CROP ROTATIONS FOR MAXIMUM PROFIT IN TAMIL NADU

Classification of Crop Plants

Abstract:

This software helps farmers to predict the best crop to cultivate for growing perennial crops based on the immediate weather, vegetation, evapotranspiration, climate, soil properties which includes soil nutrition, water retention, nutritional value and availability of water. Length of growing period as a function of rainfall, potential evapotranspiration and soil scape as a function of soils and physiography. This indirectly supports crop rotation which gradually improves not only the quality of soil but also the quality of the yield of the plant.

Introduction:

Latest concept of agro-climatic zoning or agroecologcal zoning may be implemented to decide the suitable crops. The concept agroecological regions and subregions include : bioclimate as a function of rainfall, temperature , vegetation and potential evapotranspiration ; length of growing period as a function of rainfall, potential evapotranspiration and soil storage and soil scape as a function of soils and physiography. Coupled with crop specific suitability criteria for soil and crop will further let you develop the whole concept of decision support on type of crops suitable or not in a given soil and climate.

Farmers in rural areas lack knowledge about latest technologies and hesitate to accept changes. Government bodies try their best to educate them about technology. This is another attempt in doing so. We are trying to predict the best crops to maximize profit and minimize loss. This software will be built with easy user interaction in mind. This software makes it easy for government bodies to recommend farmers what crops to grow based on soil condition

  For a perennial crop to complete it's life cycle not only requires constant care from farmer but also from nature. For example paddy requires lots of water during initial stages. This software helps a farmer to predict whether there might be any adverse conditions of drought which hinders the growth of the plant. On such occasions growing dry crops not only ensures better production but also saves capital.

Popular Crops in Tamil Nadu:

Crop		05-06		04-05	
		Production	%	Production	%
A CEREALS					
1.	Rice	5209433	85.18	5061622	82.46
2.	Jowar (Cholam)	231449	3.78	252063	4.10
3.	Bajra (Cumbu)	94799	1.55	124300	2.02
4.	Ragi	131914	2.16	154085	2.51
5.	Maize	241217	3.94	294717	4.80
6.	Korra	665	0.01	793	0.01
7.	Varagu	6676	0.11	10455	0.17
8.	Samai	19604	0.32	27866	0.45
9.	Other cereals	3127	0.05	3712	0.06
Sub Total (A)		**5938884**	**97.10**	**5929613**	**96.48**
B . PULSES					
10.	Bengalgram	4007	0.07	3942	0.06
11.	Redgram	20400	0.33	28979	0.47
12.	Greengram	45881	0.75	61760	1.00
13.	Blackgram	70758	1.16	82998	1.35
14.	Horsegram	22023	0.36	20110	0.33
15.	Other pulses	13934	0.23	18642	0.30
Sub total (B)		**177003**	**2.90**	**216431**	**3.52**
TOTAL FOODGRAINS (A+B)		**6115887**	**100.00**	**6146044**	**100.00**

Paddy cultivation in India:

	DISTRICT	Area	% to State	Gross Cropped area	% of Paddy area to Gross Cropped area
1.	Chennai	0	0.0	0	0
2.	Kancheepuram	114720	5.6	170458	67.3
3.	Thiruvallur	96994	4.7	163010	59.5
4.	Cuddalore	114291	5.6	272159	42.0
5.	Villupuram	168435	8.2	389392	43.3
6.	Vellore	58163	2.8	237833	24.5
7.	Thiruvannamalai	142744	7.0	304928	46.8
8.	Salem	37328	1.8	250573	14.9
9.	Namakkal	18833	0.9	205689	9.2
10.	Dharmapuri	29023	1.4	196648	14.8
11.	Krishnagiri	21980	1.1	204722	10.7
12.	Coimbatore	7406	0.4	333332	2.2
13.	Erode	43539	2.1	324701	13.4
14.	Tiruchirapalli	79576	3.9	204233	39.0
15.	Karur	18398	0.9	114554	16.1
16.	Perambalur	45952	2.2	227975	20.2
17.	Pudukottai	95986	4.7	162074	59.2
18.	Thanjavur	154901	7.5	241292	64.2
19.	Thiruvarur	156098	7.6	237715	65.7
20.	Nagapattinam	158100	7.7	241291	65.5
21.	Madurai	70996	3.4	160810	44.1
22.	Theni	15694	0.8	120071	13.1
23.	Dindigul	23735	1.2	261758	9.1
24.	Ramanathapuram	127395	6.2	185563	68.7
25.	Virudhunagar	30776	1.5	148843	20.7
26.	Sivagangai	89924	4.4	120451	74.7
27.	Tirunelveli	86397	4.2	200703	43.0
28.	Thoothukudi	19932	1.0	179054	11.1
29.	The Nilgiris	1430	0.1	81079	1.8
30.	Kanyakumari	21709	1.1	91807	23.6
	STATE	2050455	100.0	6032718	34.0

Dry Crops plantation in Tamil Nadu:

SEASON	Area in ha			In terms of Rice					
				Production in tonnes			Yield rate in Kg/ha.		
	05-06	04-05	% Var.	05-06	04-05	% Var.	05-06	04-05	% Var.
1.Kuruvai	321865	304597	5.7	1061401	1005504	5.6	3298	3301	-0.1
2.Samba	1531382	1437803	6.5	3560764	3651979	-2.5	2325	2540	-8.5
3.Navarai	197208	130422	51.2	587268	404139	45.3	2978	3099	-3.9
All Seasons	2050455	1872822	9.5	5209433	5061622	2.9	2541	2703	-6.0

Plant selection based on Soil Types:

Soil is one of the most important non-renewable basic resources on the earth's surface.

The major soil groups of Tamil Nadu are:

Red soils, (62 per cent)
Black soils (12 per cent)
Laterite soils (3 per cent) and
Coastal soils (7 per cent)

The Red soils are further classified as:

Red loamy (30 per cent)
Red sterile (6 per cent)
Red-sandy (6 per cent)
Thin red (2 per cent) and
Deep red loamy soils (8 per cent)

As per the USDA system of soil classification (Taxonomy), the soils of Tamil Nadu are classified in to Six orders viz,

Entisols : Young river alluvium, sandy and eroded red and laterite soils.
Inceptisols: Moderately deep red, laterite and black soils are included under Inceptisol.
Alfisols : Deep red and laterite soils
Ultisols : Highly weathered laterite soils
Vertisols: Deep black cotton soils and old alluvial soils are classified under vertisol.

Classification based on climate:

1. Tropical: Crops grow well in warm & hot climate. E.g. Rice, sugarcane, Jowar etc
2. Temperate: Crops grow well in cool climate. E.g. Wheat, Oats, Gram, Potato etc.

Classification Based on growing season:

1. Kharif/Rainy/Monsoon crops: The crops grown in monsoon months from June to Oct-Nov, Require warm, wet weather at major period of crop growth, also required short day length for flowering. E.g. Cotton, Rice, Jowar, bajara.
2. Rabi/winter/cold seasons crops: require winter season to grow well from Oct to March month. Crops grow well in cold and dry weather. Require longer day length for flowering. E.g. Wheat, gram, sunflower etc.
3. Summer/Zaid crops: crops grown in summer month from March to June. Require warm day weather for major growth period and longer ay length for flowering. E.g. Groundnuts, Watermelon, Pumpkins, Gourds.

Classification based on life of crops/duration of crops:

1. **Seasonal crops:** A crop completes its life cycle in one season-Karin, Rabi. summer. E.g. rice, Jowar, wheat etc.
2. Two seasonal crops: crops complete its life in two seasons. E.g. Cotton, turmeric, ginger.
3. Annual crops: Crops require one full year to complete its life in cycle. E.g. sugarcane.
4. Biennial crops: which grows in one year and flowers, fructifies & perishes the next year? E.g. Banana, Papaya.

5. Perennial crops: crops live for several years.   E.g. Fruit crops, mango, guava etc.

Classification based on cultural method/water:

1. Rain fed: crops grow only on rain water. E.g. Jowar, Bajara, Mung etc.
2. Irrigated crops: Crops grows with the help of irrigation water. E.g. Chili, sugarcane, Banana, papaya etc.

Classification based on photosynthesis' (Reduction of CO2/Dark reaction):

1. **C3 Plants:** Photo respiration is high in these plants C3 Plants have lower water use efficiency. The initial product of C assimilation in the three 'C' compounds. The enzyme involved in the primary carboxylation is ribulose-1,-Biophospate carboxylose. E.g. Rice, soybeans, wheat, barley cottons, potato.

2. **C4 plants:** The primary product of C fixation is four carbon compounds which may be malice acid or acerbic acid. The enzymes responsible for carboxylation are phosphoenol Pyruvic acid carboxylose which has high affinity for CO_2 and capable of assimilation CO_2 event at lower concentration, photorespiration is negligible. Photosynthetic rates are higher in C4 than C3 plants for the same amount of stomatal opening. These are said to be drought resistant & they are able to grow better even under moisture stress. C4 plants translate photosynthates rapidly. E.g. Sorghum, Maize, napter grass, sesame etc.

3. **Cam plants:** (Cassulacean acid metabolism plants) the stomata open at night and large amount of CO_2 is fixed as a malice acid which is stored in vacuoles. During day stomata are closed. There is no possibility of CO_2 entry. CO_2 which is stored as malice acid is broken down & released as CO_2. In these plants there is negligible transpiration. C4 & cam plant have high water use efficiency. These are highly drought resistant. E.g. Pineapple, sisal & agave.