

Online fertiliser recommendation software

STCR based Online Fertiliser Recommendation software has been developed by linking Soil Test Crop Response based Fertiliser Nutrient Prescription Equations for FCV Tobacco in NLS.

STCR based online software for fertiliser recommendation in NLS region

The software was developed in the form of a website for global accessing through Internet with two main modules viz., Administrator and 'User'. Administrator modules is an authenticated based modules which allows the administrators / programmers to view / edit the target yield equations, view the list of messages received from the users and the list of users (farmers) data which was entered into this software for computations.

The 'User' module classified into three menus viz., Farmer details, Field / Crop details, Soil test data and yield target. Soil test data to be filled and range of yield targets for respective region were given which are to be selected by the user. Once the 'submit' button is selected report will be generated for the selected yield target. Provision is made to take the hard copy of the same. 'Contact' option allows the user to give their suggestions in the 'Message' box which includes their name, email and mobile number.

ICAR - CENTRAL TOBACCO RESEARCH INSTITUTE, RAJAHMUNDRY
Soil Test Crop Response Based Fertiliser Recommendation for FCV Tobacco
Northern Light Soils

Farmer Details		District: WEST GODAVARI	
Name:	K VENKATARAJO	State:	Andhra Pradesh
Survey Number:	15	Phone Number:	09177833628
Village:	JEELUGUMILLI	Irrigated/ Rainfed:	Irrigated
Mandar:	JEELUGUMILLI		
Field / Crop Details		Average Yield (quintals/ha): 22	
Name of the Variety:	KANCHAN	Green Manure:	Yes
Season:	Rabi	Date of Planting:	Normal
Spacing:	100 X 60 cm	Nitrogen Fertiliser (kg/ha):	Ammonium Sulphate:150
FYM (tha):	2.5	Potassium Fertiliser (kg/ha):	SOP:100
Phosphorous Fertiliser (kg/ha):	DAP:100		
Soil Test Data		EC (dSm): 0.04	
pH:	5.8	Available Nitrogen (kg/ha):	22
Available Nitrogen (kg/ha):	110	Available Phosphorus (kg/ha):	22
Organic Carbon (%):	0.2	Available Potassium (kg/ha):	140
Nutrient Recommendation (kg/ha)		Yield Target(q/ha): 22	
N:	118	P ₂ O ₅ :	27
K ₂ O:	138		
Fertilizer Recommendation			
Basal / Split	Nutrient (kg/ha)	Fertiliser Source	Fertiliser Dose (kg/ha)
Basal	Nitrogen (N):	30 Ammonium Sulphate	91
	Phosphorous(P ₂ O ₅):	27 DAP	59
	Potassium (K ₂ O):	35 Potassium Sulphate	69
2 nd Dose	Nitrogen (N):	59 Ammonium Sulphate	281
	Potassium (K ₂ O):	69 Potassium Sulphate	138
3 rd Dose	Nitrogen (N):	30 Urea	65
	Potassium (K ₂ O):	35 Potassium Sulphate	69

Note : Dolomite @ 200 kg/ha is recommended for the supply of calcium to FCV tobacco in NLS region.
Other Recommendations
Organic Manures & Amendments
Organic manures: 2.5 tha or green manure

Benefits

- Farmers of a specific agro-climatic region can get the fertiliser recommendation for their fields using soil test values for a desired yield target of FCV tobacco
- Report of fertiliser recommendation can be generated online and same can be taken as a hard copy from any place

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Soil Test Crop Response Based Fertiliser Recommendation for Yield Targets of FCV Tobacco in Northern Light Soils of A.P.



Project

Assessment of Soil Fertility and Development of Online Fertiliser Recommendation System for FCV tobacco growing soils of India

(Sponsored by: Tobacco Board, Guntur)

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Introduction

Soil testing as a tool for judicious fertilizer use is a well-recognized practice all over the world which takes care of too little, too much or disproportionate applications of nutrients. Soil testing and fertility management programmes have been given adequate importance for sustaining crop production and balanced fertilization in Indian agriculture.

After introduction of high yielding varieties and hybrids the need for systematic Soil Test Crop Response research in different soil agro-climatic regions become evident. ICAR established the AICRP on STCR in 1967 and the STCR concept was developed by Ramamoorthy *et al.*, during 1967. STCR provides the relationship between a soil test value and crop yield. The soil test values are needed to be correlated with actual crop response obtained under field conditions.

Objective

- To prescribe fertilizer doses for a given crop based on soil test values to achieve the "Targeted yields" in a specific soil agro-climatic region under irrigation or protective irrigation conditions by using mathematical equations for different crops and different soil agro-climatic zones separately. This takes into consideration the efficiency of utilization of soil and added fertilizer nutrient by the crops and its nutrient requirements for a "desired yield level"

Concept of STCR and Targeted Yield

This approach is aiming at obtaining a basis for precise quantitative adjustment of fertilizer doses under varying soil test values and response conditions of the farmers and for a given targeted yield levels. The fertilizers are recommended based on the following criteria.

- Fertilizer recommendations based on regression analysis approach
- Recommendations for certain % of maximum yield

Advantages

- Efficient and profitable site-specific fertilizer recommendation for increased crop production and for maintenance of soil fertility.
- Aims to provide balanced, efficient and profitable nutrient application rates for pre-set yield targets giving due consideration to basic fertility status of soil.

Methodology

To develop the prescription equations for fertiliser nutrient requirement for a targeted yield, the following basic data is required which is to be generated through standard STCR field experimentation methodology.

- Nutrient requirement (NR) in kg per quintal of the produce
- Percentage contribution from soil available nutrients (Cs)
- Percentage contribution from added fertilizers (Cf) towards making effective fertilizer prescriptions for specific yields.

Generated basic data are transformed into workable adjustment equations for required fertiliser nutrient for a given yield target i.e cured leaf (q ha⁻¹):

$$\text{Fertiliser N/P}_2\text{O}_5/\text{K}_2\text{O} = \text{NR}/(\text{Cf}/100) * \text{T} - \text{Cs}/\text{Cf} * \text{STV}$$

Where,

F = Fertilizer (kg ha⁻¹); NR = Nutrient requirement; Cs = Per cent contribution from soil;

Cf = Per cent contribution from fertilizer; STV = Soil test value (kg ha⁻¹); T = Yield target (q ha⁻¹).

STCR based Fertiliser Recommendation in FCV Tobacco

FCV tobacco is a commercial crop grown in the states of Andhra Pradesh and Karnataka used for cigarettes. It is generally grown in light textured soils in Karnataka during Kharif and in Andhra Pradesh during Rabi. It is grown in an area of 1.51 Lakh hectares with a production of 240 M kg. Leaf is the main commercial part and its physical and chemical quality is the important factor that influence the market.

Nitrogen and Potassium are the major nutrients influencing the leaf quality. There was no soil test-based fertiliser recommendation to FCV tobacco only the region wise standard recommendation is being followed. Recent years it was found that there was a build up of Phosphorus in the soil. In some areas the availability of potassium is high. Use of high yielding varieties and hybrids require relatively high amounts of these nutrients. Balanced use of fertilisers based on soil tests can reduce the phosphorus accumulation and excessive application of potassium in the form of sulphate of potash which is costly.

In order to rationalise the usage of phosphorus and potassium and to avoid the imbalance in nutrient application the STCR based fertilizer prescription equations were developed for desired yield targets in FCV tobacco under Northern Light Soils with the help of AICRP on STCR, Indian Institute of Soil Science, Bhopal. Workable adjustment equations developed for FCV tobacco in Northern Light soils of Andhra Pradesh are:

- FN = 9.91T - 0.91 SN**
- FP₂O₅ = 4.09T - 2.89 SP**
- FK₂O = 8.47T - 0.35 SK**

A ready reckoner was developed using the developed equations to know the fertiliser nutrient requirement instantly for expected yield targets of FCV tobacco in NLS region.

READY RECKONER

STCR based Fertiliser Recommendation for Targeted Yields of FCV Tobacco grown in Northern Light Soils Region

A. Fertiliser Nitrogen Recommendation (kg N/ha)

Yield Target (q/ha)	Soil test value for Nitrogen (kg/ha)									
	80	100	110	120	130	140	150	160	170	180
20	125	107	98	89	80	71	62	53	44	34
22.5	150	132	123	114	105	96	86	77	68	59
25	175	157	148	139	129	120	111	102	93	84
27.5	200	182	172	163	154	145	136	127	118	109
30	225	206	197	188	179	170	161	152	143	134

* Reduce Nitrogen dose by 5.2 kg for every one tonne FYM applied

B. Fertiliser Phosphorus Recommendation (kg P₂O₅/ha)

Yield Target (q/ha)	Soil test value for Phosphorus (kg/ha)									
	10	14	18	22	26	30	34	38	42	46
20	53	41	30	18	7	-5	-16	-28	-40	-51
22.5	63	52	40	28	17	5	-6	-18	-29	-41
25	73	62	50	39	27	16	4	-8	-19	-31
27.5	84	72	60	49	37	26	14	3	-9	-20
30	94	82	71	59	48	36	24	13	1	-10

* Reduce Phosphorus dose by 0.5 kg for every one tonne of FYM applied

C. Fertiliser Potassium Recommendation (kg K₂O/ha)

Yield Target (q/ha)	Soil test value for Potassium (kg/ha)									
	160	180	200	220	240	260	280	300	320	340
20	113	106	99	92	85	78	71	64	57	50
22.5	135	128	121	114	107	100	93	86	79	72
25	156	149	142	135	128	121	114	107	100	93
27.5	177	170	163	156	149	142	135	128	121	114
30	198	191	184	166	170	163	156	149	142	135

* Reduce Potassium dose by 4.8 kg for every one tonne of FYM applied

Note: Select the yield target and find the corresponding fertiliser nutrient requirement against the soil test value

Fertiliser sources

- ★ 4.76 kg Ammonium sulphate provides 1 kg Nitrogen
- ★ 6.60 kg Calcium nitrate provides 1 kg Nitrogen
- ★ 2.17 kg DAP provides 1 kg Phosphorus (P₂O₅) and 0.39 kg Nitrogen
- ★ 2.00 kg Potassium Sulphate provides 1 kg Potassium (K₂O)
- ★ 2.22 kg Potassium Nitrate provides 1 kg Potassium (K₂O)