

Dept. of Soil Science And Agril.

Chemistry

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Soil Fertility And Plant Nutrition

TOPIC:

**Soil Test Crop Response (STCR) and
Targeted Yield Concept**

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Soil Test Crop Response and targeted Yield Concept

Most popular and adopted method of soil Fertility Evaluation is soil Testing method. But flat recommendations on the basis of soil test values are not suitable for every conditions. For example the conditions like different soil pH, different water availability, different management practices, different temperature regime, different varieties and crop rotation etc. the requirement of fertiliser will be different.

Due to adoption of multiple cropping and introducing of high yielding varieties of principle crops in our country, soils are depleted in nutrients at a much faster rate than in the case of old cropping system. As a result, crop production has become highly fertilizer oriented. As cost of fertilizers are very high in our country, judicious use of fertilizers are required. Soil problems in making fertilizer recommendations based only on soil test values.

Recently in our country systems of soil test are being modified incorporating crop response data available from systematic field experiments. It has been accepted by the scientists that any soil test method intended for use in advisory work needs to be correlated with actual crop response obtained under field conditions and the success of the fertilizer recommendations programme will depend on the accuracy of the calibrations obtained this way. Modern approaches of soil fertility evaluation are mainly focussed towards increasing fertilizer use efficiency. The approaches may be as follows:

1. Soil analysis and correlation.
2. Critical soil test level approach.
3. Agronomic approach.
4. Soil fertility cum soil survey.
5. Inductive approach based on soil test and crop response correlation
6. Deductive approach based on soil test crop response correlation and
7. Targeted yield concept approach.

The purpose of different approaches is to utilise soil and fertilizer nutrients judiciously and effectively in a manner best suited to different agro-climatic concept approach is being discussed.

From the soil test, crop response field experiments, it has been possible to derive three basic parameters like:

- (i) Nutrient requirement in kg per quintal of the produce,
- (ii) Percentage contribution from soil available nutrients and
- (iii) Percentage contribution from added fertilizers towards making effective fertilizer prescription for specific yields.

The parameters have been calculated as follows:

- (i) Nutrient requirement in kg for producing one quintal of grain

$$= \frac{\text{Total uptake of nutrient (Grain+Straw) in kg/ha}}{\text{Yield of grain } \left(\frac{q}{ha}\right)}$$

(ii) Contribution from soil (in per cent) (cs)

$$= \frac{\text{Total uptake of nutrient in control plots} \left(\frac{\text{kg}}{\text{ha}} \right)}{\text{Available soil test values of control plots} \left(\frac{\text{kg}}{\text{ha}} \right)} \times 100$$

(iii) Contribution from fertilizer (cf) (in per cent)

= Total uptake of nutrient in treated plot – (available soil test value of nutrient in treated plot x cs)

(iv) Contribution percentage from fertilizer

$$= \frac{cf}{\text{Fertilizer dose applied} \left(\frac{\text{kg}}{\text{ha}} \right)} \times 100$$

Basic data have been derived from the field experiment conducted under the project of soil test crop response correlation in district of Burdwan West Bengal on Vindhyan alluvium Soil using paddy (Cv. Ratna) during Kharif season which are as follows:

	N	P2O5	K2O
1. Nutrient requirement in Kg per quintal of Grain	2.60	1.53	3.31
2. Percent contribution from soil available nutrients	36	33	51
3. Percent contribution from fertilizer Nutrient	33	45	158

From above basic data soil test calibrations given in the form a ready reckoner to recommended fertilizer doses for obtaining specific yield targets.

Soil Test Crop Response (STCR) Approach-

This is also called as Rationalized Fertilizer Prescription approach in which inherent soil fertility and yield level of the crop are taken into account while recommending the fertilizer doses. Fertilizer recommendations are made for different crops and different zones separately. Fertilizer recommendations based on such equation has been given as under for rice crop:

$$FN = 4.39 T - 0.6723 SN$$

$$FP_2O_5 = 2.83 T - 6.110 SP$$

$$FK_2O = 1.41 T - 0.329 SK$$

The soil phosphorus and potassium in the equation are considered in elemental form while fertilizer P and K are in oxidized forms as P₂O₅ and K₂O.

In the equation FN - Fertilizer nitrogen; FP₂O₅ - Fertilizer P₂O₅; FK₂O - Fertilizer K₂O; SN- Soil Nitrogen; SP- Soil phosphorus, SK- Soil potassium and T – targeted yield of rice.