

## **Co-Efficient Of Variation Analysis for the Total Food and Non- Food Crops Grown In Villupuram District during 1999- 2009**

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### **Abstract**

This study addresses to co-efficient of variation analysis carried out to see the variations in total area, production and productivity exhibit the fact that the coefficient of variation in the case of area under paddy shows greater variation during 1998-2009. In Villupuram district food crops viz, paddy, cholam, cumbu ragi, other millets, pulses, sugarcane and other food crops (Sami, varagu, korra and maize) are grown traditionally. The district is also famous for the production of non-food crops especially sugarcane, cotton, gingelly and groundnut. In this context, the soil of the district is suitable for the production for the total food and non- food crops grown in villupuram district during 1999-2009. Thus from the C.V analysis, it could be concluded that food crops show greater co-efficient variations in total area, production and productivity. While the coefficient of variation for area, production and productivity of non- food crops.

**Key Words:** Traditionally Production, Crops Grown, Variation, Productivity, Especially.

### **Introduction and statement of problem**

The farming community has responded to the changing consumption patterns of consumer 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 (Barghouti et al., 2003; Dorjee et al., 2002). Besides rising income levels, the expanding urbanization, increasing infrastructural development and liberalization of trade policies have been identified as factors that triggered the process of agricultural diversification out from the area of staple food production (Joshi et al., 2004, Pingali, 2004) Despite, a silent revolution in the high value food segment, performance of the agricultural sector was not as impressive as that of the overall economy of the country.

Faster growth in agriculture is central to rural development and poverty reduction in Tamil Nadu. Although agriculture accounts for only 14% of Tamil Nada's GDP growth, non farm income accounts for about 50% of rural house hold income. Rejuvenating agriculture growth remains critical since a vibrant agriculture sector encourage industrial growth. Farm income accounts for 78% of the income of the poorest 20% of the rural population. Growth in labor intensive agriculture could further reduce rural poverty through higher yields to small producers, higher real wages to agriculture laborers and increased income and employment opportunities with forward and background linkage to the rural non-farm sector. The Agriculture in Tamil Nadu is generally subject to impediment such as not tapping potential yields. Unbalanced fertilizer use, low rate of seed replacement, non- availability of institutional credit in time, diversion of cultivable land for non- agricultural purposes, poor contribution from rain fed cultivation, lack of proper rain water harvesting and conservation and its optimum utilization, lack of technology, etc. All these are the causes for the low production and

productivity of the state agriculture in Tamil Nadu between 2002-2003 and 2008-09. In essence, the diversification to commercial crops/commodities becomes an essential strategy in Tamilnadu that can increase income in agriculture, minimize risks due to crop failures and above all, earn foreign exchange. Planned diversification increase both individuals and social gains.

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### **Concept**

#### **Crop Diversification**

Crop diversification is intended to give a wider choice in the production of a variety of crop in a given area so as to expand production related activities on various crops and also to lesson risk. Crop diversification in India is generally viewed as a shift from traditionally grown lees remunerative crops to more remunerative crops. The crops shift also take place due to governmental policies and thrust on some crops over given time

#### **Review of Literature**

**Barghouti et.al. (2005)**, in their study explained that in south and southeast Asia diversification towards high value food commodities supported the development of innovative supply chains and opened new vistas for augmenting income, generating employment and promoting exports .

**Pingali and Rosegrant (1995)** explained that the diversification reflected a change in business activities based on the flexible and differentiated response to changing opportunities created by new production technology or market signals. More specifically, diversification was the result of change in product, choice and input use decisions based on market force and the principle of profit maximization. At the farm level, diversification represented a change in the underlying characteristics of the farm system such that farm practices and products are more aligned with the social, environmental and economic contexts, as well as the constraints and opportunities that exist. At the community level, diversification Implied establishing a dynamic optimal mixture of farmer production alternatives capitalizing between farm heterogeneity in terms of resource availability.

**Jaya Kumaravardan, (2009)**, suggested the acreage response of crops to various price and non- price factors. Short run and long- run elasticity's of acreage show that farmers cultivating commercial crops adjust their cropping pattern very quickly in response to price. The high degree of instability prevailing in commercial crops demanded efficient crop insurance delivery mechanism. Hence the policy makers can use price mechanism as a tool to bring more area under commercial crops to enhance the income and employment of rural people.

## Objectives

The objectives of the research paper are:

1. To study the growth of various total food and total non- food crops in Villupuram District during 1999-2009.
2. To analyze the variation in area, production and productivity of the crops grown in the district.
3. To suggest policies to increase the agricultural development in Villupuram district.

## Hypotheses

The area, production and yield variability of different crops determine the level of crop diversification.

## Methodology

The present study is based on secondary data. The information's relating to the growth variations of crop and pattern change at the district level is collected from Season and Crop Reports for twelve years from 1998- 2009.

## Statistical Tools

Co-efficient of variation analysis

C.V is found out for area, production and yield variability of food and non-food crops by using the formula:

$$C.V = \frac{\sigma}{\bar{x}} \times 100$$

## Co-efficient of Variation Analysis for the Total Food and Non- Food Crops Grown in Villupuram District During 1998- 2009

In Villupuram district food crops viz, paddy, cholam, cumbu ragi, other millets, pulses, sugarcane and other food crops (sami, varagu, korra and maize) are grown traditionally. The district is also famous for the production of non-food crops especially sugarcane, cotton, gingelly and groundnut. The soil of the district is suitable for the production of above crops.

## Food Crops

Bajra (cumbu): Bajra known as cumbu in Tamil Nadu is generally sown under rain fed condition in the state. Villupuram, Thoothukudi, Maduari, Thiruvannamalai, Virudhunagar together accounted for 71% of the total area under this crop during 08-09. Korra crop accounted for 0.3% (813 ha) of the total area under other cereals. Major part of korra is grown in the districts of Salem, Villupuram, Cuddalore and Namakkal.

Varugu crop is mainly sown under rainfed condition in the districts of Cuddalore, Villupuram and Ariyalur. The area under varagu contributed 1.3% (4086 ha) of the total area under other millets.

Black gram is one of the important pluses grown in both kharif and Rabi seasons. It accounts for 49.2% of the total area under pulses. This crop is extensively grown in Nagapattinam, Cuddalore, Thiruvarur, Thoothukudi,

Villupuram and Thanjavur districts and these districts together accounted for 80.2% of the total area under the crop during 08-09.

Villupuram, Erode, Cuddalore, Thiruvannamalai, Namakkal, Dharmapuri, Vellore and Salem district together accounted for 67.9% of the total sugarcane area of the state during 08-09 (Season and Crop Report, 2009).

### **Non-food crops**

Groundnut is the major crop under oilseeds accounting for 8.4% of the total cropped area in the state during 08-09. It is raised as both rain fed as well as irrigated crop .Thiruvannamalai, Villupuram, Vellore, Namakkal, Salem, Kanchepuram, Erode and Pudukottai districts constitute 65.8% of the area under groundnut in the state during 08-09.

Gingelly next to groundnut and Coconut is the major oilseed crop in the state. Erode, Thanjavur, Karur, Cuddalore, Villupuram and Salem district accounted for 62.2% of the total area under this crop during 08-09.

The major cotton growing districts are Perambalur, Salem, Trichy, Virudhunagar, Villupuram and Madurai. These districts together accounted for 64.4% of the total area under cotton during 08-09 (Season and Crop Report, 2008).

**Table-1.1**

**Co-efficient of Variation in Area under Food Crops in Villupuram District during 1998 to 2009**

(in Ha)

Year	Area Under Food Crops
1998	2,97,106
1999	2,69,039
2000	2,63,668
2001	2,79,150
2002	1,87,985
2003	2,82,785
2004	2,77,316
2005	2,93,911
2006	2,72,458
2007	2,74,335
2008	2,66,764
2009	2,64,165
Total	32,28,682
Co-efficient of Variation	9.85

**Source:** Computed

### Co-efficient of Variation in Area under Food Crops in Villupuram District during 1998-2009

In order to analyze the variation in total area cultivated under food and non- food crops in Villupuram District, the co – efficient of variations are calculated and they are presented in Table -1.1 & 1.2 The Co-efficient of variation for food crops is 9.85 and for non- food crops it is 8.83. From the calculated co –efficient of variation values it is followed that the area cultivated under food crops show greater variation than the area under non- food crops. This is because the food crops need more and continuous irrigation than non- food crops. Depending on the availability of water the area is brought under cultivation. Scanty rainfall in some years results in lesser area under cultivation. For example in 2002, due to Northwest monsoon failure (only 343.1 mm) the area under cultivation is reduced from 2, 79,150 hectares in 2001 to 1, 87,985 hectares in 2002.

Likewise in the years 2004, 2006, 2007 and 2008 the rainfall were only 525.3, 599.3, 776.9 and 771.4 mms respectively. In the above stated years the area under cultivation was around 2, 65,000 hectares. Hence the formulated hypothesis that the food crops show greater variation in area than non-food crops in the district is validated.

**Table-1.2**

### Co- efficient Variation in Area under Non-Food Crops in Villupuram District during 1998 to 2009

(in Ha)

Year	Area Under Non- Food Crops
1998	1,52,111
1999	1,49,005
2000	1,45,134
2001	1,47,391
2002	1,30,296
2003	1,33,761
2004	1,43,750
2005	1,41,506
2006	1,15,412
2007	1,34,504
2008	1,25,244
2009	1,15,349
Total	16,33,463
<b>Co- efficient of Variation</b>	<b>8.83</b>

Source: Computed

### Co-efficient of Variation in Area under Food Crops and Non- Food Crops

The co-efficient of variation values calculated for villupuram district over a period from 1998-2009 exhibits the fact that area under both food crops and non- food crops show greater variation. The co-efficient of variation for area under food crops is 9.85 which is found to be greater than the C.V for area under non-food crops which is only 8.83. The area under food crops fluctuated more during the twelve year period and it is observed from this that the farmers either diversified their crops from food crops to non- food crops or left barren without cultivation. The area under food crops was 2.97 lakh hectares in 1998 and it reduced to 2.64 lakh hectares in 2009 while the area under non- food crops also reduced from 1.52 lakh hectares to 1.15 lakh hectares. Hence the area under cultivation of both food crops as well as non- food crops were found to be reduced. (Table-1.2)

**Table-1.3**

**Co-efficient of Variation in Production of Food Crops in Villupuram District**  
(in Tonnes)

<b>Year</b>	<b>Production</b>
1998	50,93,170
1999	44,56,120
2000	48,39,437
2001	60,46,396
2002	40,20,594
2003	37,45,532
2004	55,13,738
2005	72,65,971
2006	92,13,208
2007	68,83,245
2008	66,26,382
2009	63,70,526
Total	70074219
<b>Co-efficient Variation</b>	<b>of 25.2</b>

**Source:** Computed

The variation in production of food crops in Villupuram district is analyzed. The area under food crops is fallen from 2.97 lakh hectares in 1998 to 2.64 lakh hectares in 2009. Because of the fall in area under food crops, the production might have fallen or due to increase in irrigation availability, production might have increased. By seeing the total production of food crops in Villupuram district over the twelve year period from 1998 to 2009, it is observed that the total

production is increased from 50.93 lakh tonnes to 63.71 lakh tonnes. But the fluctuations in production are seen during the twelve year period. In 2003, production has fallen from 50.93 lakh tonnes in 1998 to 37.45 lakh tonnes in 2003. In 2006, the production level was 92.13 lakh tonnes which is found to be more than the previous year's production level of 72.06 lakh tonnes. But in 2007 the production has fallen by 33 lakh tonnes. Likewise in 2009, the production level was 63.71 lakh tonnes which was lower than the previous year production of 66.26 lakh tones. By observing these wide fluctuations in the total production, the co-efficient of variation is worked out and it is found to be 25.2. The variation is more than 20 which is to be considered as the highest co-efficient of variation. (Table – 1.3)

**Table-1.4**

**Co-efficient of variation in Production of Non- Food Crops in villupuram District 1998-2009**

(in Tonnes)

<b>Year</b>	<b>Production</b>
1998	1,29,800
1999	1,26,700
2000	1,35,925
2001	1,33,313
2002	96,777
2003	1,58,893
2004	1,28,590
2005	1,34,392
2006	1,14,043
2007	1,58,618
2008	1,48,589
2009	1,53,528
Total	16,19,168
<b>Co-efficient of Variation</b>	<b>12.58</b>

**Source:** Computed

The C.V for non-food crops is calculated for a period of twelve years from 1998-2009 and it is found to be equal to 12.58. The production of non-food crops also exhibited higher production from 1.3 lakh tonnes in 1998 1.54 lakh tonnes in 2009. In between 1998 and 2009, in the year 2002, the production is fallen from 1.3 lakh tonnes to 96,777 tonnes in 2002. Likewise in the year 2004, the production is fallen from 1.59 lakh tonnes in 2003 to 1.28 lakh tonnes in 2004 and to 1.14 lakh tonnes in 2006. But in the year 2008 and 2009, the production level has increased from 1.49 lakh tonnes to 1.54 lakh tonnes. By observing the fluctuations in the production of non- food crops, the C.V is calculated as 12.58.

(Table – 1.4) While comparing the co-efficient of variations for food and non- food crops, the variation is found to be above 20 for food crops and it is below 15 for non- food crops.

**Table-1.5**

**Co-efficient of Variation in the Productivity of Food Crops in Villupuram District During 1998-2009**

(in kg/ha)

<b>Year</b>	<b>Productivity</b>
1998	17.142
1999	16.563
2000	18.354
2001	21.66
2002	21.38
2003	13.24
2004	19.88
2005	24.517
2006	33.815
2007	25.09
2008	24.83
2009	24.11
Total	260.5
<b>Co-efficient of Variation</b>	<b>51.226</b>

**Source:** Computed

**The coefficient of variation is worked for the productivity of food crops in villupuram district during 1998-2009.**

The productivity of food crops vary between 13.24 to 33.82 over the twelve year period. The year 2003, experienced a very low level productivity of 13.24 than any other year. Likewise in 2006, the productivity reached the highest level of 33.82. So wider fluctuations are observed in the productivity. The co-efficient of variation calculated for the twelve years is 51.23. The variation is also exceeding 50. So it could be concluded that the C.V for productivity is higher than the C.Vs for area and production. (Table – 1.5)



**Table-1.6****Co-efficient of Variation in the Productivity of Non- Food Crops in Villupuram District During 1998-2009**

(in kg/ha)

<b>Year</b>	<b>Productivity</b>
1998	0.853
1999	0.850
2000	0.9365
2001	0.9044
2002	0.742
2003	1.1858
2004	0.894
2005	0.9497
2006	0.988
2007	1.179
2008	1.186
2009	1.330
Total	11.998
<b>Co-efficient of Variation</b>	<b>16.89</b>

**Source:** Computed**Co-efficient of Variation in the Productivity of Non- Food Crops in Villupuram District During 1998-2009**

The co-efficient of variation worked out for the productivity of non- food crops in Villupuram district is 16.89. The C.V for non- food crops is far less than the C.V for food crops. The productivity varies between 0.85 to 1.3. The range of variation is found to be less in the case of non- food crops being .65 only. The co-efficient of variation is also 16.89 which are found to be far less than the C.V for food crops (51.23). Thus from the C.V analysis, it could be concluded that food crops show greater co-efficient variations in area, production and productivity viz 9.85, 25.2 and 51.23 while the coefficient of variation for area, production and productivity of non- food crops are 8.83, 12.58 and 16.89. (Table – 1.6)

Thus from the co-efficient of variation analysis, the inference drawn is that due to the fluctuations in area, production and productivity of food crops, the crop diversification is taking place among the food crops in Villupuram district which is known from Herfindhal index and Entropy index values. In this context, the second hypothesis framed in the study is: The area, production and yield variability of different crops determine the level of crop diversification.

## Conclusion

In Villupuram district food crops viz, paddy, cholam, cumbu ragi, other millets, pulses, sugarcane and other food crops (Sami, varagu, korra and maize) are grown traditionally. The district is also famous for the production of non-food crops especially sugarcane, cotton, gingelly and groundnut. The soil of the district is suitable for the production of above crops,

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