Change in area, production and cropping intensity as an impact of community tanks under National Horticulture Mission

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ABSTRACT

As there is wider s cope and greater opportunity for horticultural crop production, processing and export for more gain to growers in order to raise their income and socio-economic status National Horticulture Mission is making continuous efforts from 2005-06. Rainfed farming dependence of rain was the main cause of growers vicious cycle of low income, poverty, frustration and farmers suicide. For overcoming this and to raise productivity and income availability of water to grow crops is must. Thinking this National Horticulture Mission emphasized on construction of community tank. The water stored in community tank will be useful for irrigating crop at critical stages and scarcity period. It was felt necessary to evaluate out coming and shortcomings of community tanks. The variation in absolute change in area expansion to the extent of 29.53 per cent. Mean absolute change in area expansion was 1.24 hectare. Absolute change in area expansion is significant. Family size, family annual income, scientific orientation, extension contact and knowledge contributed positively in increasing the area. Absolute change in cropping intensity from 10.01 per cent to 20.00 per cent was exhibited by 40.00 per cent of the beneficiaries. The variation in absolute change in cropping intensity was to the extent of 42.76. Social participation, occupation, socio-economic status, information sources, area under horticultural crops and adoption contributed significantly towards the variation in absolute change in cropping intensity. Mean absolute change in production was found to be 106.29 qtls. Age, experience of horticulture, family land holding, family annual income and attitude towards community tank, soil type and knowledge were the prominently influencing variables in absolute change in production. The variation in absolute change in production and productivity was found to be 42.49 per cent and 31.43 per cent respectively. Mean per cent change in productivity for horticultural crops was 29.45 per cent. Age, experience in horticulture, family size, family land holding, family annual income, soil type, knowledge and adoption contributed significantly on productivity. Community tank contributed in solving water demand for crop growth. There was increase in yield per unit area.

Key words : Community tank, Cropping Intensity, Socio-economic status, Impact, National Horticulture Mission

INTRODUCTION

There is wider scope to export fruits, vegetables and spices. There is also scope for development of agriculture. The rainfed areas in the country contribute about 63 per cent The rainwater management is the only viable solution for providing water for irrigation as well as domestic water supply. The challenges before the Indian agriculture is to transform rainfed farming into more sustainable and productive farming system through conservation and management of rainwater in rainfed areas. By constructing tanks water could be made available for agriculture and for making judicious use of water. In order to increase productivity and for overall socio-economic development of rural masses in changing climatic conditions and for protective irrigation in crisis. Community tanks are highly beneficial (Satpute *et al.* 2010).

Government has taken initiative in increasing scope for horticulture crop, medicinal crop, cultivation of floriculture. There is increasing opportunity for horticultural crop production, processing and export to gain more income. For bringing this revolutionary change National Horticulture Mission is being executed in Maharashtra State since 2005-06.

Construction of community tank for stage of water by two or more beneficiaries with Governmental aid for utilization of water to irrigate crops and utilization of community tank for fishery as subsidiary occupation for increasing income of the grower is the innovative concept of community tank.

Six suicide prone districts of Vidarbha region viz. Akola, Washim, Buldhana, Amravati, Yeotmal and Wardha are included in this mission. National Horticulture Mission emphasis on community tank construction for water conservation and its judicious use for crop cultivation. The present study is proposed with the objective in mind as

Objectives

1) To study the impact of community tanks on area expansion,
2) To study the change in cropping intensity.
3) To know the change in production and productivity of different crops.

The hypothesis formulated for the study were

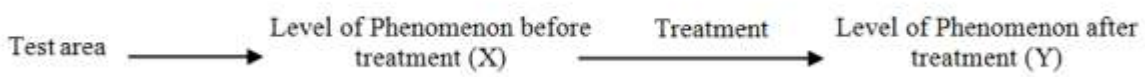
1) There is growth in Horticultural crops due to adoption of community tanks.
2) There is change in cropping intensity after adoption of community tank.
3) There is change in production and productivity.

METHODOLOGY

The research study area confined to six suicide prone districts of Vidarbha region of Maharashtra State namely, Akola, Buldana, Washim, Yeotmal, Amravati and Wardha covered under special Prime Minister Package for horticulture and overall development.

Census method was used for the study. All the community tank beneficiaries farmers interviewed from six districts formed 135 samples for the study.

Experimental design of social research was used which consists of before and after data for this the status before and after the use of community tanks was measured as shown in following model.



Treatment effect = Y - X

The change was calculated over base year with the help of following formula.

i) Absolute change in i^{th} variable = Status of i^{th} variable (study year) - Status of i^{th} variable (base year)

In order to workout attitude of the farmers towards community tank and attitude scale was constructed and standardized for computing change in area, production, productivity and cropping intensity. The absolute change over base year was worked out. Simple tabular analysis and Z test were used for analysis and interpretation of data.

I) Change in area expansion

It was operationalized as an increase in area under cultivation of horticultural crops. It was assumed that there will be an increase in horticultural cropped area thereby increase in production. Yield and income brings rise in socio-economic status of the beneficiaries hence it was studied. Absolute area expansion ($?E_1$) was worked out by using formula -

$$?E_1 = A_1S - A_1b$$

Where,

$?E_1$ = Absolute expansion in area under horticultural crops

A_1S = Area under horticultural crops in hectares (study year)

A_1b = Area under horticultural crops in hectares (base year)

ii) Change in cropping intensity

Cropping intensity means number of crops grown per annum in a given area of land. Cropping intensity is the ratio of Net area sown in different seasons to total land holding expressed in terms of percentage.

Absolute change in cropping intensity was worked out by using formula

$?C_1 = C_1C - C_1b$

Where,

$?C_1$ = Absolute change in cropping intensity

C_1C = Cropping intensity at present (study year)

$C1_b$ = Cropping intensity at base year

The beneficiaries were categorized into four categories on the basis of absolute change in cropping intensity.

iii) Change in production

Production refers to the total potential in terms of biological and economic crops. The change in production was measured with the help of formula.

$?P_n = P_na - P_nb$

Where,

$?P_n$ = Absolute change in production

P_na = Production after construction of community tank (study year)

P_nb = Production before construction of community tank (base year)

iv) Change in productivity

Productivity refers to the economic yield or production of plant products of economic importance expressed in standard units per area. Productivity is calculated in terms of crop yield index.

Change in productivity means increase or decrease in productivity level of the crop and it is measured in quintals per hectares. Absolute change in productivity was computed by using formula.

$$\Delta P_y = \frac{P_ya - P_yb}{P_yb} \times 100$$

Where,

$?P_y$ = Per cent change in productivity

P_ya = Productivity after construction of community tank (study year)

P_yb = Productivity before construction of community tank (base year)

Categorization of the beneficiaries on the basis were done according to change in productivity.

RESULTS AND DISCUSSION

i) Change in area expansion

It was assumed that there will be an increase in area after construction of community tank. Hence, to find out impact on area expansion absolute change in area was worked out and presented in Table 1.

Table 1
Distribution of the respondents according to absolute change in area expansion

Sl. No.	Absolute change in area expansion (ha)	Respondents	
		Frequency	%
1	No change	39	28.90
2	Upto 1.00 ha	47	34.81
3	1.01 to 2.00 ha	18	13.33
4	2.01 to 4.00 ha	17	12.59
5	4.01 ha and above	14	10.37
	Total	135	100.00

X = 1.2383 ha Z = 1.50 S.D. = 0.8267*

From Table 1, it is observed that absolute change in area expansion upto 1.00 ha appeared in nearly one third (34.81%) cases. There was no change in area expansion in 28.90 per cent cases. Absolute change in area expansion 1.01 to 2.00 ha and 2.01 to 4.00 ha found to be 13.33 per cent and 12.59 per cent beneficiaries, respectively. One tenth (10.37%) of the beneficiaries exhibited absolute change in area expansion to the extent of 4.01 hectares and above.

Mean area under horticultural crop before construction of community tank was 2.89 ha and after construction of community tank it was 4.13 hectare as indicated in Table 1. Mean absolute change in area expansion was 1.24 hectare. Similar were the findings of Hazra (2008) and Naik (2009).

By means of construction of community tank the provision for additional storage of water was made available with the beneficiaries. This additional water storage in additional to conventional sources i.e. well, tubewell, canal, etc. encourages plantation of new orchard viz. fruit crops and vegetables resulting in area expansion under horticultural crops.

The hypothesis formulated that there is growth in horticultural crops after adoption of community tank is proved and accepted. By pairing the observations before and after the difference is tested for it's significance by 'Z' test. Absolute change in area expansion is significant as calculated 'Z' value was 1.50.

ii) Change in cropping intensity

Is the ratio of cultivated area net area sown to total cropped area expressed in terms of percentage.

Table 2
Distribution of the beneficiaries according to absolute change in cropping intensity

Sl. No.	Absolute change in cropping intensity	Beneficiaries	
		Frequency	%
1	Upto 10.00 per cent	45	33.34
2	10.01 to 20.00 per cent	54	40.00
3	20.01 to 30.00 per cent	18	13.33
4	30.01 per cent and above	18	13.33
	Total	135	100.00

$\overline{X}$ = 17.9427 per cent Z = 2.45** S.D. = 7.3093

From Table 2, it is observed that absolute change in cropping intensity from 10.01 per cent to 20.00 per cent was exhibited by 40.00 per cent of the beneficiaries. Followed by 33.34 per cent beneficiaries absolute change in cropping intensity upto 10.00 per cent. Equal per cent of i.e. 13.33 per cent beneficiaries revealed absolute change in cropping intensity to the extent of 20.01 to 30.00 per cent and 30.01 per cent and above respectively. Mean of cropping intensity before construction of community tank at base year 2006-07 was 138.87 per cent and after construction of community tank at study year 2009-10 it was 156.81 per cent. Mean absolute change in cropping intensity was found to be 17.94 per cent. More or less similar were the findings of Rathod (2001) and Mapari (2005). The results were not in agreement with the findings of previous researchers Thakare (2004).

The calculated 'Z' value 2.45 indicates significant absolute change in cropping intensity. The hypothesis formulated that there is change in cropping intensity after adoption of community tank is also proved and accepted.

iii) Change in production

Production refers to the total potential in terms of biological and economic crops it means increase or decrease in production presented in Table 3.

Table 3
Distribution of the beneficiaries according to absolute change in production

Sl. No.	Absolute change in production (qtl)	Beneficiaries	
		Frequency	%
1	No change	37	27.41
2	Upto 50.00 qtl.	35	25.92
3	50.01 to 100.00 qtl.	22	16.30
4	100.01 qtl. and above	41	30.37
	Total	135	100.00

$\overline{X}$ = 106.29 qtl Z = 1.53* S.D. = 69.23

From Table 3, it is noticed that the absolute change in production 100.01 qtl. and above occurred in case of 30.37 per cent beneficiaries. The beneficiaries whose production increased upto 50.00 qtl. and 50.01 to 100.00 qtl. were 25.92 per cent and 16.30 per cent, respectively. However, there was no change in production in 27.41 per cent cases. This was due to climate factor as very low rainfall. In some part of study area particularly in Buldhana district there was very low rainfall in study year. Hence, the rise in the area under horticultural crop was in remaining five districts.

Mean absolute change in production was found to be 106.29 qtl. The 'Z' value 1.53 indicates significant absolute change in production.

The above findings were not in agreement with the findings of previous researcher Thakare (2004).

After adoption of community tank farmers grow vegetable crops on large scale. The area under vegetable crops before construction of community tank was 17.40 hectares that was 65.18 hectares after construction of community tank. Also the area under fruit crops which was 337.75 hectares rises upto 428.98 hectares. Due to this there was tremendous increase in production.

iv) Change in productivity

Change in productivity was measured in terms of quintal per hectare. Per cent change in productivity over base year was worked out.

Table 4
Distribution of the beneficiaries according to per cent change in productivity

Sl. No.	Percent change in productivity	Beneficiaries	
		Frequency	%
1	No change	37	27.41
2	Upto 50.00 per cent	42	31.11
3	50.01 per cent to 100.00 per cent	09	6.67
4	100.01 per cent and above	47	34.81
	Total	135	100.00

$\overline{X}$ = 29.45 per cent Z = 2.52** S.D. = 11.69

From Table 4, it could be observed that absolute change in productivity upto 50.00 per cent appeared in 31.11 per cent cases. Followed by no change in absolute productivity in 27.41 per cent beneficiaries. 6.67 per cent beneficiaries exhibited absolute change in productivity to the extent of 50.01 to 100.00 per cent and 34.81 per cent beneficiaries have 100.01 per cent and above per cent change in productivity. The mean of horticultural crop productivity before construction of community tank was 59.28 per cent and after construction of community tank it was 88.73 per cent. Mean per cent change in productivity was found to be 29.45 per cent. The 'Z' value 2.52 indicates significant absolute change in productivity. More or less similar results were reported earlier by Tilekar *et al.* (2000) and Naik (2009). The findings were not in accordance with the findings of Rathod (2001), Gawande (2003), Bhople *et al.* (2004), Thakare (2004), Mapari (2005).

After construction of community tank there was increase in area under fruit crops, vegetable crops. Community tanks made possible to irrigate these crops at proper time as per it's requirement. Availability of water, fertile soil, quality seed and better management techniques of crop cultivation might results in per cent change in productivity.

CONCLUSIONS

1) Absolute change in area expansion upto one hectare appeared in nearly one third (34.81%) cases. There was not change in area expansion in 28.90 per cent cases. Absolute change in area expansion 1.01 to 2.00 ha and 2.01 to 4.00 ha found to be 13.33 per cent and 12.59 per cent beneficiaries, respectively. One tenth (10.37%) of the beneficiaries exhibited absolute change in area expansion to the extent of 4.01 hectares and above. Mean absolute change in area expansion was 1.24 hectare. Absolute change in area expansion is significant as calculated 'Z' value was 1.50. In overall horticultural cropped area over base year 91.23 hectares absolute change in area expansion was observed. Vegetable crops had 47.78 hectares absolute change in area expansion. Total absolute change in area expansion was 139.01 hectares. Assured irrigation facility, Government policies, subsidies, opportunities of export, growing demand for fruits and vegetable and better prices were the reasons for absolute change in area under horticultural crops.

2) Regarding absolute change in cropping intensity from 10.01 per cent to 20.00 per cent was exhibited by 40.00 per cent of the beneficiaries. Followed by 33.34 per cent beneficiaries absolute change in cropping intensity upto 10.00 per cent. Equal per cent of i.e. 13.33 per cent beneficiaries revealed absolute change in cropping intensity to the extent of 20.01 to 30.00 per cent and 30.01 per cent and above, respectively. Mean absolute change in cropping intensity was found to be 17.94 per cent. The calculated 'Z' value 2.45 indicates significant absolute change in cropping intensity. Due to irrigation facilities already they utilize land maximally. Also irrigation potential limits horticultural area. Removal of old Orchard and land occupied for construction of community tank were the cause of not significant increase in cropping intensity.

3) The absolute change in production 100.01 qtl. and above occurred in case of 30.37 per cent beneficiaries. The beneficiaries whose production increased upto 50.00 qtl. and 50.01 to 100.00 qtl. were 25.92 per cent and 16.30 per cent, respectively. However, there was no change in production in 27.41 per cent cases. This was due to climate factor as very low rainfall. Mean absolute change in production was found to be 106.29 qtl. The 'Z' value 1.53 indicates significant absolute change in production. There was significant change in absolute production in case of fruit crops viz., orange, sweet orange, lemon, pomogranate, grapes, aonla and mango. Besides fruit crops change appeared in vegetable crops. Community tank provides additional water storage. Assured irrigation potential encourages growers to meet water requirement of crop time to time resulting better growth and higher yield resulting absolute change in production.

4) Data pertaining to per cent change in productivity reveals that percent change in productivity upto 50.00 per cent appeared in 31.11 per cent cases. Followed by no change in absolute productivity in 27.41 per cent beneficiaries. 6.67 per cent beneficiaries exhibited percent change in productivity to the extent of 50.01 to 100.00 per cent and 34.81 per cent beneficiaries have 100.01 per cent and above percent change in productivity. Absolute change in productivity in case of fruit crop was 27.17 qtl/ha and vegetable crops 32.23 qtl/ha. Mean per cent change in productivity for horticultural crops was 29.45 per cent. The 'Z' value 2.52 indicates significant absolute change in productivity. Water is causal agent of crop growth and yield as community tank contributed in solving water demand for crop growth. There was increase in yield per unit area.

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