

CHANGE IN CROPPING PATTERN AND PRODUCTION OF MAJOR CROPS IN VILLUPURAM DISTRICT

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Abstract

This study focuses on change in cropping pattern and production of major crops in Villupuram district and builds upon a comprehensive approach to realize the impacts of climate variability on crop yields and production. Crop yields were studied to discover the trends and inter-annual variability. The farming community has responded to the changing consumption patterns of consumers by diversifying its production portfolio towards high-value food commodities. Experiences from many developing countries have revealed about the changing production portfolio at the farm level due to altering dietary pattern. In this context, the changing scenario of agriculture has forced the farming community and policy makers in agriculture to search for a more remunerative and viable production portfolio. Farmers of this district are pioneers in adopting agricultural technologies. Agricultural department latently faces the challenge of attaining high growth ratio by successfully implementing various development schemes and allied technologies. To improve the farmers' economic situation through value added products and increased income, the study is novel in the light of discovering and highlighting the critical importance of this course of action and recommends using this measure in the future for more robust and realistic determinations of crop production dynamics.

Key words: The farming community, crop yields and production, changing scenario, cropping pattern, production portfolio, etc.

1. Introduction

A sustained economic growth, rising per capita income and growing urbanization are ostensibly causing shift in the consumption pattern in favour of high-value food commodities like fruits, vegetables, dairy, meat and fish products from staple food such as rice, wheat and coarse cereals. The demand for and supply of these commodities have grown much faster than those of food grains. There is an additional dimension of diversification, i.e. changing the cropping pattern mix. It is important to note that the shifts among the cropping pattern can occur in any direction, i.e. from low value crops to high value crops or vice versa. In terms of interpreting the significance of changing diversification, the major debate is centred on quantifying the significance of changing crop mix in the output growth, followed by identifying the factors affecting the process of crop diversification. Diversification into higher values, less water intensive products such as fruits, vegetable, spices and livestock products is one of the promising sources of future agriculture growth. To improve the farmers' economic situation through value added products and increased income, we are implementing schemes like, NMSA, MSDA, collective farming, micro irrigation, bio fertilizers, SSI, INM, IPM in addition to normal schemes like crop rotation and crop extension

technologies. A greater emphasis has been placed in the literature to determining the changes in crop yield variability and the climate contribution to influence this variability. Crop diversification and revival of millets in high risk rain fed cotton tracts, demonstrating the importance of using decentralised knowledge and management systems that work with the diversity and variability of rain fed agriculture.

2. Changing cropping pattern

Agriculture is the backbone of the economy of Tamil Nadu since it provides livelihood support to 56 per cent of the population. The state accounts for 7 per cent of water resources of the country. About 56 per cent of the total cropped area of the state is under irrigated conditions while around 44 per cent of the area was under dry land farming. The contribution of agriculture to state income is around 13 per cent. It supplies raw materials to agro based industries besides providing employment opportunities to the rural population. The state aims at increasing production and productivity of both food and non-food crops and also focuses on the development of wastelands. The farmers noted that the recently introduced changes in practice had taken them back to traditional ways of managing risk. Their wellbeing, marketing strategies, and mixed crops for higher and more sustainable yields are all elements of a system that understands and works with local diversity. Their success demonstrates the importance of using location specific decentralised knowledge and practices.

The government supplies external inputs to rainfed farming tracts through programmes and policy instruments that incentivise the adoption of production boosting technologies. But rainfed agriculture is diverse and subject to variable intensity and frequency of rainfall, meaning there is little scope for the adoption of uniform technologies. The increasing costs of inputs and rapidly worsening incremental capital output ratios mean rainfed farming communities can ill afford these unsuitable technologies. The global drivers of agricultural production and their variability include technology, genetics, climate, soil, field management practices and associated decisions such as fertilizer applications, tillage and crop hybrid selection, irrigation management, row spacing, planting date and depth, population density, etc.

3. Review of literature

Gulati and Kelly (1999) stated that cropping patterns were determined in large measures by agro climatic factors such as soil, temperature and rainfall distribution and the physical condition of the region. Crops suited to the given conditions were grown and this was popularly known as traditional cropping pattern of the region. Thus, while agro climatic factors determined the condition under which crops were grown, farmers were increasingly influenced by changes in economic, technological, and institutional and policy induced factors.

Escobal, et al., (2002) discussed that the process of diversification out of traditional commodities is generally triggered by factors such as rapid technological change in agricultural production in a wide variety of commodities including cereals, pulses and high value crops. Improved rural infrastructure, policy changes, and diversification in food demand patterns resulted in the decline in the profitability from traditional commodities.

Rajagopal (2005), in his presentation on agriculture diversification highlighted the declining net area sown, rising trend in fallows, diminishing return from dry land farming pointed out deficient rainfall, the variation in rainfall received, erratic flow of water in the river system and the depletion of ground water table were causing concern and further he added that out of 385 blocks in Tamil Nadu state. The strategies revolved around making a shift to alternative cropping pattern which was now centred on the traditional hydrophilic crops such as paddy, banana, and sugarcane. He informed that the successes of the alternative cropping strategy would depend on the extent to which the pattern captured other factors, such as availability of credit and easy access to available markets.

4. Objectives

1. To study the building capacity for sustainable rain fed agriculture.
2. To reveal the pattern of irrigation in Villupuram district.
3. To examine cropping pattern in Villupuram district.
4. To suggest the measures of improving agriculture in Villupuram district.

5. Methodology

The present study is based on secondary data. The information relating to the crop pattern change at the district level are collected from Season and Crop Reports for twelve years from 2001-2011. Mean and standard deviation are done for analysing production of major crops and change in crop pattern in Villupuram from 2001-02 to 2011-12.

6. Results and discussions

Climate and rainfall: The pattern of rainfall over the years in Villupuram and Tamil Nadu is presented in a graphical manner in Table 1. The actual level of rainfall against the normal level is shown for every year from which the percentage deviation is derived. The actual level of rainfall in the district has ranged from 617.4 millimetres in 2002-03, the lowest level in the last 12 years, to the highest level of 1897.4 mm in 2010-11. The percentage deviation of the actual level of rainfall gives a better picture about the extent of variation or the level of deficiency / surplus in each year.

Out of the 12 years, the actual rainfall level has been deficient in 4 years, while it has been positive / surplus in all the other eight years.

TABLE 1

Rainfall in Villupuram and Tamil Nadu from 2000-01 to 2011-12

Year	Villupuram (in mm)			Tamil Nadu (in mm)		
	Actual	Normal	Deviation (%)	Actual	Normal	Deviation (%)
2000-01	664.5	1076.1	1076.1	-38.2896.8	977.5	-8.26
2001-02	699.7	1059.4	-34.0	785.4	979.3	-19.80
2002-03	617.4	1030.0	-38.9	795.2	974.6	-18.40
2003-04	1680.6	1029.4	63.3	731.0	964.1	-24.20
2004-05	1224.0	1029.4	18.9	1034.6	961.8	7.57
2005-06	1334.8	1029.4	29.7	1078.8	961.9	12.15
2006-07	1000.4	1029.4	-2.8	1304.1	958.5	36.06
2007-08	1505.2	1029.4	46.2	859.7	911.6	-5.69
2008-09	1111.2	1029.4	7.9	1164.8	911.6	27.78
2009-10	1096.9	1029.4	6.6	937.8	911.6	2.87
2010-11	1897.4	1378.1	37.7	1165.1	908.6	28.23
2011-12	1012.8	1011.6	1.0	937.1	921.6	1.68
Mean	1153.7	1063.4	8.0	974.2	945.2	3.3
S.D	401.5	100.5	33.4	177.1	29.3	19.9

Source: Season and Crop Report, Government of Tamil Nadu

The year 2007-08, where the district has received surplus rainfall in all the years and it has peaked in 2010-11 with the highest rainfall of 1897.4 mm against the normal level of 1378.1, though in percentage of deviation-wise, the year 2003- 04 has seen the highest year of surplus rainfall with 63.3 per cent. When compared to the pattern of rainfall at the state level, the district's situation is a lot better. The state average shows that, out of the 12 years, the state has received less than normal rainfall in five years, and the highest level of deficit was 24.20 per cent in 2003-04. But, among the surplus years, the highest level of surplus was 36.06 per cent in 2006-07, when the state as a whole has received 1304.1 mm level of rainfall. Thus, at both the district and state levels, there has been a lot of variation in rainfall and the former in particular shows a dry picture. The mean score of actual rainfall in the district for the whole period is higher than that of the state. Standard 70 deviations also show that the pattern of rainfall is also not consistent in both the district as well as state, though it is higher in the former.

Pattern of irrigation: The source-wise irrigation pattern in Villupuram district during 2001-02 to 2011-12 is presented in Table 2. It is observed from the table that the share of canal irrigation has declined in Villupuram district from 2.91 per cent of the total irrigated area in 2001-02 to 0.84 per cent in 2011-12 and its mean share stands at 1.87 per cent. In the case of ponds and tanks, their proportion too has come down from 36.55 per cent to 24.50 per cent between 2001-02 and 2011-12 and its mean percentage stands at 26.82 per cent for the total period. Similarly, the share of tube well too has declined, though not consistently; from 20.98 per cent to 17.50 per cent in the given period, while it was as high as 30.07 per cent in irrigation.

TABLE 2

Sources of Irrigation in Villupuram from 2001-02 to 2011-12

Year	Ponds	Canals and Tanks	Tube Well	Open Well	Others	Total
2001-02	2.91	36.55	20.98	39.54	0.02	100.00
2002-03	2.47	34.11	21.42	41.99	1.01	100.00
2003-04	2.06	30.49	19.29	48.15	0.02	100.00
2004-05	3.63	26.35	30.07	39.93	0.03	100.00
2005-06	3.32	25.08	28.04	43.52	0.03	100.00
2006-07	1.74	22.16	22.12	53.94	0.04	100.00
2007-08	0.92	23.67	21.41	53.92	0.08	100.00
2008-09	1.11	24.50	18.91	55.44	0.04	100.00
2009-10	0.77	23.17	17.64	58.41	0.02	100.00
2010-11	0.81	24.43	18.47	56.28	0.02	100.0
2011-12	0.84	24.50	17.50	57.16	0.01	100.00
Mean	1.87	26.82	21.44	49.84	0.03	-----
S.D	1.08	4.75	4.11	7.36	0.02	-----

Source: Statistical Handbook, Government of Tamil Nadu

The major source of irrigation in Villupuram district has been open well, as its share has gone up from 39.54 per cent in 2001-02 to 57.16 per cent in 2011-12 and its mean share stands at 49.84 per cent. Hence, irrigation in this district is predominantly carried out through open wells, which is highly monsoon driven and thus, erratic in nature. Agricultural sector plays a major role in the economy of the district, as it is mostly agrarian in nature.

Cropping pattern: Table 3 presents the cropping pattern in the Villupuram district since 2001-02.

TABLE 3

Cropping Pattern in Villupuram District, 2001-02 to 2011-12 (in percentage)

Year	Paddy	Cholam	Cumbu	Ragi	Total Cereals	Total Pulses	Sugarcane	Fruits	Vegetables	Cotton	Groundnut
2001-02	43.5	0.8	5.6	0.4	52.1	5.1	10.0	2.5	4.2	1.4	16.1
2002-03	32.8	0.9	6.9	0.4	42.0	7.5	12.6	3.5	5.2	0.7	19.6
2003-04	46.4	0.8	5.2	0.3	54.2	4.4	8.5	2.7	4.2	1.4	16.9
2004-05	43.8	0.7	4.6	0.4	51.3	5.2	10.6	2.6	4.6	1.4	15.8
2005-06	43.3	0.4	3.8	0.2	48.6	5.5	14.6	2.5	4.3	1.3	15.0
2006-07	40.3	0.6	3.3	0.3	45.5	6.0	17.3	2.7	4.4	1.5	13.1
2007-08	38.8	0.8	4.1	0.3	45.4	6.0	15.2	2.6	4.1	1.9	14.8
2008-09	39.5	0.9	3.4	0.2	46.2	5.2	14.3	2.7	3.8	2.3	13.8
2009-10	40.9	0.6	3.1	0.2	46.4	5.4	15.0	2.7	3.4	1.8	13.2
2010-11	41.0	0.5	2.9	0.2	46.0	6.1	17.6	2.6	3.5	1.5	10.8
2011-12	36.6	Neg.	3.6	0.2	42.5	6.8	20.7	2.9	3.8	1.3	10.2
Mean	40.6	0.6	4.2	0.3	47.3	5.8	14.2	2.7	4.1	1.5	14.5
S.D	3.8	0.3	1.2	0.1	3.9	0.9	3.6	0.3	0.5	0.4	2.7

Source: Season and Crop Report of Tamil Nadu, Chennai

It is noted that paddy is the most dominant crop as far as its area is concerned, since it has been occupying more than 40 per cent of the GSA over the period, though it has declined in the year 2011-12. Its share has gone up 73 from 43.5 per cent in 2001-02 to 46.4 per cent in 2003-04, but has declined since then to the level of 36.6 per cent in 2011-12 and its mean share stands at 40.6 per

cent over the period. In the case of cholam, its share has decreased from 0.8 per cent to very negligible level during the period and its mean score stands at 0.6 per cent of the total sown area. The share of area under cumbu is considerably higher than that of cholam, though it too has declined from 5.6 per cent to 3.6 per cent between 2001-02 and 2011-12 with a mean share of 4.2 per cent; similarly, the proportion of area under ragi has declined from 0.4 per cent to 0.2 per cent. Thus, the total share of all cereals in Villupuram district has come down from 52.1 per cent in 2001-02 to 42.5 per cent in 2011-12, a decline of around 10 percentage points in a decade and its mean share stands at 47.3 per cent. The decline in the area under cereals has been compensated by the rise in the share of area under pulses, though not to the same extent, as it has gone up from 5.1 per cent to 6.8 per cent and its mean score stands at 5.8 per cent for the period 2001-02 to 2011-12. However, the most rapid rise in the area has taken place in the case of sugarcane, as its percentage of area has moved up from 10 per cent to 20.7 per cent, with a mean share of 14.2 per cent, while there has been a marginal rise in the share of area under fruits from 2.5 per cent to 2.9 per cent between 2001-02 and 2011-12, whereas the area under vegetables has declined from 4.2 per cent to 3.8 per cent in the given period, with some fluctuations. As far as cotton and groundnut are concerned, the share of area under cotton has gone up only marginally from 1.4 per cent to 1.8 per cent, while that of groundnut has declined from 16.1 per cent to 10.2 per cent between 2001-02 and 2011-12 and the mean share of the area under these crops stands at 1.5 per cent and 14.5 per cent respectively. This suggests that the proportion of area under food crops which include total cereals and total pulses account for more than 49.3 per cent in 2011-12 in Villupuram district, though it has declined from 57.2 per cent in 2001-02.

Yield of major crops: The yield of major crops in Villupuram for the period 2001-02 to 2011-12 is presented in Table 4 along with that of the State average in order to understand the level of yield in the district.

TABLE 4

Production of Major Crops in Villupuram from 2001-02 to 2011-12

Year	Paddy		Cholam		Cumbu		Sugarcane		Cotton		Ground nut	
	VIII	TN	VIII	TN	VIII	TN	VIII	TN	VIII	TN	VIII	TN
2001-02	4151	3196	811	866	2757	1223	108	116	195	238	1578	1885
2002-03	7867	2359	1075	660	2907	869	109	106	205	188	1706	1429
2003-04	3396	2308	744	612	2828	1085	105	102	216	213	1975	1552
2004-05	1474	2703	557	669	1208	1273	115	110	238	244	1520	1632
2005-06	3175	2541	1083	732	3232	1157	109	105	256	260	2437	1775
2006-07	3921	3423	871	999	3116	1511	114	123	295	374	2196	1981
2007-08	3524	2817	386	874	835	1436	110	108	324	343	2162	1957
2008-09	3445	2945	500	912	2520	1472	107	104	344	352	2979	2056
2009-10	3236	3070	1460	930	1522	1513	106	101	350	367	2771	2154
2010-11	3415	3039	891	1014	1202	1564	114	108	336	349	2392	2323
2011-12	3428	355	924	1033	1346	1575	116	109	328	354	2388	2372
Mean	3730	2860	846	846	2139	1334	1088	281	298	2191	2191	1920

Source: Season and Crop Report of Tamil Nadu, Chennai

It is noted from the table that the production of paddy has fluctuated from 687210 tonnes in 2001-02 to 471616 tonnes in 2011-12. The mean output of paddy stood at 525587 tonnes with a

standard deviation of 122841.8. The mean share of Villupuram in the total paddy output of the State stood at of cumbu has declined from a high of 58765 tonnes in 2001-02 to a low of 12810 tonnes in 2007-08, which then has increased only marginally to 29870 tonnes in 2011-12. Thus, the mean output of cumbu stood at 34915 tonnes with a SD of 17382, which underscores the extent of fluctuations in the same. Villupuram district alone on an average contributes 24.6 per cent of the total production of cumbu in the state, which indicates the role played by this district in the production of cumbu. The mean output of sugarcane stood at 2195289 tonnes and its SD of 3147332.5 indicates a huge fluctuation in the output of sugarcane over the years. This is also the case with the output of cotton and groundnut. The share of sugarcane in the overall state's production stood at 15.3 per cent, which was 5 per cent in the case of cotton and 10.3 per cent in the case of groundnut. This suggests that the agricultural sector plays a dominant role in the overall state, as crops like paddy, cumbu, sugarcane and groundnut account for substantial share in the overall state's production. The yield of major crops in Villupuram for the period 2001-02 to 2011-12 is presented in Table –4 along with that of the State average in order to understand the level of yield in the district. It is observed from the table that there have been considerable fluctuations in the yield levels of major crops in both Villupuram and Tamil Nadu, though the yield in the district has been higher than that of the state in most of the years.

7. Conclusion

Agriculture is the mainstay of the district and the workers are engaged mostly in that sector, which is particularly true in the rural areas and among the female workforce. The huge dependence on agriculture, mainly as wage labourers and the reliance on the open well for cultivation all indicate. It is suggest that the study is novel in the light of discovering and highlighting the critical importance of this course of action and recommends using this measure in the future for more robust and realistic determinations of climate vs. crop production dynamics. To improve the farmers' economic situation through value added products and increased income, schemes like, NMSA, MSDA, collective farming, micro irrigation, bio fertilizers, SSI, INM, IPM were implemented in addition to normal schemes like crop rotation and crop extension technologies. Hence, the efforts to quantify crop yield variability this study generates critical information on the state of these regions in the context of food security and quantitatively emphasizes that regions differ in their susceptibility to factors that can affect crop yields.

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