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Identification of Efficient Cropping Zone for Rice, Maize and Groundnut in Tamil Nadu

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Abstract

A methodological study was made at the Agro Climate Research Centre, Tamil Nadu Agricultural University, and Coimbatore during 2012 to identify the potential districts for cultivation of rice, maize and groundnut in Tamil Nadu. The data on area, production and productivity of study crops for 2000–'01 to 2009–'10 were collected and indices such as Relative Spread Index (RSI) and Relative Yield Index (RYI) were computed and the potential cropping districts for the study crops were identified. In Tamil Nadu, nine districts were found to be prospective regions for rice, seven districts for maize and three districts for groundnut as in these areas both the RYI and the RSI were high. In some of the districts, RSI is more for a particular crop, while the RYI is low indicating non suitability of that crop. However, due to other factors such as market demand and value of the produce, farmers cultivate the crops that are not suitable for their location which relates in high RSI with low RYI.

Keywords: Efficient Cropping Zone, Relative Spread Index, Relative Yield Index.

1. Introduction

The productivity level of crops has to be enhanced and sustained and this is possible only when efficient locations have been identified for the crops [1]. This information would help to replace the uneconomical crop in the identified areas. This gives an opportunity to use the natural resources to the maximum extent possible without any degradation: These uneconomical crops will be replaced by the crops with good potential to achieve the sustainability and self sufficiency. The scientific information based crop cultivation also not stable for over years and the suitability of crops of a region to be verified frequently. By this means, the farmers can take up likely crops or go for alternate cropping pattern which boost them to harvest better yield and fetch more income. Advances in the agricultural sciences helped in the development of several techniques for finding out the suitable crops in the specified areas. Delineation of efficient cropping zones for agricultural crop and for horticultural crops was done in earlier studies as reported by Thavaprakaash et al. [2]. Cereal grains are grown in greater quantities than any other type of crop; they are therefore staple crops. Horticultural crops fetch 20–30 times more foreign exchange per unit area than cereals due to higher yields and higher prices available in the international market. One such tool for identifying the potential area of crops is by calculating Relative Yield Index and Relative Spread Index and in turn Efficient Cropping Zone of the crops [3]. Hence the present investigation was carried out to find the potential areas for rice, maize and groundnut in Tamil Nadu.

2. Materials and Method

The data related to area, production and productivity and total cultivable area of rice, maize and groundnut in different districts and state were collected for 2000–'01 to

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2009– '2010 (10 years) from the respective Season and Crop Report. From the data, Relative Spread Index (RSI) and Relative Yield Index (RYI) were computed [4] by using the following formula.

$$RSI = \frac{\text{Area of particular crop expressed as \% of total cultivablearea in the district}}{\text{Area of crop expressed as percentage to the total cultivable area in the State}} \times 100$$

$$RYI = \frac{\text{Mean yield of a particular crop in a district (Kg/ha)}}{\text{Mean yield of the crop in the State (Kg/ha)}} \times 100$$

2.1 Criteria for Efficient Cropping Zone

RSI	RYI	Cropping Zone
>100 (High)	>100 (High)	Most Efficient Cropping Zone (MECZ)
>100 (High)	< 100 (Low)	Efficient Cropping Zone (ECZ)
< 100 (Low)	>100 (High)	Not Efficient Cropping Zone (NECZ)
< 100 (Low)	< 100 (Low)	Highly Inefficient Cropping Zone

3. Result and Discussion

3.1 Efficient Cropping Zone for Rice

The perusal of rice crop area and productivity data revealed that the Most Efficient Cropping Zone (MECZ) which has high RSI and high RYI for rice was found in Cuddalore, Kancheepuram, Madurai, Tanjore, Thiruvannamalai, Thiruvallur Tiruchirapalli, Tirunelveli and Villupuram districts of Tamil Nadu (Table 1). The rice crop can well establish with amble water source during the crop growing period and the spread of crop with the farming community is more in these districts since these areas are situated in and around river basins. For MECZ, high technology practices for the concerned crops may be introduced to explore higher productivity [5]. The districts such as Ariyalur, Coimbatore, Dharmapuri, Dindugul, Erode, Kanyakumari, Karur, Krishnagiri, Namakkal, Salem, The Nilgiris, Tiruppur, Theni, Tutucorin, Vellore and Virudhunagar fell under Efficient Cropping Zone (ECZ) with high RYI and low RSI values (Figure 1). Nagapattinam, Pudukottai, Ramanathapuram, Sivaganga and Tiruvarur comes under Not Efficient Cropping Zone (NECZ) where the districts registered high RSI and low RYI values. Only Perambalur district fell under Highly-Inefficient Zone (HInEZ) where both RSI and RYI values were below 100 per cent. In context to Tamil Nadu, nine districts comes under MECZ, 16 districts under ECZ, five districts under NECZ and one district under HInEZ.

3.2 Efficient Cropping Zone for Maize

The MECZ which has high RSI and RYI for maize was found in Coimbatore, Dindugul, Erode, Salem, Tiruppur, Theni, and Virudhunagar districts in Tamil Nadu. Maize crop is sensitive to both excessive moisture and moisture stress, optimum amount of water is needed throughout the crop growth stage. The districts such as Karur, Namakkal, Madurai, Pudukottai, Tanjore, Thiruvannamalai, Vellore and Villupuram fell under ECZ with high RYI and low RSI values (Figure 2). The yield of the crop in these regions is high and hence the crop may be promoted by better extension methodologies or the reasons for the low spread may be examined [6]. Ariyalur, Perambalur, Tirunelveli and Tutucorin comes under NECZ and Cuddalore, Dharmapuri, Krishnagiri, Kancheepuram, Kanyakumari, Nagapattinam, Ramanathapuram, Sivanganga, Tiruchirapalli, Tiruvarur, Tiruvallur and The Nilgiris districts fell under HInEZ.

On the whole, seven districts come under MECZ, eight districts under ECZ, four districts under NECZ and 12 districts under HInEZ.

3.3 Efficient Cropping Zone for Groundnut

The MECZ considering high RSI and RYI for groundnut fell with Kancheepuram, Thiruvallur and Villupuram districts in Tamil Nadu (Figure 3). The reason accredited for superior RSI and RYI values in these districts might be the marketing facility which is highly pronounced in these areas and the Villupuram district is an important groundnut market in Tamil Nadu. Since these districts have the required soil type for groundnut with favourable climatic condition naturally the productivity would be more and as a result the spread of the crop with farming community also could be more.

The district such as Cuddalore, Dindugul, Karur, Krishnagiri, Nagapattinam, Tanjore, Tiruppur, Tiruvarur, Tiruchirapalli and Tiruenelveli comes under ECZ with high RYI and low RSI. Though the yield potential good, the spread is low and hence efforts should be made mainly to increase the area of the crop by some change in Government policies. Ariyalur, Erode, Namakkal, Perambalur, Pudukkottai, Salem, Tiruvannamalai and Vellore districts comes under NECZ. Coimbatore, Dharmapuri, Kanyakumari,

Table 1. Efficient cropping zone of rice, maize and groundnut in different districts of Tamil Nadu

	RICE			MAIZE			GROUNDNUT		
District	RSI	RYI		RSI	RYI		RSI	RYI	
Kancheepuram	H	H	ME	L	L	HINE	H	H	ME
Thiruvallur	H	H	ME	L	L	HINE	H	H	ME
Cuddalore	H	H	ME	L	L	HINE	L	H	E
Villupuram	H	H	ME	L	H	E	H	H	ME
Vellore	L	H	E	L	H	E	H	L	NE
Thiruvannamalai	H	H	ME	L	H	E	H	L	NE
Salem	L	H	E	H	H	ME	H	L	NE
Namakkal	L	H	E	L	H	E	H	L	NE
Dharmapuri	L	H	E	L	L	HINE	L	L	HINE
Krishnagiri	L	H	E	L	L	HINE	L	E	E
Coimbatore	L	H	E	H	H	ME	L	L	NE
Tiruppur	L	H	E	H	H	ME	L	H	E
Erode	L	H	E	H	H	ME	H	L	NE
Tiruchirapalli	H	H	ME	L	L	HINE	L	H	E
Karur	L	H	E	L	H	E	L	H	E
Perambalur	L	L	HINE	H	L	NE	H	L	NE
Ariyalur	L	H	E	H	L	NE	H	L	NE
Pudukottai	H	L	NE	L	H	E	H	L	NE
Tanjore	H	H	ME	L	H	E	L	H	E
Thiruvarur	H	L	NE	L	L	HINE	L	H	E
Nagapattinam	H	L	NE	L	L	HINE	L	H	E
Madurai	H	H	ME	L	H	E	L	L	HINE
Theni	L	H	E	H	H	ME	L	L	HINE
Dindigul	L	H	E	H	H	E	L	H	E
Ramanathapuram	H	L	NE	L	L	HINE	L	L	HINE
Virudhunagar	L	H	E	H	H	ME	L	L	HINE
Sivagangai	H	L	NE	L	L	HINE	L	L	HINE
Tirunelveli	H	H	ME	H	L	NE	L	H	E
Thoothukudi	L	H	E	H	L	NE	L	L	HINE
The Nilgiris	L	H	E	L	L	HINE	L	L	HINE
Kanyakumari	L	H	E	L	L	HINE	L	L	HINE

H – High; L- Low; ME – Most Efficient; E – Efficient; NE – Not Efficient; HINE – Highly Inefficient Zone.

Madurai, Ramanathapuram, Sivaganaga, The Nilgiris, Theni, Tutucorin and Virudhunagar districts come under HInEZ. With respect to Tamil Nadu, three districts fell under MECZ, 10 districts under ECZ, eight districts under NECZ and 10 districts under HInEZ.

4. Conclusion

In context to Tamil Nadu, Dindugul, Karur, Tanjore, Tiruppur and Villupuram was found efficient cropping zone for all the three crops. For MECZ, high technology

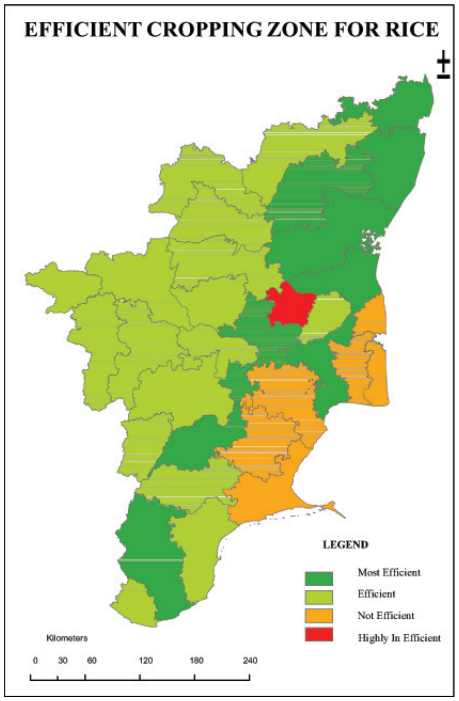

Figure 1. Efficient Cropping Zone for rice in different districts of Tamil Nadu.

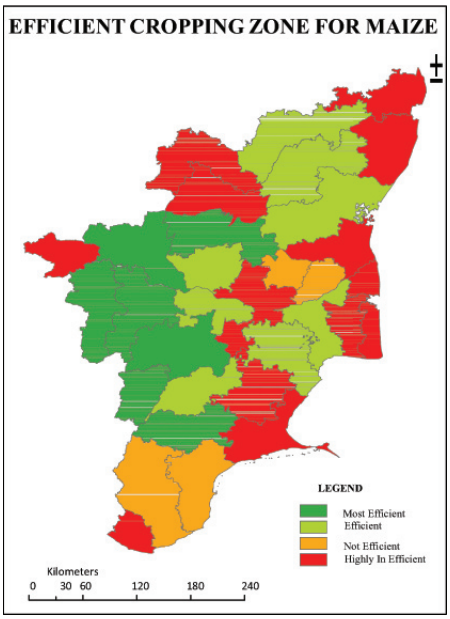

Figure 2. Efficient Cropping Zone for maize in different districts of Tamil Nadu.

practices for the concerned crops may be introduced to explore higher productivity. Under this context, when the productivity goes towards positive side, there is also pull down factor like biotic and abiotic risks in crop production

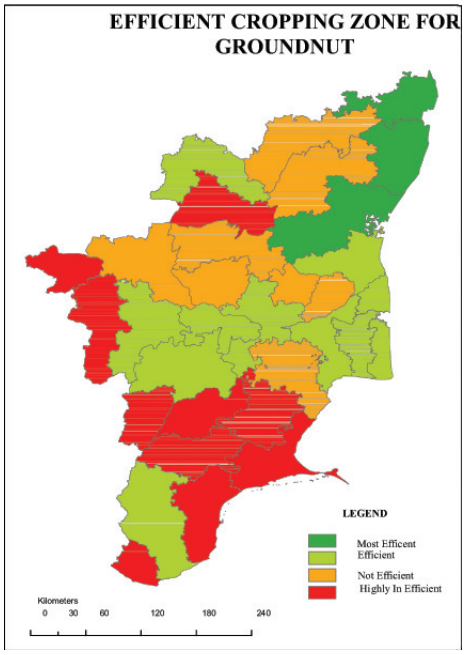

Figure 3. Efficient Cropping Zone for groundnut in different districts of Tamil Nadu.

that would operate. Considering these factors, the crop insurance promoted for efficient crop zone would protect the farmers from crop losses.

5. References

1. Sanbagavalli S, Rohini A et al. (2002). Efficient cropping zones - decadal analysis for major crops in Tamil Nadu, Indian Journal of Agricultural Research, vol 36(4), 227–233.
2. Thavaprakaash N, Babu C et al. (2008). Identifying potential cropping zones for important horticultural crops of Tamil Nadu, The Madras Agricultural Journal, vol 95(7–12), 418–424.
3. Veeraputhiran R, Kathikeyan R et al. (2003). Crop planning climate atlas – principles, Relative spread index and relative yield index, A.E. Publications, Coimbatore, 156–158.
4. Kanwar J (1972). Cropping patterns, scope and concept, In. Proc. Symp, on Cropping Pattern in India, ICAR, New Delhi, 11–32.
5. Narayanan A L, Balasubramanian T N et al. (2003). Identification of efficient rice cropping zone for union territory of Pondicherry, The Madras Agricultural Journal, vol 90 (10–12), 729–731.
6. Poornima S, Kokilavani S Et al. (2008). Examining the prospective cropping zone of important field crops of Tamil Nadu, The Madras Agricultural Journal, vol 95 (7–12), 364–370.