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Efficient Cropping Zone for Groundnut in Tamil Nadu

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A B S T R A C T

An analytical study was made to identify the efficient cropping zone for groundnut in Tamil Nadu. For this study the data on percentage area and productivity of groundnut for ten years (2006-07 to 2015-16) were collected. Based on relative spread index (RSI) and relative yield index (RYI) the efficient cropping zone were identified. Among thirty one districts, five districts were found as most efficient cropping zones (MECZ).

Introduction

In Tamil Nadu, Groundnut was cultivated in 3.47 Lakh ha area with the average productivity of 2574 kg ha^{-1} (Season and Crop Report, 2015-16). Even though there was a wider spread of cultivated area in different regions have less contribution on total production, because of lower productivity. The productivity of crops was determined by their adaptability to the particular region. To achieve sustainability, the cultivation of crops should be carried on their potential zones. This study assists to found the efficient cropping zone for Groundnut in Tamil Nadu Which helps to get higher yield in limited area through better crop selection and also the development of new technologies which enhances the productivity still further.

Materials and Methods

The data on percent area and productivity of groundnut for different districts of Tami Nadu were collected from the season and crop report by the Department of Economics and Statistics, Government of Tamil Nadu. From this ten year (2006-07 to 2015-16) data, relative spread index (RSI) and relative yield index (RYI) were computed by using Kanwar (1972) formula.

$$RSI = \frac{\text{Area of that particular crop expressed as \% of total cultivable area in the district}}{\text{Area of that particular crop expressed as \% of total cultivable area in the state}} \times 100$$

$$RYI = \frac{\text{Mean yield of a particular crop in a district}}{\text{Mean yield of a particular crop in the state}} \times 100$$

For each year, the RSI and RYI were calculated separately. Based on the criteria for efficient cropping zone (Table 1), the efficient cropping zone for groundnut crop among all districts were identified.

Results and Discussion

Relative spread index (RSI): The data of relative spread index for groundnut (Table 2) indicated that among all districts, the RSI was maximum (397) with Thiruvannamalai district followed by Vellore district (304). Higher RSI indicates the major groundnut cultivating area. The soil type, rainfall pattern and other climatic factors of that area was highly favoured for groundnut cultivation.

Among all other districts The Nilgiris (0.14) have lowest RSI value followed by Kanyakumari (0.33), which indicated the lower spread of groundnut due to unsuitable soil and climatic conditions.

Relative yield index (RYI): The relative yield index (Table 3) was higher in Thiruvallur (179) followed by Thiruvarur (171) district. Higher RYI shows those areas have higher productivity of groundnut.

Efficient cropping zone: From the computed data (Table 4), it could be interpreted that out of thirty one districts, Kancheepuram and Vilupuram districts have high RSI & high RYI.

Thiruvallur and Karur districts have medium RSI with high RYI. These four districts were categorized under Most Efficient Cropping Zone (MECZ) for groundnut. These districts played a major role for groundnut production in Tamil Nadu.

Table.1 Criteria for efficient cropping zone

RSI	RYI	Cropping Zone
High/Medium	High	Most Efficient Cropping Zone (MECZ)
High/Medium/Low **Low** **High/Medium**	Medium High Low	Efficient Cropping Zone (ECZ) Not Efficient Cropping Zone (NECZ)
Low	Low	Highly Inefficient Cropping Zone (HICZ)

Relative Spread Index (RSI)	Relative Yield Index (RYI)
> 125 High	> 100 High
75-125 Medium	75-100 Medium
<75 Low	< 75 Low

Table.2 Percentage area of groundnut

District	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015 -16	Ave.	RYI
Kancheepuram	4149	2997	3584	4187	4469	3823	3580	3756	3600	3089	3723	158
Thiruvallur	3734	3480	3850	4281	3518	4094	4584	5089	4823	4562	4202	179
Cuddalore	3193	1855	2535	2918	3093	3569	3637	3880	4663	6469	3581	152
Vilupuram	2076	2402	2447	2897	2392	2728	2719	3265	3100	2966	2699	115
Vellore	1665	1885	1730	1924	2265	2257	2123	2564	2768	3064	2225	95
Thiruvannamalai	1825	2139	1503	1823	1849	2739	2119	2463	2419	1732	2061	88
Salem	1511	1454	1497	1539	2192	2484	1932	1989	2395	2158	1915	81
Namakkal	1732	1660	1902	1569	2340	2438	1365	2110	2171	1764	1905	81
Dharmapuri	1945	2282	2385	1819	2028	3193	2226	2460	2798	2763	2390	102
Krishnagiri	1189	2109	1563	1790	2374	3088	2112	2666	2104	2271	2127	90
Coimbatore	1689	1878	3304	1757	2033	2528	1573	2451	2162	2256	2163	92
Thiruppur	-	-	1888	2272	1952	2388	1253	1416	2259	2026	1932	82
Erode	1371	1609	2141	1695	1861	1406	1405	1862	1885	1738	1697	72
Thiruchirappalli	2258	1846	1609	1748	1806	2337	2527	2538	2467	2180	2132	91
Karur	2258	2280	2432	2430	1858	2634	2713	3208	2467	2792	2507	107
Perambalur	1924	1287	1492	2144	1385	2089	2489	2636	2518	2838	2080	88
Ariyalur	-	-	-	1946	3091	4134	2527	4290	4273	4217	3497	149
Pudukkottai	1759	1188	1283	1685	1564	2175	1967	2032	3344	3184	2018	86
Thanjavur	2327	1414	2220	3627	3760	3153	3103	3714	3788	4582	3169	135
Thiruvarur	2549	2199	2009	3634	5041	5629	3218	5225	4949	5687	4014	171
Nagapattinam	3800	1985	2517	3017	3164	3840	2872	3211	3252	3719	3138	133
Madurai	2132	1871	1981	1536	1828	1900	2000	2146	2124	1716	1923	82
Theni	2149	1971	1793	2197	1906	2452	5213	2442	3501	3384	2701	115
Dindigul	2387	2203	3213	2594	2859	3510	2503	2940	3867	2797	2887	123
RamanathaPuram	1246	771	1486	1336	1328	1390	1252	946	2254	1359	1337	57
Virudhunagar	1573	1183	1291	678	1096	1671	1109	1531	1598	2150	1388	59
Sivagangai	1226	838	1470	909.6	1186	2680	2542	1817	1389	1520	1558	66
Thirunelveli	1668	1767	1755	1501	2212	3027	2614	2762	3119	2841	2327	99
Thoothukudi	1461	1598	1302	1389	2227	2940	2602	2999	3049	2926	2249	96
The Nilgiris	-	-	-	1400	1882	-	-	2213	1000	2175	1734	74
Kanyakumari	1583	1641	1500	1450	1882	2202	1891	2870	2786	2574	2038	87
District Average	1981	1957	1990	2169	2323	2751	2314	2721	2753	2574	2353	

Table.3 Productivity of groundnut

District	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	Ave.	RSI
Kancheepuram	14.53	15.95	16.18	13.78	12.32	12.87	14.17	10.35	11.3	8.41	12.99	184
Thiruvallur	10.45	12.21	10.84	9.15	7.60	7.43	7.80	6.07	4.6	4.71	8.086	115
Cuddalore	5.18	5.62	5.42	4.65	3.33	3.24	4.01	3.59	3.4	2.90	4.134	59
Vilupuram	13.09	14.78	13.83	13.22	10.81	10.20	10.14	9.09	7.0	7.03	10.92	155
Vellore	24.37	24.73	24.09	22.67	22.25	21.66	20.27	18.65	18.6	17.10	21.44	304
Thiruvannamalai	31.97	34.76	36.45	29.25	24.19	22.79	24.10	25.47	27.6	23.29	27.99	397
Salem	12.52	11.24	9.85	8.80	7.18	6.05	6.28	6.43	6.8	7.16	8.23	117
Namakkal	21.26	18.66	17.03	16.94	16.18	14.79	15.74	11.61	12.8	15.13	16.01	227
Dharmapuri	7.57	7.71	6.48	6.30	5.08	6.84	6.70	5.28	4.0	4.61	6.06	86
Krishnagiri	9.88	8.97	9.33	8.67	7.93	7.50	7.53	5.10	5.5	5.89	7.63	108
Coimbatore	4.73	4.65	4.32	3.83	3.59	3.82	3.14	2.86	2.6	2.75	3.63	51
Thiruppur	-	-	4.79	4.04	4.00	4.13	3.23	4.09	4.1	4.58	4.12	58
Erode	10.65	10.19	10.46	8.63	8.98	9.32	9.09	9.34	10.1	10.55	9.73	138
Thiruchirappalli	7.08	7.35	6.80	6.37	5.85	6.44	5.69	4.77	4.8	5.28	6.04	86
Karur	3.99	6.22	7.57	7.40	6.98	6.95	5.35	2.86	4.9	4.98	5.72	81
Perambalur	9.17	9.91	2.36	2.18	1.42	2.06	1.45	1.81	1.3	2.38	3.40	48
Ariyalur	-	-	12.54	12.52	10.47	12.24	9.43	8.80	8.0	7.90	10.24	14
Pudukkottai	15.16	15.46	12.54	12.62	10.95	11.08	8.73	6.40	4.9	6.46	10.43	148
Thanjavur	2.47	5.69	3.34	3.20	2.81	2.90	2.97	1.88	1.5	1.80	2.86	40
Thiruvarur	0.84	3.00	0.47	0.73	0.71	1.46	1.70	1.13	0.5	0.65	1.12	16
Nagapattinam	1.16	1.46	1.24	0.89	0.94	0.93	0.78	0.68	0.6	0.64	0.93	13
Madurai	3.48	3.10	3.04	2.50	2.15	2.35	2.68	1.90	2.0	1.85	2.51	35
Theni	1.70	1.58	1.95	1.51	2.12	1.75	1.51	1.50	1.5	1.93	1.71	24
Dindigul	5.09	6.01	4.70	3.75	4.72	5.16	3.39	2.10	3.4	4.44	4.28	61
RamanathaPuram	3.72	3.26	2.91	5.59	2.06	1.98	2.00	1.78	1.6	1.92	2.68	38
Virudhunagar	5.07	5.71	6.28	3.38	4.62	4.20	3.84	4.29	4.6	4.44	4.64	66
Sivagangai	4.35	4.64	3.66	0.78	3.43	5.16	3.41	3.32	2.3	3.12	3.42	48
Thirunelveli	2.05	1.59	1.43	0.35	0.59	0.60	0.90	0.39	0.9	0.98	0.98	14
Thoothukudi	1.22	0.94	0.48	0.01	0.27	0.28	0.29	0.27	0.4	0.49	0.47	7
The Nilgiris	-	-	-	0.01	0.00	0.00	0.00	0.01	0.0	0.01	0.01	0.14
Kanyakumari	0.01	0.04	0.02	0.02	0.01	0.02	0.04	0.03	0.0	0.02	0.02	0.33
District Average	8.7	9.2	8.41	7.41	6.7	6.55	6.6	5.71	5.6	5.71	7.06	

Table.4 Categorization of efficient zone

Districts	RSI	RYI	Category
Kancheepuram	H	H	MECZ
Thiruvallur	M	H	MECZ
Cuddalore	L	H	ECZ
Vilupuram	H	H	MECZ
Vellore	H	M	ECZ
Thiruvannamalai	H	M	ECZ
Salem	M	M	ECZ
Namakkal	H	M	ECZ
Dharmapuri	M	H	MECZ
Krishnagiri	M	M	ECZ
Coimbatore	L	M	ECZ
Thiruppur	L	M	ECZ
Erode	H	L	NECZ
Thiruchirappalli	M	M	ECZ
Karur	M	H	MECZ
Perambalur	L	M	ECZ
Ariyalur	L	H	ECZ
Pudukkottai	H	M	ECZ
Thanjavur	L	H	ECZ
Thiruvarur	L	H	ECZ
Nagapattinam	L	H	ECZ
Madurai	L	M	ECZ
Theni	L	H	ECZ
Dindigul	L	H	ECZ
Ramanathapuram	L	L	HICZ
Virudhunagar	L	L	HICZ
Sivagangai	L	L	HICZ
Thirunelveli	L	M	ECZ
Thoothukudi	L	M	ECZ
The Nilgiris	L	L	HICZ
Kanyakumari	L	M	ECZ

H-High; M-Medium; L-Low; MECZ- Most Efficient Cropping Zone; ECZ-Efficient Cropping Zone; NECZ-Not Efficient Cropping Zone; HICZ-Highly Inefficient Cropping Zone

Among other districts Vellore, Namakkal, Thiruvannamalai and Pudukkottai districts have high RSI and medium RYI values. Krishnagiri, Thiruchirappalli, Salem districts have medium RSI & medium RYI. Cuddalore, Ariyalur, Thanjavur, Thiruvarur, Nagapattinam, Theni and Dindigul districts have low RSI & high RYI. Coimbatore, Thiruppur, Perambalur, Madurai, Thirunelveli, Thoothukudi and Kanyakumari districts have low RSI & medium RYI. So, these twenty one districts were categorized under Efficient Cropping Zone (ECZ).

Erode district have high RSI and low RYI value, which was grouped under Not Efficient Cropping Zone (NECZ).

Rest of the four districts namely Ramanathapuram, Virudhunagar, Sivagangai and The Nilgiris have low RSI and low RYI values. These districts were identified as Highly Inefficient Cropping Zone (HICZ) for groundnut cultivation.

From this analysis, it is concluded that Kancheepuram district were found to be Highly Efficient Cropping Zone for groundnut cultivation. All soil, environmental and other factors in that area were highly suitable for groundnut cultivation. The technologies should be develop to further increase the productivity of groundnut. Crop loans and insurance for growing of groundnut will promote farmers to increase the area of cultivation and also minimize the risk.

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