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SOIL SURVEY AND EVALUATION FOR LAND USE INTERPRETATIVE GROUPING - HORTICULTURAL RESEARCH STATION FARM, PERIAKULAM

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ABSTRACT

Detailed soil survey of Horticultural Research Station Farm, Periakulam and characterisation of morphology were made. Periakulam, Irugur and Palaviduthi series were identified and mapped. The morphological characteristics and productivity rating are described. There can be 320, 330 and 640 per cent of improvement in productivity rating by scientific management in Pvd, Pkm, Igr series respectively.

The information on the resources of soils, will be useful to practice scientific agriculture to get maximum return from each and every unit area of land. A detailed soil survey of Horticultural Research Station, Periakulam was undertaken to investigate the morphological characteristics of the soil series and finally to arrive at the interpretative groupings and taxonomy for the different soil phases and to suggest management practices.

The farm is situated at 6 km away from Periakulam to the right of Periakulam - Batlagundu road in Madurai district. It is geographically situated at 10°1' N latitude and 77°3' E longitude with an altitude of 260 M above MSL. It has an area of 112.15 ha. It experiences long and hot summer and a very brief cold and rainy winter with unpredictable monsoonic rain effect. This tract is generally undulating in nature forming the foot hill region of Kodaikanal hill ranges, an off-shoot from the western ghats.

MATERIALS AND METHODS

A detailed soil survey of the farm was carried out using the cadastral map as the base material as per the procedure given by Soil Survey Staff (1951). In each mapping unti (soil series), three pedons were dug up at different places of the farm, examined, described as per the procedure of soil survey staff (1951) and sampled horzontalwise for laboratory analysis.

RESULTS AND DISCUSSION

A detailed soil survey amp of the farm and characteristics of the soil are furnished in tables 1 and 2 which reveals three mapping units, namely Pvd-S1-d5 b-e1, Pkm-gsl-d4 c-e3, st2, G1 and Igr-gls-td3 D-e3, st3, G2, occupying 52.6, 27.8 and 31.7 ha respectively.

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Based on the morphological, physical and chemical properties (Balasubramanian, 1987) the interpretative groupings on Storie Index Rating (Storie, 1964), Land use capability classification (Soil Survey Staff, 1964), Soil and Land Irrigability classifications (Anon, 1970) and productivity and potential productivity classification (Riquier et.al., 1970) along with co-efficient of improvements are given in Table -2.

It is seen that the Pvd and Pkm series are placed under Storie Index Ratings grade 3 (Fair) and pointing out the near marginal suitability for sustained use and agriculture. The Igr series secures the lowest score (Grade 5 very poor), owing, to its coarse texture, shallow, solum, low nutrient status and potential erodibility hazards, thus making it fit for limited use.

The land capability classification of Pvd series revealed that moderate soil problems such as erodibility and sub-surface dense layer hazards. The Pkm series indicated moderately good suitability for cultivation with moderate slopes favouring erosion due to its light texture, potential erodibility and gravelly texture hazards (Units 1,4). The characteristics of Igr series revealed its suitability for occasional or limited cultivation with severe wind and water erosion potentiality due to coarse texture and shallow solumn hazards. The potential hazards like erodibility, coarse loamy and very gravelly texture and low fertility limitations were observed.

The Pvd series has sub-surface dense layer and gravels that will not hinder the horticultural crops since they have thick roots capable of easy penetration and proliferation. Form the above interpretations of the different soil series under land use capability classification, it could be seen that both Pkm and Igr series have coarse texture and potential erodibility restrictions dictating the need for soil conservation measures in this tract. In order to conserve moisture in those soils, soil breeding (mixing with high clay containing vertisols) as suggested by Jagannathan (1985), amending these soils with organic wastes like coir pith filter cake as suggested by Mayalagu (1986). These interpretations are in line with the reports of Mahapatra (1979), Natarajan and Sachithanandham (1985) and Balasubramainan et.al.,(1986). It could be interestingly noted that both storie index rating and land capability classification agree in the class or grade of evaluation for these soils.

With regard to soil irrigability classifiction Pvd, Pkm and Igr had slight, moderately and severe soil limitations for sustained use under irrigation respectively.

The Pvd series and Pkm series had moderate soil and topography (2st) and topography limitations for sustained use under irrigation. The Igr series had severe soil and topography (3st) limitations for land irrigability.

Being a horticultural research station, the Igr series in this farm is unsuitable for horticultural tree crop and deep rooted annuals.

Considering the morphological, physical and chemical properties of these soils, the taxonomy of the soils is as follows. The Palaviduthi series is a member of fine loamy, kaolinitic, isohyperthermic family of Udic Rhodustalfs. The Irugur series is a member of loamy, skeletal, kaolinitic, isohyperthermic family of heptic Rhodustalfs.

The Pvd and Pkm series are potentially good for crop production. The productivity may be increased three folds in these soils. The Pvd series is highly suitable for majority of the crops. The Pkm series is highly suitable for many garden land crops. The Igr series is only average in potential productivity and unsuitable for most of the crops. However, the productivity may be increased six folds with suitable management practices.

Table -1 Comparative statement of soils morphology in horticultural research station, Periakulam

Sl. No.	Morphological features	Palavidhuthi series (Pvd)	Periyakulam series (Pkm)	Irugur series (Igr)
1.	Parent material	Weathered gneiss	Weathered gneiss with ferrugonous conoretions	Weathered gneiss overlaid with quartz band
2.	Depth ofsolum	Very deep (d_5)	Deep (d_4)	Moderately deep (d_3)
3.	Physiographic position	Low terrace	Low terrace	Upland
4.	Soil colour			
	Surfce	5 YH 4/4 (Reddish brown)	2.5 YH 4/6 (Dark reddish brown)	2.5 YH 4/6 (Dark reddish brown)
	Sub-surface	2.5 YH 3/6 (Dark red)	2.5 YH 3/4 (Dark reddish brown)	2.5 YH 3/4 (Dark reddish brown)
5.	Textural class			
	Surface	al	gal	gls
	Sub-surface	sol to gao	gacl to gol	gal
6.	Sructure			
	Surface	Very fine, week, subangular blooky (vf_1sbk)	Fine to medium, weak, crumb (f-m_2sbk)	Fine to medium, weak, sub-angular blooky (vf_1abk)
	Sub-surface	Medium to coarce, strong, subangular blooky (m-O_3abk)	Fine to medium, moderate, subangular blooky (f-m_2sbk)	Fine to medium, weak, sub-angular blooky (m-c_3abk)
7.	Clay akins	Patchy, moderately thin, clay films on pvd faces and pore spaces.	Clay films both in pores and pad faces.	Clay films on pores.

8.	Internal drainage	Moderately slow	Moderately rapid	Rapid
9.	Profile group	VII o	VII o	VII
10.	Soil reaction			
	Surface	Neutral	Neutral	Acidic
	Sub-surface	Neutral	Neutral	Acidic
11.	Diagnostic horizon			
	Sufrace	Ochric epipedon	Ochric epipedon	Ochric epipedon
	Sub-surface	Argillic horizon with clay pan (B22tm)	Argillic horizon (B22t)	Argillic horizon (B2t)
12.	Surface features	Nil	Stoniness and gullies present	More stoniness and gullies present

TABLE -2 : Interpretative groupings of soils of horticultural research station, Periakulam

	Interpretative grouping	Palavidhuthi series (Pvd)	Periyakulam series (Pkm)	Irugur series (Igr)
I	Storie Index Rating			
	Rating (Per Cent)	45.91	45.52	18.20
	Grade	3(Fair)	3(Fair)	5(Very poor)
II	Land Use Capability Classification			
	Class/Sub-class/Unit	III s-u	III e,s-1,4	IV e,s-1,4,9
III	Soil Irrigability Classification			
	Class	A	B	C
IV	Land Irrigability Classification			
	Class/sub-class	2st	2st	3st
V	Productivity Classification			
	Rating (Percent)	19.66	17.00	3.98
	Grade	4 (Poor)	4 (Poor)	5 (Extremely poor)
VI	Potential Productivity Classification			
	Rating (Percent)	61.97	55.77	25.49
	Grade	II (Good)	II (Good)	III (Average)
	Co-efficient of improvement	3.2	3.3	6.4

VII	Crop Suitability Classification			
	Wet lands crops			
	Paddy	HS	PS	US
	Sugarcane	HS	PS	US
	banana	HS	MS	US
	Garden land crops			
	Millets	HS	HS	MS
	Groundut	HS	HS	MS
	Cotton	MS	MS	US
	Chillies	HS	MS	US
	Coconut	HS	MS	US
	Vegetables	HS	HS	PS
	Tapioca	HS	HS	US
	Fruit Trees	HS	MS	US
	Dryland crops			
	Millets	MS	MS	PS
	Cotton	HS	PS	US
	Pulses	HS	HS	MS
	Groundnut	HS	MS	PS
	Chillies	PS	PS	US

N.B. : HS - Highly stuited, PS - poorly suited,
MS - Moderately suited, US - Unsuited.

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GENOTYPIC ASSOCIATION AND PATH ANALYSIS IN F_3 GENERATION OF RICE CROSSES

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ABSTRACT

Genotypic correlation and path co-efficient analyses were carried out in F_3 populations of two intervarietal crosses of rice for grain yield and its components. Tiller number, panicle length and plant height showed positive correlation with grain yield. Hundred grain weight exhibited negative correlation with grain yield. Due stress must be laid on number of productive tillers per plant and panicle length during the selection for higher yield in rice.

INTRODUCTION

A detailed study of nature and direction of association between yield components and with yield and a knowledge of their direct and indirect causes on yield are the prime requisites for an efficient plant breeding programme. The present paper reports the results of an investigation carried out in intervarietal crosses of rice (Oryza sativa L.) in F_3 generation bring out useful relationships among different traits associated with yield.

MATERIALS AND METHODS

The study was conducted with intervarietal cross of rice in F_3 generation. The F_3 populations of Co 37 X Co 41 (cross 1) and its reciprocal Co 41 X Co 37 (cross 2) formed the material for the present study. Twenty five families in each cross combinations were raised in a randomised block design with three replications. Each family was allotted to a row of three meter length. Row to row and plant to plant distances were