

Recent Research in Science and Technology 2010, 2(5): 01-07

ISSN: 2076-5061

www.recent-science.com

AGRICULTURE

CHANGES IN THE CROPPING PATTERN, CROP CONCENTRATION, AGRICULTURAL EFFICIENCY IN PAPANASAM TALUK, THANJAVUR DISTRICT, TAMIL NADU, INDIA

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Abstract

Cropping pattern simply means the proportion of area under different crops at a point of time, where us change in cropping pattern refers to the change in proportion of area under different crops at two different points of time. The cropping pattern of any area is generally controlled by physical, socio economic and technological factors. There are more than 20 crops with varying hectares are grown in this taluk. Of these 20 crops only 5 crops based on the properties of land to the total area under cultivation alone has been considered for analysis. Simple percentage obtained by dividing total area under crops, in to area of different crops. Paddy is the dominant crop in this taluk. During the year 1995-1996 to 2008-2009 the following are the major 5 major crops are taken in to cultivate in the study area. Such as Paddy 82.2%, Sugarcane 6.5%, Oilseeds 4.5%, Pulses 4.1% and Cotton 1.9% to the total cropped area in the taluk.

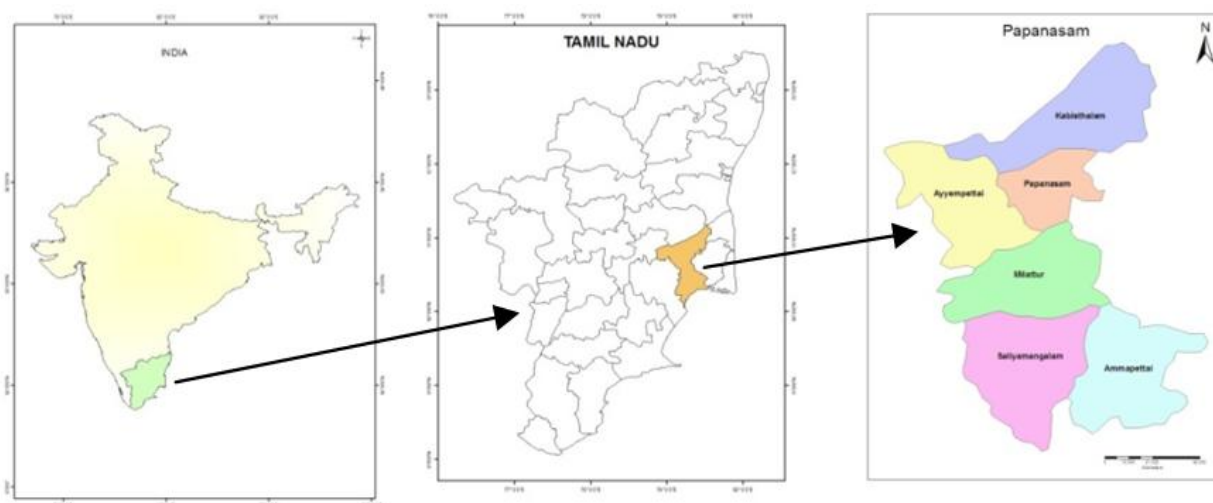
Keywords: Cropping pattern, Concentration, agricultural efficiency, Papanasam, Thanjavur

Introduction

Agriculture is by for the most important of the world economic activities. The term Agriculture is derived from the Latin word "AGRICULTURE" which literally means care of soil. The science of art of cultivating crop growing and harvesting of crops, domestication of animals and rising of livestock are known as agriculture. According to Zimmerman (1915) agriculture would mean the cultivation of the land [Saini (1965), Majid hussian (1970), Sharma (1972), Bal (1975), Varsha vaid and Datye (1976), Moranand Mouton (1981) Kurosaki (1999), Timmer and Szirmai (2000), Huffman and Evenson (2001), Kurosak and Fafchamps (2002), Misra and Govind Rao (2003),

Hayami (2003) Ainsworth and Leakey (2008)]. There are many previous investigations available. But agriculture includes animal husbandry tree culture, forestry, and many other varied activities. Agriculture is the primary activity in Papanasam taluk, 70% of people are engaged in agricultural activity. Papanasam has $\frac{3}{4}$ of agricultural land 50% of the total investment is invested in the development of agriculture. Since physical and climatic condition of the taluk is favourable for cultivation. The farmers of Papanasam cultivated food grains like paddy, Pulses, Groundnuts, Gingelly and others. Cash crops and vegetables are also cultivated in this taluk.

Figure 1. Location map of the study area



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Study area

Papanasam taluk is located in the western part of Thanjavur district of TamilNadu. It is bounded on the NorthEast by Kumbakonam taluk, East and SouthEast by Valangaiman taluk, South by Orathanadu taluk Southwest by Thanjavur taluk and West by Thiruvaiyaru taluk and the Northern part by Ariyalur taluk. Papanasam taluk extends from 10^o 45' to 11^o 0' North latitude and 79^o 15' to 79^o 16' East longitude. It occupies an area of about 129.82 sqkms. This taluk has been divided in to six revenue firkas namely Papanasam, Ayyempettai, Kabisthakam, Ammapettai, Salyamangalam and Miletur. There are 152 revenue villages are in this taluk. The study are map is given in the fig 1.

Aims and Objectives

1. To analyse the existing cropping pattern.
2. To analyze the changes of cropping pattern between the period 1995-96 to 2008-2009.
3. To analyze the pattern crop concentration for major five crops.
4. To find out the agricultural efficiency in the Papanasam taluk.
5. To find out the distribution of Acre yield 2008-2009.

Methodology

In this study area is mainly used for statistical techniques and arc map soft wares were used to analyze the changes of cropping pattern and agricultural efficiency. Index of concentration is used to analyze the distribution pattern of crops; Bhatia's method is used to find out the Agricultural Efficiency in the Papanasam taluk. The following crops are selected for the study Paddy, Oilseeds, Pulses, Sugarcane and Cotton. Totally the study area 4 toposheets. The location maps are prepared by S.O.I toposheets. The map scales are 1: 50000. Agriculture data's are available in statistical office, and agriculture office.

Existing cropping pattern (1995-1996)

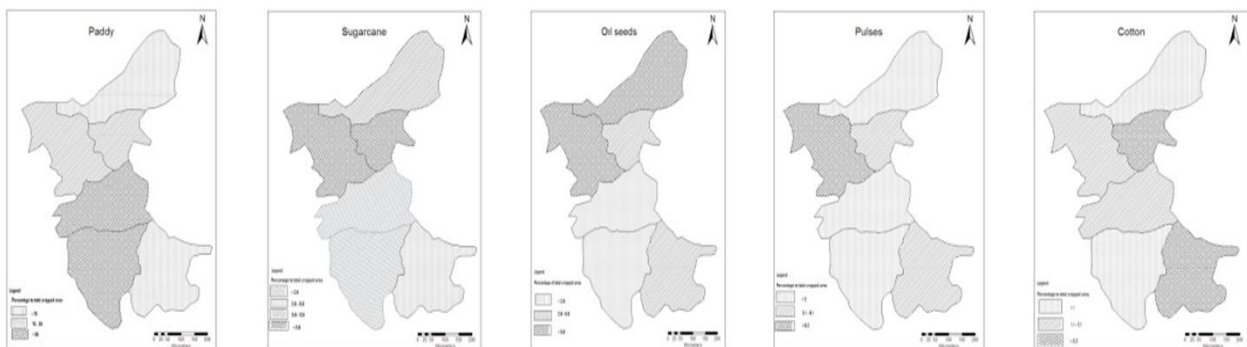


Figure 2: Existing cropping pattern 1995-1996.

Paddy

Paddy is the first ranking crop, during the year 1995-96 in the study area. Almost all the Firkas in this taluk have more than 50% of area under Paddy to the gross cropped area. The taluk with total cropped area of 82.2% under paddy. The firka of salyamangalam has got 94%, Miletur 90%, Ammapettai 83%, Kabisthalam 81% of area under Paddy. Papanasam have got 71% and Ayyempattai have got 53%. Mostly in this taluk paddy is the main crop. This area is mainly for plain area topography and suitable for climatical condition.

Sugarcane

Sugarcane is the second ranking crop, about 6.5% of the gross cultivated area in the taluk is under sugarcane Papanasam 15.6%, Kabisthalam 6.1%, Miletur 2.5% and Salyamangalam 1.1%, Ammapettai 3.5%. Now days in sugarcane crops are slowly decreased.

Oilseeds

Oilseeds rank as a third important crop in the taluk with 4.5% of the gross cultivated area in the gross cultivated area in the taluk under its cultivation. Ayyempattai has got 10.5 % and Kabisthalam 8.8%, Ammapettai 4.5% of the cropped area under oilseeds. Papanasam 4.3% and salyamangalam, Miletur has 2.3% of the cropped area under oilseeds.

Pulses

Pulses ranks as a fourth important crop in the taluk 4.1% of the gross cultivated area under pulses. The firka of Ayampettai 12.2% Ammapettai 5.3% of area under Pulses. Papanasam 5.1%, Kabisthalam 2.7% and Miletur have got 2.6%, Salyamangalam 1.3% respectively of the area.

Cotton

Cotton ranks as a fifth important crop in the taluk, which occupies 1.9% of the total cropped area. Papanasam have got 3.2% and Ammapettai 3.4% of Cotton. In 1995-1996 existing cropping pattern detailed in the figure 2.

Paddy is the first ranking crop in the taluk with 74.6% of the total cropped area. Almost all firkas in this taluk have more than 70% are under Paddy to the total cropped area. The Firkas of Salyamangalam has got 95% Miletur 94% Ammapettai 83% and Kabisthalam 84% of area under Paddy, Ayyempettai 75% Papanasam has 72%.

Pulses

Pulses are the second ranking crop in order of its area. It occupies an area of 12.83% of the total cropped area in this taluk. The Firkas of Ayyempettai has got 13% of the total cropped area under Pulses. Papanasam has an area of 11.8% and Ammapettai 5.8% of the total cropped area of the firka. Salyamangalam, Miletur and Kabisthalam have less than 3% of the total area of the firkas.

Oilseeds

Even though oil seeds third rank in order of the area which occupies 6.2% of the total cropped area. The firka of Ayyempettai has got 8.2% Papanasam

7.8% and Kabisthalam 7.3% of the total area of the firka. Ammapettai have got 4.3% Salayamangalam and Miletur has got less than 2% of the area.

Sugarcane

Sugarcane is the fourth ranking crop in order of its area. It occupies an area of 2.7% of the total cropped area in this taluk. The firkas of Papanasam has got 38.6% and Ayyempettai 20% of the total cropped area under Sugarcane. Ammapettai, Salayamangalam, Miletur and Kabisthalam have less than 5% of the total area of the firka.

Cotton

Cotton occupies fifth place with 0.7% of the total cropped area in the taluk. Papanasam firka has 3.8%, Ammapettai 2% of the total cropped are under cotton. In the firkas of Salayamangalam, Ayyempettai, Kabisthalam have less than 1% if the total cotton area in the firka. Miletur has got 1% of area under cotton. In 2008-2009 existing cropping pattern detailed in the figure 3.

Figure 3: Existing cropping pattern 2008-2009



Changes in the cropping pattern (1995-1996 to 2008-2009)

In 1995-96 Paddy, Pulses, Oilseeds, Sugarcane, Cotton are ranked as five important major crops in Papanasam taluk. In the same order of the crops have ranked for the year 2008-2009 also. But there is a

change in the area of paddy has been decreased. It is due to the lack of water facilities. The Cauvery water is the main source of irrigation for this delta region. For the past 10 years the incoming water to the Mettur reservoir is low. The details are given in the Table 1.

Table 1: Changes in the cropping pattern 1995-1996 to 2008-2009.

S.no	Name of the Firka	Paddy	Pulses	Oilseed s	Sugarcane	Cotton
1.	Papanasam	-37.9	+40.9	+11.3	+51.8	-26.4
2.	Ayyempettai	+70.8	+37.0	-4.0	+16.1	-41.1
3.	Kabisthalam	+25.8	+2.9	+2.8	-1.3	+15.3
4.	Ammapettai	+39.2	+52.0	+31.6	+51.7	-18.3
5.	Salyamangalam	+19.34	+41.7	-10.8	-39.7	-70.6
6.	Miletur	+47.3	+37.6	-47	-37.7	-6.3

By the establishment of Sugar mill the farmers in this taluk have changes their ideas. They have given importance to cultivate sugarcane than paddy. But pulses crops area has been increased. In the year 1995-96 the area under paddy accounts 82.2% to the total cropped area. But in the year 2008-2009 it has decreased to 74.6% to the total paddy area. The paddy area 1995-96 to 2008-2009 the areas are decrease. Pulses and Oilseeds areas are increased in the same period. This is mainly due to the lack of water facilities and also for the establishment of Thirumandagudi sugar mill in the year 1989.

The above analyses clearly bring out the shift in the cropping pattern as well as the area under each crop. The are under paddy has been decreased to the total cropped area (82.2% to 74.6%). Other crops like pilses (4.1 to 12.9%), Oilseeds (4.5 to 6.2%), Sugarcane, Sugarcane (6.5 to 2.7%) and cotton (1.9 to 0.7%).

Crop concentration (2008-2009)

The relationship between density of individual crops in the firka and the corresponding density for the taluk as a whole has been studied. The objectives of the study of crops concentration pattern is mainly to differentiate the areas of high and low density of the individual crops in the different parts of the taluk. Crop concentration was determined by the following formula. The details are given in the table 2 and 3.

$$\text{Index of concentration} = \frac{\text{Area of crop 'a' in the component areal unit}}{\text{Area of all crops in the component areal unit}} \div \frac{\text{Area of crop 'a' in the entire unit}}{\text{Area of all crops in the entire unit}}$$

Figure: 4 Crop concentrations 2008-2009.



Table.2: Levels of concentration

Crop Name	Index value	Levels of Concentration	Firka under zone
Paddy	>1.2 1.1 -1 < 0.9	A B C	Salyamangalam, Miletu. Ammapettai Ayyempettai, Kabisthalam, Papanasam
Pulses	> 0.08 0.04 – 0.07 < 0.03	A B C	Miletur, Papanasam, Ayyempettai Ammapettai Salyamangalam, Kabisthalam
Oilseeds	>1 0.06-0.09 <0.05	A B C	Papanasam, Ayyempettai Ammapettai, Kabisthalam. Salyamangalam, Miletur
Sugarcane	>0.09 0.06-0.08 <0.05	A B C	Papanasam, Ayyampettai. Salyamangalam, Kabisthalam. Ammapettai, Miletur
Cotton	>0.04 0.02-0.03	A B C	Salyamangalam, Papanasam Ammapettai Miletur, Ayyempettai, Kabisthalam

Table.3

Types of Zone	Concentration	Levels of Concentration
Zone A	High level	High concentration
Zone B	Medium Level	Medium concentration
Zone C	Low level	Low concentration

Paddy

I can analyse the concentration of Paddy with the help of three zones. High concentration is found in the Firkas of Salyamangalam, Milettur, Medium concentrations are found in the Firkas such as Ammapettai, Ayyempettai and Kabisthalam. The remaining firka Papanasam has the low concentration in Paddy cultivation.

Pulses

I can analyse the concentration of Pulses with the help of three zones. High concentrations are found in the Firkas like Milettur, Papanasam and Ayyempettai. Medium level concentration is found in the firkas such as Ammapettai. Low concentration is found in the firka of Salyamangalam and Milettur.

Oilseeds

I can analyse the concentration of oilseeds with the help of three zones. High concentration in the Firkas of Papanasam, Ayyempettai. Medium concentration is found in the firka such as Ammapettai and Kabisthalam. Low concentration is found in the firka of Salyamangalam and Milettur.

Sugarcane

High concentration is found in the Firkas of papanasam and Ayyempettai. Medium concentration is found in the Firkas such as Salyamangalam and Kabisthalam. The remaining firka Ammapettai, Milettur have low concentration under Sugarcane cultivation.

Cotton

Salyamangalam, Papanasam found to be the high concentration in cotton area. Ammapettai to be the medium level concentration. Low concentration is found in the firka of Milettur, Ayyempettai and Kabisthalam.

Agricultural efficiency (2008-2009)

Agricultural efficiency is a scientific device to study the inherent fertility, productivity and capability of land. There are numerous factors which influences the

agriculture efficiency of land including physical, Social, economic and techno, organizational. The combined effect of these factor manifest itself in per acre yields as well as volume of production in any given region. Bhatia's method (1963) has been used to find out the agricultural efficiency. The details are given in the figure 5 table 4.

$$I_{ya} = ya / yr \times 100$$

$$E_i = \frac{IYCa + IYCb + IYCd + IYCe}{Ca + Cb + Cc + Cd + Ce}$$

E_i - Is the agricultural efficiency

I_{ya}, I_{yb} - Yield index of various crops

C_a, C_b, C_c - Percentage of crop land under different crop

Y_a - Acre yield of crop in an enumeration

Y_r - Acre yield of crop in the entire region.

Figure: 5 Levels of agricultural efficiency 2008-2009.

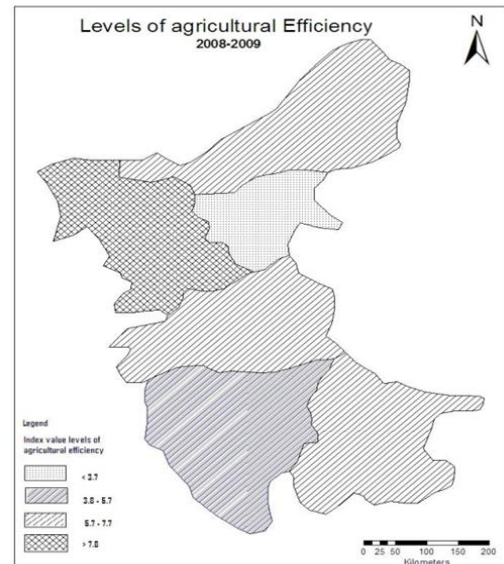


Table.4: Levels of agricultural efficiency 2008-2009.

Name of the Firka	Index score	Efficiency
Papanasam	3.2	Low efficiency
Ayyempettai	8.9	High efficiency
Kabisthalam	5.6	Medium efficiency
Ammapettai	4.7	Low efficiency
Salyamangalam	6.0	Medium efficiency
Milettur	5.4	Medium efficiency

Agricultural efficiency is worked out for the firka of Papanasam taluk. High agricultural efficiency is found in Ayyempettai firka and medium agriculture efficiency is found in the firka of Kabisthalam, Salyamangalam and Miletur low efficiency is found in Papanasam and Ammapettai.

The formula is useful for identifying the spatial variations in agricultural efficiency. According to Bhatia's method is useful for Agricultural Efficiency details. The index value is mainly indicated by all firka level agricultural details. In the study area mainly for one firka has the highest index value and three firkas of medium index value and two firka has low level index value.

Conclusion

The technique for measuring agricultural efficiency seems to be a useful tool for generalizing the relationship between acre-yield and share of cropland. From which these are derived in order to find out the overall performance of an area at a given point of time. Cropping pattern simply means the proportion of area under different crop at a point of time. The cropping pattern of an area is generally controlled by physical, social economic and technological factors. The present study will explain the existing cropping pattern, crop concentration for the year 2008-2009 and Agricultural efficiency in Papanasam taluk. There are more than 20 crops with varying hectares are grown in the taluk. Of these 20 crops only five major crops based on the properties of land to the total area under cultivation alone has been considered for analysis. Cropping pattern means the percent contribution of area under number of crops at a time. It is a dynamic concept indicated that no cropping pattern is ideal and good for all times to come.

Paddy is the first ranking crop in this taluk with 74.6% of the total cropped area. Pulses occupy the second place with 12.93% of the total cropped area in the taluk. Oilseeds are the third ranking crop with 6.2% of the total cropped area. Sugarcane is the fourth ranking crop in order of its area. It occupies an area of 2.7%. Cotton is the fifth ranking crop with 0.7% of the total cropped area. The relationship between density of individual crops in the firka and the corresponding density for the taluk as a whole has been studied on the basis of crop concentration index. Crop concentration pattern is mainly to differentiate the area of high and low density of individual crops in the different parts of the region. Agriculture efficiency is the function of the combined interplay of variety of factors, including physical, socio and economic factors. Agricultural efficiency, index value shows value is found in Papanasam firka.

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