



# **IMPACT OF IRRIGATION ON CROPPING PATTERN IN VALADI AND SEVALUR REVENUE VILLAGES OF TIRUCHIRAPPALLI DISTRICT**

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## **ABSTRACT**

*Irrigation is one of the main factors influencing the cropping pattern. And irrigation is a vital input at different stages of cultivation of crops. The sources of irrigation are tanks, bore wells, wells, canals, river and reservoirs. Apart from these sources the change in cropping pattern is mainly dependent on monsoon and amount of rainfall in various seasons. Rainfall is not fulfilling the demand of water. Canals are non-perennial in nature. The principal crops cultivated in both the Revenue villages namely Valadi and Sevalur are Paddy, Sugarcane, Banana, Urad, Sesame and Makkamaize, White maize, Red maize, Black maize, and Horse Gram (Kollu) respectively. The total number of beneficiaries are 60. The purpose of cultivation include, own consumption, fodder for breeding animals, commercial farming, and subsistence farming have also been analysed in the present study. Apart from this, the sources of selling access and reasons for changing cropping pattern on selected five crops have also been studied and analysed. The present study is mainly based on primary data, collected from Valadi and Sevalur revenue villages of Trichirappalli district.*

**Key words:** Irrigation, consumption, fodder, cultivation, access

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## 1. INTRODUCTION

Irrigation is one of the main factors influencing the cropping pattern. If water is adequate cropping pattern can be changed. Water is a critical input that largely determines the cropping pattern of a region or district or taluk or revenue villages. Bore wells and wells irrigation has lead to a marked change in the cropping pattern in the present study, villages of Trichirappalli district (Gopinath & Shibu, 2015a). It is true that the increase in irrigation facilities in the form of construction of tanks, tempted the farmers to cultivate two or more than two crops. It has been rightly pointed out that irrigation facilities indicate the basic factor to improve the income of the farmers by keeping to after their cropping pattern. Irrigation is human being's efforts to substitute for any deficiency in natural rainfall with the objective of a steady expansion in crop output. The impact of irrigation on cropping pattern depends upon the magnitude of irrigated and un-irrigated areas, income and also the overall crop yield per hectare with special reference of sample revenue villages (Gopinath & Shibu, 2015b). It is observed that the more variations found in the impact of irrigation on cropping pattern in the study area.

### 1.1. Agro – Climatic Zone – Cauvery Delta Zone

The Cauvery Delta Zone covers the districts such as Thanjavur, Nagapattinam, Thiruvarur and Trichirappalli. Apart from these some parts of Karur, Pudukkottai and Cuddalore districts have covered in Cauvery Delta Zone. The type of soil that have found in this zone is Red loamy and Alluvium. Based on soil characteristics, rainfall distribution, irrigation pattern, cropping pattern and other ecological and social characteristics, the agro-climatic zone has been classified as Cauvery Delta Zone of Tamilnadu, with four important districts (Gopinath & Kalpana, 2020). The Cauvery Delta Zone lies in the eastern part of Tamilnadu between 10°00' and 11°30" North latitude and 78°15' and 79°45' East longitude. It is a deltaic zone. Cauvery is the river traversing the delta. The terrain is an open plain sloping gently towards each and devoid of any hills or hillocks. The attitude ranges from 6 to 250 m above Mean Sea Level (MSL). The Cauvery delta zone has diverse climatic conditions as the zone includes coastal belt as well as in land area (Gopinath, 2016a). Cyclonic storms and high humidity occur in coastal belts. The coastal belt is favoured by high rainfall and when it proceeds to the interior, the rainfall intensity decreases. The mean maximum temperature searches 38.6°c in the month of May and the minimum of 21.0°c in December. April to August is the hot month and November to February are cool months.

## 2. OBJECTIVES OF THE STUDY

- To study the farm size and cropping pattern in both the study revenue villages namely Valadi and Sevalur.
- To find out the sources of irrigation facilities in both the study revenue villages namely Valadi and Sevalur.
- To analyse the reasons for changing cropping pattern in both the study revenue villages namely Valadi and Sevalur.
- To find out the purpose of cultivation in both the study revenue villages.
- To assess the rainfall in various season in the period 2018-2019.

## 3. METHODOLOGY

The present study is based on both primary and secondary data for a period of one year (i.e) 2018-2019. The primary data is collected with the help of interview schedule from the farmers in both the study revenue villages namely Valadi and Sevalur. The secondary data is obtained from various published sources such as season and crop report, Tamilnadu, Indian, and

Meteorological Department Chennai. Crop informations, Tamilnadu, Government data (India, Tamilnadu&Trichirappalli) and crop data, census report, Statistical Department Trichy and Agricultural Department, Trichy for a period of 2018-2019.

### 3.1. Sample Size

The total sample size is 60. Each village 30 farmers are identified and data is collected. The periods of data collection is for one calendar year (i.e.) 2018-2019.

### 3.2. Statistical Tool

The statistical tools such as simple averages, Rank correlation coefficient and Chi-square test have also been calculated.

### 3.3. Hypotheses

- There is a positive rank correlation between Valadi and Sevalur villages regarding the reasons for changing cropping pattern.
- There is a significant relationship between beneficiaries and non-beneficiaries and the sources of irrigation facilities.

### 3.4. Hypothesis Tested (Chi-Square Test)

The main focus of the present study is to find out the impact of irrigation on changing cropping pattern in both the study villages namely Valadi and Sevalur of Trichirappalli district.

The total number of farmers and regarding the source of irrigation is tested by using chi-square test where the total sample is 90. It is classified as sources of irrigation – Bore wells, wells and canals and farmers have classified as beneficiaries (60) and non-beneficiaries (30).

Result of Chi-square Test

$$\begin{aligned}\text{Chi-square } (X^2) &= \sum (O - E)^2 / E \\ &= 20.1\end{aligned}$$

$$V = (r-1) (c-1) = (2-1) (3-1) = 2 \text{ for}$$

$$V = 2, X^2 \text{ at } 5 \% \text{ level of significance } (X_{0.05}^2 = 5.99)$$

The calculated value of Chi-square is grater (20.1) than the table value of ( $X_{0.05}^2 = 5.99$ ) level of significance and so null hypothesis ( $H_o$ ) is rejected. Hence, it is concluded that there is association between sources of irrigation and farmers (both beneficiaries and non-beneficiaries) in both the study area (Gopinath, 2016b).

## 4. ANALYSIS OF DATA

The present study is an empirical one, data is collected from two revenue villages namely Valadi and Sevalur. The Table 1, explains the relationship between farm size and the varieties of crop cultivated in Valadi village (Gopinath, 2014). It is found that 30 per cent of the crops cultivated with the farm size of 1 to 2 hectare and the least is above 10 hectare of with 3.33 per cent. The farmers are cultivating the Paddy crop which is the staple food. But, in Table 2, it is found that, in Sevalur village being a dry area, the farmers are cultivating the crop named Makka Maize, Black Maize and Horse Gram (i.e.) 73.33 per cent with the farm size of below 1 hectare of land holding.

**Table 1** Farm size and cropping pattern (Valadi Revenue Village)

| S. No | Farm size (in Hectare) | Name of the crops |           |        |      |        | Total no. of farmers | % to total |
|-------|------------------------|-------------------|-----------|--------|------|--------|----------------------|------------|
|       |                        | Paddy             | Sugarcane | Banana | Urad | Sesame |                      |            |
| 1     | Below 1                | 4                 | 0         | 0      | 2    | 2      | 8                    | 26.67      |
| 2     | 1 - 2                  | 4                 | 0         | 1      | 2    | 2      | 9                    | 30.00      |
| 3     | 2 - 4                  | 3                 | 1         | 1      | 1    | 1      | 7                    | 23.33      |
| 4     | 4 - 10                 | 1                 | 2         | 2      | 0    | 0      | 5                    | 16.67      |
| 5     | Above 10               | 0                 | 1         | 0      | 0    | 0      | 1                    | 3.33       |
|       | TOTAL                  | 12                | 4         | 4      | 5    | 5      | 30                   | 100.00     |

Source: Compiled from primary data.

**Table 2** Farm size and cropping pattern (Sevalur Revenue Village)

| S. No | Farm size (in Hectare) | Name of the crops |             |           |             |            | Total no. of farmers | % to total |
|-------|------------------------|-------------------|-------------|-----------|-------------|------------|----------------------|------------|
|       |                        | Makka Maize       | White Maize | Red Maize | Black Maize | Horse Gram |                      |            |
| 1     | Below 1                | 3                 | 1           | 2         | 13          | 3          | 22                   | 73.33      |
| 2     | 1 - 2                  | 2                 | 2           | 1         | 1           | 2          | 8                    | 26.67      |
| 3     | 2 - 4                  | 0                 | 0           | 0         | 0           | 0          | 0                    | 0          |
| 4     | 4 - 10                 | 0                 | 0           | 0         | 0           | 0          | 0                    | 0          |
| 5     | Above 10               | 0                 | 0           | 0         | 0           | 0          | 0                    | 0          |
|       | TOTAL                  | 5                 | 3           | 3         | 14          | 5          | 30                   | 100.00     |

Source: Compiled from primary data.

**Table 3** Source of Irrigation (Valadi Revenue Village)

| S.No | Sources of Irrigation | No. of Beneficiaries | % to total |
|------|-----------------------|----------------------|------------|
| 1    | Borewells             | 8                    | 26.67      |
| 2    | Wells                 | 0                    | 0          |
| 3    | Canals                | 22                   | 73.33      |
| 4    | River/Tank            | 0                    | 0          |
| 5    | Reservoirs            | 0                    | 0          |
|      | TOTAL                 | 30                   | 100.00     |

Source: Compiled from primary data.

Table 3 and 4, explained the sources of irrigation in both the villages. In the Valadi village, farmers have mostly used canals as the maximum source of irrigation for cultivating Paddy, Sesame and Urad (i.e.) 73.33 for per cent and usage of Borewells is only 26.67 per cent. But in the case of Sevalur village, farmers are using Borewells (63.33 per cent) and 36.67 percent farmers are having wells. In this village farmers are cultivating Black Maize, Makka Maize and Horse Gram (Kollu), because these crops do not consume more quantity of water to cultivate these crops. And, in both the villages' farmers have mainly dependent on rain water and monsoon (Gopinath & Shibu, 2014).

**Table 4** Source of Irrigation (Sevalur Revenue Village)

| S.No | Sources of Irrigation | No. of Beneficiaries | % to total |
|------|-----------------------|----------------------|------------|
| 1    | Borewells             | 19                   | 63.33      |
| 2    | Wells                 | 11                   | 36.67      |
| 3    | Canals                | 0                    | 0          |
| 4    | River/Tank            | 0                    | 0          |
| 5    | Reservoirs            | 0                    | 0          |
|      | TOTAL                 | 30                   | 100.00     |

Source: Compiled from primary data.

**Table 5** Reasons for cropping pattern in both the Revenue village

| S.No | Reasons                                 | Total No. of Farmers |         | % to Total |         |
|------|-----------------------------------------|----------------------|---------|------------|---------|
|      |                                         | Valadi               | Sevalur | Valadi     | Sevalur |
| 1    | Decline in yield of cultivation         | 10                   | 2       | 33.33      | 6.67    |
| 2    | High cost of production                 | 2                    | 3       | 6.67       | 10.00   |
| 3    | Lack of Irrigation                      | 0                    | 17      | 0          | 56.66   |
| 4    | Scarcity of Labour                      | 7                    | 3       | 23.33      | 10.00   |
| 5    | Introduction of new varieties/crops     | 6                    | 2       | 20.00      | 6.67    |
| 6    | Lack of purchase of crops by the buyers | 5                    | 0       | 16.67      | 0       |
| 7    | Problem of Marketing                    | 0                    | 3       | 0          | 10.00   |
|      | TOTAL                                   | 30                   | 30      | 100.00     | 100.00  |

Source: Compiled from primary data.

Table 5, shows the reasons for changing cropping pattern in both the villages. From this, the farmer's order of preference (Rank) is found out and Rank Correlation Coefficient is calculated. There are seven reasons identified. The reasons are decline in yield of cultivation, high cost of production, lack of irrigation, scarcity of labour, introduction of new varieties, lack of purchase of crops by the buyers and problem of marketing (Gopinath, 2020a). But, it is found that in both the study villages (Valadi & Sevalur), the farmers expressed their view as lack of irrigation (56.66 per cent) and decline in yield of cultivation (33.33 per cent) made than to change the cropping pattern where the crops will consume low quantity of water especially in Sevalur village (Dry area). But, in Valadi village, the farmers are enjoying irrigation facilities either by using canals or borewells as a source of water for cultivation.

The reasons for changing cropping pattern is analysed by applying Spearman's Rank correlation on farmer's preferences. The calculated value of Rank correlation Coefficient is +0.83. There is positive correlation regarding the reasons for changing cropping pattern found in both the study villages, namely Valadi and Sevalur.

**Table 6** The purpose of cultivation in both the Revenue villages

| S.No | Purpose                       | Total No. of Farmers |         | % to Total |         |
|------|-------------------------------|----------------------|---------|------------|---------|
|      |                               | Valadi               | Sevalur | Valadi     | Sevalur |
| 1    | Own Consumption               | 5                    | 7       | 16.67      | 23.33   |
| 2    | Fodder for Breeding animals   | 4                    | 11      | 13.33      | 36.67   |
| 3    | Commercial farming            | 15                   | 10      | 50.00      | 33.33   |
| 4    | Subsistence farming (selling) | 6                    | 2       | 20.00      | 6.67    |
|      | TOTAL                         | 30                   | 30      | 100.00     | 100.00  |

Source: Compiled from primary data.

The purpose of cultivation in both the revenue villages have found in Table 6. In Valadi village, the main purpose on impact of irrigation on cropping pattern is mainly due to commercial farming (i.e.) 50 per cent, for own consumption 16.67 per cent, 13.33 per cent for fodder for breeding animals and only 2 per cent is left out for subsistence farming. But, in case of Sevalur village, 36.67 per cent is cultivated mainly utilized for fodder for breeding animals (Goat, Sheep, Bullocks and Cow) and 6.67 per cent is for subsistence farming (Selling). So, the purpose of cultivation in both the study areas showed the negative rank correlation coefficient (Gopinath, 2020b). The calculated value of Rank correlation coefficient is -0.4 in both the study areas. That means, the farmers purpose is not fulfilled because of lack of irrigation facilities in both the revenue villages namely Valadi and Sevalur.

**Table 7** The purpose of cultivation in both the Revenue villages

| S.No | Source              | Total No. of Farmers |         | % to Total |         |
|------|---------------------|----------------------|---------|------------|---------|
|      |                     | Valadi               | Sevalur | Valadi     | Sevalur |
| 1    | Middlemen           | 12                   | 18      | 40.00      | 60.00   |
| 2    | Cooperative Society | 8                    | 0       | 26.67      | 0       |
| 3    | Private Mandy       | 10                   | 12      | 33.33      | 40.00   |
|      | TOTAL               | 30                   | 30      | 100.00     | 100.00  |

Source: Compiled from primary data.

From the able 7, it is understood that the maximum source of selling access in both the revenue villages dominated by Middleman (i.e.) 40 per cent and 60 per cent respectively and followed by Private Mandy as 33.33 per cent 40 per cent respectively. And only in Valadi revenue village the farmers are selling their produce through cooperative society (i.e.) 26.67 per cent and it is not found in Sevalur village (Gopinath, 2020c).

**Table 8** Monthly Rainfall for Trichirappalli District year 2018-2019

| Period                           | Normal Rainfall | Actual Rainfall | % Deviation |
|----------------------------------|-----------------|-----------------|-------------|
| <u>South West Monsoon Period</u> |                 |                 |             |
| TOTAL                            | 293.9           | 143.2           | -51.28      |
| June – 2018                      | 31.5            | 9.4             | -70.2       |
| July – 2018                      | 53.2            | 70.7            | 32.9        |
| August – 2018                    | 73.8            | 5.8             | -92.1       |
| September – 2018                 | 135.4           | 57.3            | -57.7       |
| <u>North East Monsoon</u>        |                 |                 |             |
| TOTAL                            | 391.5           | 208.1           | -46.85      |
| October – 2018                   | 173.2           | 78.3            | -54.8       |
| November – 2018                  | 139.9           | 124.0           | -11.4       |
| December – 2018                  | 78.4            | 5.8             | -92.6       |
| <u>Winter – Period</u>           |                 |                 |             |
| TOTAL                            | 22.7            | 0.0             | -100.00     |
| January – 2019                   | 13.6            | 0.0             | -100.00     |
| February – 2019                  | 9.1             | 0.0             | -100.00     |
| <u>Hot – Weather Period</u>      |                 |                 |             |
| TOTAL                            | 109.9           | 31.8            | -71.00      |
| March – 2019                     | 11.8            | 0.0             | -100.00     |
| April – 2019                     | 38.4            | 9.4             | -75.5       |
| May                              | 59.7            | 22.4            | -71.06      |
| ANNUAL TOTAL                     | 818.0           | 383.1           | -53.17      |

Source: Indian Meteorological Department Chennai -6.

Table 8 showed the monthly rainfall data for the year 2018-2019 of Trichirappalli District. Trichirappalli district mainly depend upon mainly East monsoon. (i.e.) North-East monsoon from the month of October 2018 – December 2018 (i.e). total of 391.5 (millimetres) But, overall total amount of rainfall is 818.0 (millimetres) in the year 2018 – 2019. So, the farmers are very happy to cultivate two or more that two crops under rotation to increase the yield per crop and also they started to cultivate short-duration crops also.

## 5. SUGGESTIONS

- Change the cropping pattern from one to more than two crops which consumes less quantity of water.
- Need of improvement of fertility of the soil.
- Provide drip – irrigation system.
- Provide storage facility to store water during rainy seasons (October to December).
- Construct more number of water tanks for cultivation purposes.
- Clean the canals, ponds and wells to get adequate water and to get free flow of water, throughout the year.

## 6. CONCLUSION

From the present study it is understood that the impact of irrigation on cropping pattern depends upon so many factors such as Agro-climatic factors such as terrain, topography, slope, soils and socio-economic and political factors such as land ownership and use, size and type of land holding, labour and capital availability. And it is clear from the data that irrigation alone cannot increase agricultural output and bring about the desired shifts in the cropping pattern.

The reasons for changing cropping pattern have influenced the main factors as lack of irrigation and decline in yield of crop varieties. The purpose of cultivation have also been analysed. But, regarding the order of preference for the impact of irrigation on changing cropping pattern showed the positive rank correlation among farmers in both the revenue villages. Farmers have faced the problem of marketing because of the role played middleman in buying and selling of agricultural produce which is produced by them. So, it is concluded that there is an association between sources of irrigation and farmers which has the impact to change the cropping pattern in both the revenue villages namely Valadi and Sevalur of Trichirappalli district.

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