5894
2013-2014	3995	1613.77	2.4758
2014-2015	3384	1707.04	1.9824
2015-2016	4395	1734.00	2.5343
2016-2017	1756	1747.00	1.0052
2017-2018	1550	1778.06	0.8717
Average	**2501**	**1596.99**	**1.5661**
CAGR	**-1.65 %**	**2.96 %**	**-4.47 %**

MT=Metric Tonnes.

CAGR=Compound Annual Growth Rate.



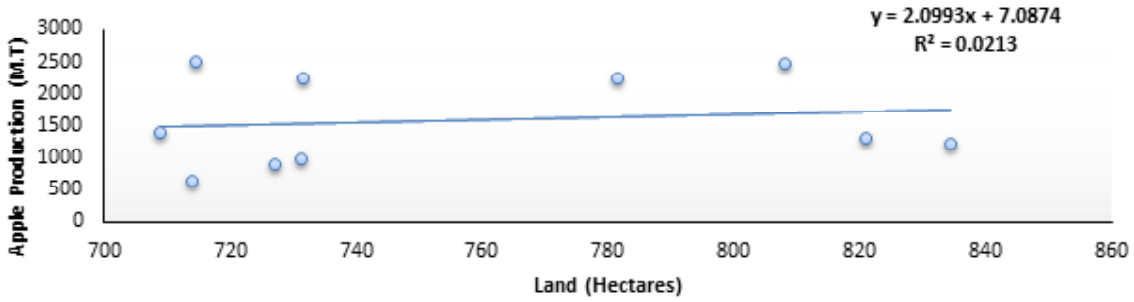
Graph 1.1: Block Mashobras Input-Output Relation.

Table 1.2: Block Basantpur Input-Output Status.

Year	Block Basantpur Apple Production (MT)	Block Basantpur Apple Production Area (Hectares)	Block Basantpurs Apple Per Hectare Productivity (M.T)
2008-2009	1400	708.83	1.9751
2009-2010	650	714.10	0.9102
2010-2011	2500	714.58	3.4986
2011-2012	1000	731.21	1.3676
2012-2013	910	727.02	1.2517
2013-2014	2247	731.57	3.0720
2014-2015	2244	781.38	2.8718
2015-2016	2482	808.00	3.0718
2016-2017	1303	821.00	1.5871
2017-2018	1230	834.28	1.4743
Average	**1596**	**757.197**	**2.1080**
CAGR	**-1.43 %**	**1.83 %**	**-3.20 %**

MT=Metric Tonnes.

CAGR=Compound Annual Growth Rate.



Graph 1.2: Block Basantpur Input-Output Relation.

given Table 1.2 and it was revealed from the Table that the Average productivity of the Basantpur for given ten years is 1596 (MT) which is minimum and average per hectare productivity for ten years is 2.1080 (M.T) which is second lowest among all the other blocks. However when one look towards CAGR of Basantpur block it was found that apple production (M.T) and per hectare production (M.T) is showing negative results with -1.43 and -3.20 percent annual growth rate which is low but looks fine as compare to other blocks whose production is going down by -7.93,-7.39,-5.50 percent. Whereas when one look it statically it was revealed from the Graph 1.2 that land and production are positively related with each other and the line is suggesting resource efficiency with elasticity coefficient of 2.09 which specifies that with 1.00 percent increase in land output is increasing by 2.09 percent which looks fair compared to other blocks and is fifth best among all the other blocks whose coefficient values are negative and showing resource inefficiency.

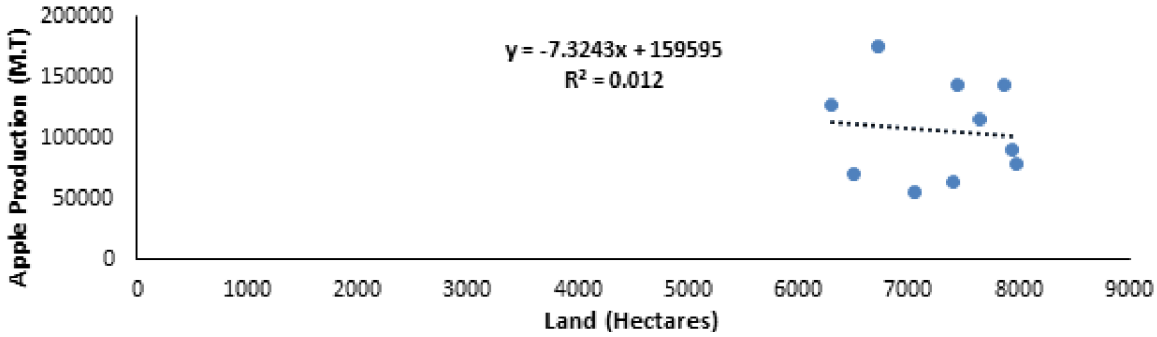
Productivity and resource efficiency of Jubbal & Kotkhai Block

From the Table 1.3 one can understand the apple productivity of the block and it can be observed from the Table that the average production of given block is 106237.951 (M.T) and average per hectare apple productivity is 14.7297 (M.T) which is highest among all the blocks, but when one look towards the CAGR of block it is revealing the negative results with -7.69,-5.24 percent growth rate for annual per hectare production (M.T) and apple production (M.T) whereas land area is increasing by 2.65 percent hence, revealing the decreasing performance.As far as resource efficiency is concern with coefficient value of -7.32 which has been statically examined in the Graph 1.3 therefore revealing negative picture hence specifies that marginal production of land of given block which is going down by -7.32 (M.T) with every increase in 1-hectare land which is third lowest compare to other blocks and raise a very big question on resource efficiency.

Productivity and resource efficiency of Chiragon Block

One can see in the Table 1.4 apple productivity of the Chirgaon block and it can be observed that the average apple productivity for 10 years in the given block was 32861.44 (M.T) with average per hectare productivity of 8.1973 (M.T). As far as CAGR is concern block is showing negative results with -1.07, -4.09 percent growth rate for apple production (M.T) and per hectare production (M.T), however area under production is increasing by 3.15

percent. When one compare block with others, it has been found that in average, per hectare production block is fourth and fifth best whereas in CAGR Block it is at third position for apple production (M.T) and area under production (Hectares) among all the other blocks. When one look towards the land and output relation of the Chiragon block, it has been revealed from the Graph 1.4 that they are positively related with coefficient value of 10.32 which



Graph 1.3: Block Jubbal & Kotkhai Input-Output Relation.

Table 1.3: Block Jubbal & Kotkhai Input-Output Status.

Year	Block Jubbal & Kotkhai Apple Production (MT)	Block Jubbal & Kotkhai Apple Production Area (Hectares)	Block Jubbal & Kotkhai Apple Per Hectare Productivity (M.T)
2008-2009	127365	6300.77	20.2142
2009-2010	70536	6506.4	10.8410
2010-2011	176000	6720.78	26.1874
2011-2012	55000	7049.81	7.8016
2012-2013	62826	7408.56	8.4802
2013-2014	143334	7440.85	19.2631
2014-2015	114904	7642.23	15.0354
2015-2016	143400	7867.00	18.2280
2016-2017	90564	7937.00	11.4104
2017-2018	78450	7976.11	9.8356
Average	**106237.951**	**7284.951**	**14.7297**
CAGR	**-5.24 %**	**2.65 %**	**-7.69 %**

MT=Metric Tonnes.

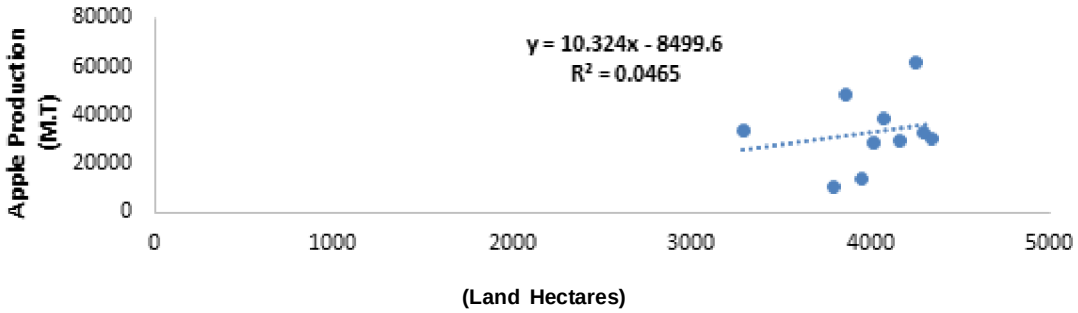
CAGR=Compound Annual Growth Rate.

Table 1.4: Block Chiragon Input-Output Status.

Year	Block Chiragon Apple Production (MT)	Block Chiragon Apple Production Area (Hectares)	Block Chiragon Apple Per Hectare Productivity (M.T)
2008-2009	33280	3288.34	10.1206
2009-2010	10319	3794.95	2.7191
2010-2011	48750	3859.14	12.6323
2011-2012	14000	3956.07	3.5389
2012-2013	29120	4023.27	7.2379
2013-2014	38955	4074.87	9.5598
2014-2015	29929	4169.29	7.1784
2015-2016	61559	4254.00	14.4710
2016-2017	32502	4295.00	7.5674
2017-2018	30200	4346.65	6.9479
Average	**32861.44**	**4006.158**	**8.1973**
CAGR	**-1.07 %**	**3.15 %**	**-4.09 %**

MT=Metric Tonnes.

CAGR=Compound Annual Growth Rate.



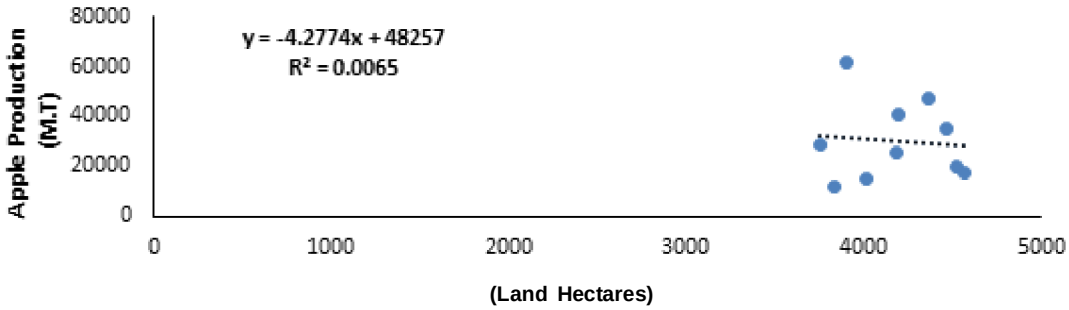
Graph 1.4: Block Chiragon Input-Output Relation.

Table 1.5: Block Theog Input-Output Status.

Year	Block Theog Apple Production (MT)	Block Theog Apple Production Area (Hectares)	Block Theog Apple Per Hectare Productivity (M.T)
2008-2009	28942	3753.51	7.7106
2009-2010	12035	3837.54	3.1361
2010-2011	61400	3898.50	15.7496
2011-2012	15000	4011.42	3.7393
2012-2013	25844	4180.78	6.1816
2013-2014	40953	4196.86	9.7579
2014-2015	47177	4359.99	10.8204
2015-2016	35000	4468.00	7.8335
2016-2017	20002	4528.00	4.4174
2017-2018	17400	4571.51	3.8062
Average	30375.26	4180.611	7.3153
CAGR	-5.50 %	2.21 %	-7.54 %

MT=Metric Tonnes.

CAGR=Compound Annual Growth Rate.



Graph 1.5: Block Theog Input-Output Relation.

specifies the positive impact of land on apple production therefore production increase by 10.32 percent with every 1.00 percent increase in land and is third highest among all the blocks.

Productivity and resource efficiency of Theog Block

When one look towards the block Theog of district Shimla for apple productivity it can be observed from the Table 1.5 that average production of the block is 30375.26 (M.T) for given time period with average area under production of 4180.611 (Hectares) and average per hectare productivity of 7.3153 (M.T). Whereas when one look towards the CAGR of Apple production (M.T) and per hectare production (M.T) it is showing negative growth of -5.50 and -7.54 percent. As far as land efficiency is concern from Graph 1.5 it can be revealed that block Theog is showing a decreasing trends with co-efficient value of -4.22 which specifies the marginal productivity of land hence explains that by increasing 1 hectare of land output is going down by -4.27 (M.T) therefore revealing picture of resource inefficiency. When one compares the block with all the other blocks it looks fair from Average and Per hectare production point of view but when it comes to CAGR and elasticity coefficient it shows

negative results with weak production and resource efficiency and is the four least performing blocks.

Productivity and resource efficiency of Nankhari Block

Table 1.6 is revealing the Apple productivity of block Nankhari and it has been found that the average production of apple in the block is 19905.628 (M.T) with the average area under crop production of 1959.71 (Hectares) which is third lowest among all the blocks. As far as average per hectare productivity is concern it is 10.13 (M.T) which is third highest among all the other blocks. However, CAGR is concern it reveals that block is second best among all the other blocks with -0.42 and 3.83 percent growth rate in apple production and area under production. As far as input and output relation of Nankhari block in concern Graph 1.6 is showing positive relation with coefficient value of 10.67 which specifies that with every increase in input land (Hectares) output increase by 10.67 (M.T) hence concludes the efficiency of resource which is second highest among all the other blocks.

Productivity and resource efficiency of Rohru Block

Apple productivity trend of Rohru can be seen from the Table 1.7 and it reveals that the average apple productivity of the block for last ten years is 60533.68 (M.T) and the average per hectare productivity for the given years is 10.88 (M.T) which is second largest among all the blocks. As far as average area under fruit productivity is concern it is 5546.683 (Hect). However, when one look towards CAGR it was found that Rohru is the only block with positive 0.25 percent growth rate and highest in Annual per hectare productivity with -1.55 percent growth among all the other blocks. One can also understand from the Graph 1.7 about land and output relation of concern block and found that relation is positive with coefficient value of 19.12 which is highest among all the blocks and tells the resource efficiency of the study area.

Productivity and resource efficiency of Chopal Block

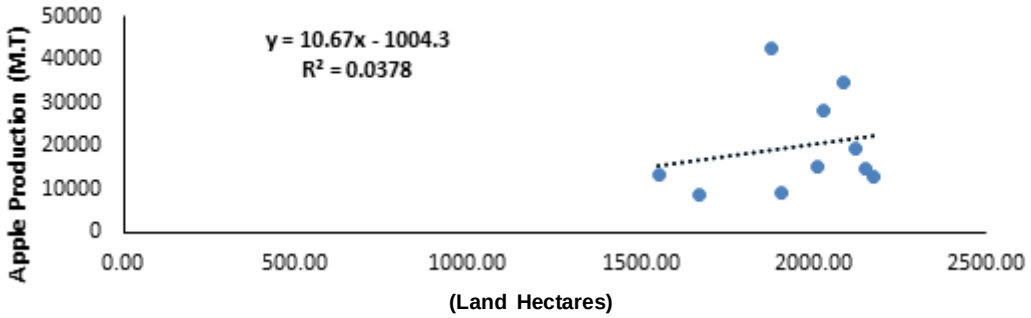
Apple production analysis of Chopal block can be seen in the Table 1.8 and it can be revealed from the Table that average productivity of apple for last 10 years is 27688.977 (M.T) with Average area under crop production is 3538.06 (Hectares). However average per hectare productivity of the Chopal block is 7.944 (M.T) with highest of 17.4528 (M.T) per hectare and lowest of 3.3985 (M.T).As far as CAGR is concern with -7.39 and -9.78 percent block is showing negative growth rate for apple production (M.T) and per hectare productivity (M.T). However, from the Graph 1.8 one can understand the negative relation between land and production with the coefficient value of - 9.927 which shows that with every 1.00 percent increase in input (Land) output is decreasing by 9.9 percent which specifies decreasing

Table 1.6: Block Nankhari Input-Output Status.

Year	Block Nankhari Apple Production (MT)	Block Nankhari Apple Production Area (Hectares)	Block Nankhari Apple Per Hectare Productivity (M.T)
2008-2009	13500	1552.46	8.6959
2009-2010	8596	1671.89	5.1415
2010-2011	42400	1876.19	22.5990
2011-2012	9100	1909.97	4.7645
2012-2013	15015	2014.48	7.4535
2013-2014	28267	2031.17	13.9167
2014-2015	34944	2087.25	16.7416
2015-2016	19500	2124.00	9.1808
2016-2017	14734	2152.00	6.8467
2017-2018	13000	2177.68	5.9697
Average	19905.628	1959.71	10.1310
CAGR	-0.42 %	3.83 %	-4.09 %

MT=Metric Tonnes.

CAGR=Compound Annual Growth Rate.

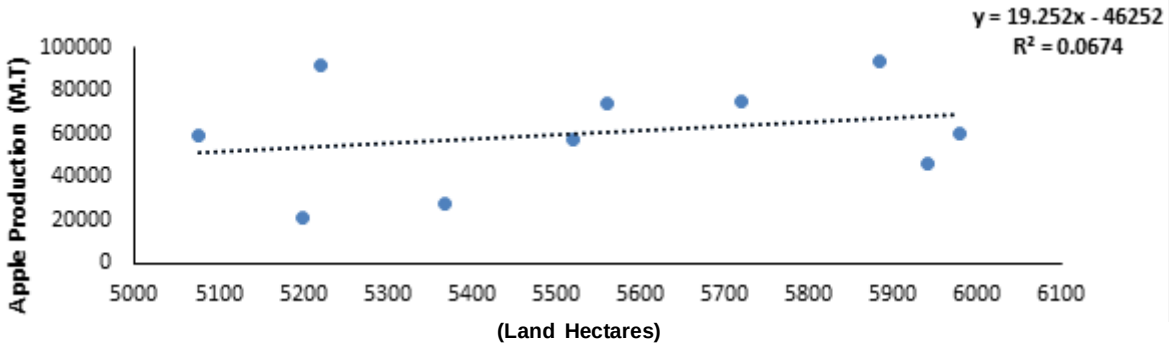


Graph 1.6: Block Nankhari Input-Output Status.

returns hence resource inefficiency. When comparing chopal block with the others it has been found that blocks resource efficiency is not good as its compound annual growth rate and elasticity coefficient is negative and is second least performing block.

Productivity and resource efficiency of Narkanda Block

Table 1.9 reveals the Apple productivity of Narkanda block from which one can understand that the average apple productivity for given 10 years is 36408 (M.T) with the maximum of 67850 (M. T) and minimum of 15456 (M. T)



Graph 1.7: Block Rohru Input-Output Relation.

Table 1.7: Block Rohru Input-Output Status.

Year	Block Rohru Apple Production (MT)	Block Rohru Apple Production Area (Hectares)	Block Rohru Apple Per Hectare Productivity (M.T)
2008-2009	58970	5076.56	11.6161
2009-2010	20633	5198.75	3.9688
2010-2011	91500	5221.73	17.5229
2011-2012	28000	5367.35	5.2167
2012-2013	57002	5520.18	10.3262
2013-2014	73914	5560.94	13.2917
2014-2015	75271	5719.64	13.1601
2015-2016	93466	5883.00	15.8875
2016-2017	46255	5941.00	7.7857
2017-2018	60325	5977.68	10.0917
Average	60533.685	5546.683	10.88
CAGR	0.25 %	1.83 %	-1.55 %

MT=Metric Tonnes.

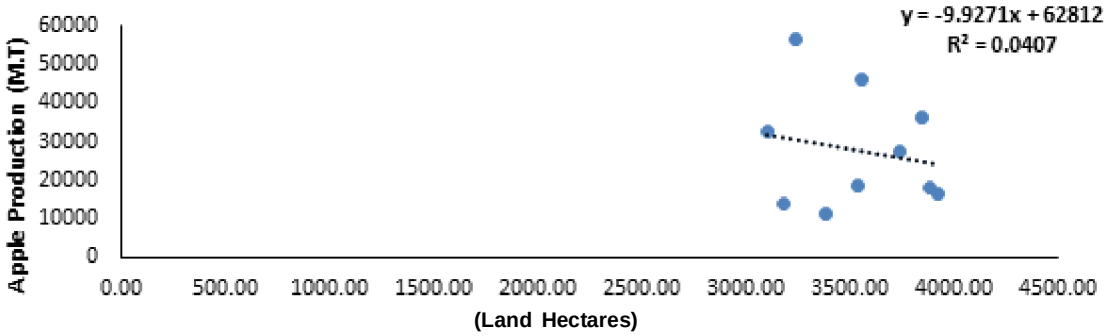
CAGR=Compound Annual Growth Rate.

Table 1.8: Block Chopal Input-Output Status.

Year	Block Chopal Apple Production (MT)	Block Chopal Apple Production Area (Hectares)	Block Chopal Apple Production Per Hectares (M.T)
2008-2009	32500	3102.00	10.4771
2009-2010	14099	3180.52	4.4329
2010-2011	56500	3237.30	17.4528
2011-2012	11500	3383.91	3.3984
2012-2013	18520	3536.27	5.2372
2013-2014	45997	3558.91	12.9244
2014-2015	27319	3737.33	7.3098
2015-2016	36000	3840.00	9.3750
2016-2017	18175	3879.00	4.6855
2017-2018	16280	3925.34	4.1474
Average	27688.977	3538.06	7.944
CAGR	-7.39 %	2.65 %	-9.78 %

MT=Metric Tonnes.

CAGR=Compound Annual Growth Rate.



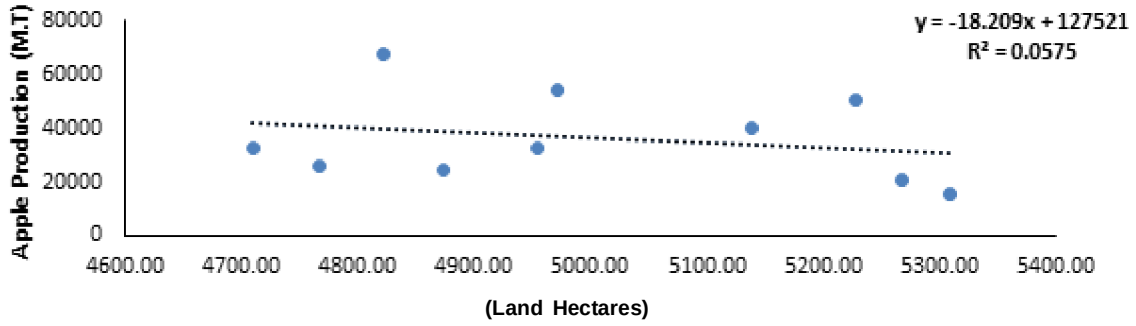
Graph 1.8: Block Chopal Input-Output Relation.

Table 1.9: Block Narkanda Input-Output Status.

Year	Block Narkanda Apple Production (MT)	Block Narkanda Apple Production Area (Hectares)	Block Narkanda Apple Per Hectare Productivity (M.T)
2008-2009	32500	4710.09	6.9001
2009-2010	25792	4766.39	5.4112
2010-2011	67850	4821.58	14.0722
2011-2012	24500	4874.27	5.0264
2012-2013	32760	4954.04	6.6128
2013-2014	53938	4971.39	10.8496
2014-2015	40204	5138.04	7.8248
2015-2016	50116	5228.00	9.5861
2016-2017	20960	5267.00	3.9795
2017-2018	15456	5307.91	2.9119
Average	36408	5003.87	7.317
CAGR	-7.93 %	1.34 %	-9.14 %

MT=Metric Tonnes.

CAGR=Compound Annual Growth Rate.



Graph 1.9: Block Narkanda Input-Output Relation.

however average per hectare productivity of Block is 7. 317 (M.T). When one look towards blocks performance as compare to others it was discovered that on the given parameters (average and per hect. productivity) it looks normal with third and seventh position but when one looks towards the CAGR it reveals that with -7.34 growth rate of apple production (M.T) block is last and with -9.14 per hect. production (M.T) growth rate block is second last among all the other the blocks. As far as resource efficiency is concern one can observe land inefficiency from the Graph 1.9 where output is decreasing by -18.20 percent with every increase of land by 1.00 percent which is lowest among all the blocks.

Productivity and resource efficiency of Rampur Block

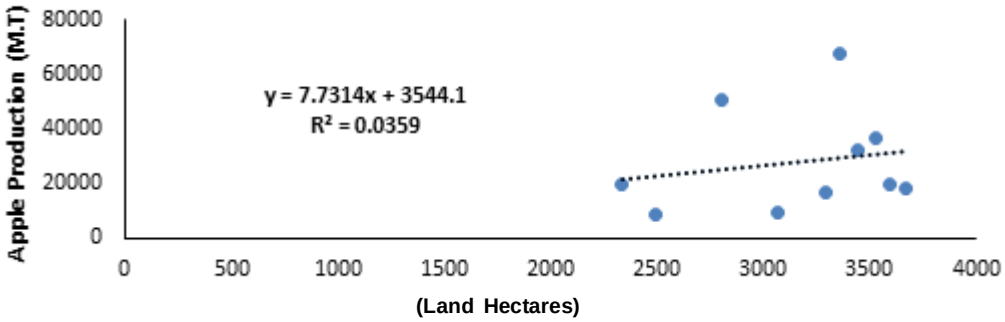
Table 1.10 is showing the apple productivity of Rampur block and can be seen from the Table that the average productivity of apple is 27964.1(M.T) for given 10 years with minimum of 8598 (M.T) and maximum of 67821 (M.T), however average per hectare apple productivity for 10 years is concern it is 8.8508 (M.T). As far as CAGR in apple production (M.T) and area under production is concern with -1.16 and 5.16 percent growth rate block is at fourth and first position among all the other blocks .When it comes to resource efficiency the Graph 1.10 reveals the input and output relationship of the block and with the elasticity

Table 1.10: Block Rampur Input-Output Status.

Year	Block Rampur Apple Production (MT)	Block Rampur Apple Production Area (Hectares)	Block Rampur Apple Per hectare Productivity (M.T)
2008-2009	20000	2335.04	8.5652
2009-2010	8598	2495.65	3.4452
2010-2011	50750	2803.26	18.1039
2011-2012	9050	3067.80	2.9500
2012-2013	16835	3294.32	5.1103
2013-2014	67821	3361.67	20.1748
2014-2015	32375	3438.81	9.4146
2015-2016	36470	3525.00	10.3461
2016-2017	19736	3593.00	5.4929
2017-2018	18006	3671.04	4.9049
Average	27964.1	3158.559	8.8508
CAGR	-1.16 %	5.16 %	-6.01 %

MT=Metric Tonnes.

CAGR=Compound Annual Growth Rate.



Graph 1.10: Block Rampur Input-Output Relation.

coefficient of 7.73 it confirms increasing return with positive resource efficiency. Therefore, one can conclude that block performance is fine as it is showing good per hectare production with fair compound annual production compare to other blocks. It can also be observed that it is the only block where CAGR for area under production is highest and with elasticity coefficient of 7.73 it is the fourth best block in the marginal productivity of land among all the other blocks.

CONCLUSION

Being a principle factor of production land occupies important position in agriculture production. As evident from the study that every Block is showing compound growth in area under production of apple crop but the marginal productive of land is showing different results for different blocks. Some blocks which are highest in average and per hectare production is actually showing negative elasticity of land and raise very big question on resource efficiency and optimization. As farming is main source of income of an area and large inconsistency among the Blocks regarding its production specifies that output is not as per the potential and hence resources are not optimum utilized. One has to fill this gap with improving farm technology, farm knowledge, advance farming methodology. Also, it is important for the government to identify these gaps and tries to filled with proper government polices/programs (Subsidies, Benefits, Agri Infrastructure, Lab Facilities).

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