

loyal to such dealers. The dealers are playing a crucial role in recommending and supply of various plant protection chemicals and the dealers should be given training on plant protection at periodic intervals.

REFERENCES

- MOHANAN, N., (1980). Farmers' Experiences with Cotton Pests and Pesticides. *Pesticides* 14 (3) : 3-6.
- SRISANKARI, (1991). A study of demand for pesticides at farm level for cotton (unpublished M.Sc. (Ag.) Thesis, Tamil Nadu Agricultural University, Coimbatore).
- SINGH, S.R. and SINGH, Y.P. (1986). Discriminating factors in selection of plant protection equipments users survey. *Pestology* 10 (2) : 25-30.
- SIVAKUMAR, S.D., (1987). A study on the market structure and buying behaviour of the farmers with reference to pesticides. (unpublished M.Sc.(Ag.) Thesis, Tamil Nadu Agricultural University, Coimbatore).

(Received : December 1996 Revised : February 1998).

Madras Agric. J., 85(5,6): 280 - 285 May, June 1998
<https://doi.org/10.29321/MAJ.10.A00739>



DETAILED SOIL SURVEY AND EVALUATION FOR LAND USE INTERPRETATIVE GROUPING IN TAMIL NADU AGRICULTURAL UNIVERSITY FARM, COIMBATORE.

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ABSTRACT

Based on detailed soil survey of the Tamil Nadu Agricultural University main campus farm, six series namely Palathurai (Pth), Somayanur (Smy), Peelamedu (Plm), Perianaickanpalayam (Pyk), Panaimarathupatti (Pmt) and Chavadiparai (Cvp) series were identified and mapped by the detailed soil survey. According to USDA system of soil taxonomy, the soils were classified as : Pth and Smy - Typic Haplustalfs, Plm - Typic Pellusterts, Pyk - Typic Chromusterts, Pmt - Vertic Ustifluvents and Cvp - Typic Rhodustalfs. Under the different interpretative groupings viz., land capability classification, storic index rating, soil and land irrigability, productivity rating and potential productivity rating of the soils of the farm, Smy and Pyk series were adjudged to be the best productive soils. The co-efficient of improvement values revealed that there was high scope to enhance the productivity of all these soils through extra investment.

KEY WORDS : Detailed Soil survey, soil taxonomy, soil series, interpretative groupings, land capability, soil rating.

Adequate soil care is the prime concern to the productivity of soil which forms major part of the factors at production viz., land, labour, capital and organisation. The proper utilisation of soil depends on the awareness of the whole nature of soil. It is highly imperative to state that the study on soil resources, identification, classification etc. are highly useful to a scientist so as to enable one make use of the soil resources to the best advantage of boosting production of food in a country like India, where the population growth is threatening the economy of the nation in the recent decades. The Tamil Nadu Soil Survey and Landuse Organisation performed reconnaissance soil survey for mapping the series at phase level in Coimbatore district. The characterization, classification and interpretative groupings of the Tamil Nadu Agricultural

University farm soils are lacking. Therefore, the detailed investigation of the oldest agricultural institution in India was taken up.

MATERIALS AND METHODS

The study was under taken during 1993 to assess the potentiality of soils in Tamil Nadu Agricultural University main campus farm, Coimbatore including the wetland and Paddy Breeding Station farm which is situated 7 km away (west) from the Gandhipuram bus stand of Coimbatore. This farm is geographically situated at 11°N latitude and 77°E longitude with an altitude of 930.0 m above MSL. It experiences long and hot summer and a very brief cold and rainy winter with unpredictable monsoonic rain effect. The mean annual rainfall is 675 mm with about 45 per cent

from the north-east monsoon, about 25 per cent from the south-west monsoon and the rest from summer showers and during winter period. The mean annual, summer and winter temperatures are 31°C, 35.1°C and 29.7°C respectively qualifying for "megathermic" soil temperature regime. This tract is generally having basin topography. The main sources of irrigation to this area are borewells and Chitraichavadi canal.

The six pedons representing the soil series viz., Palathurai series, Somayanur series, Peclamedu series, Perianaickanpalayam series, Panaimarathupatti series and Chavadiparai series were studied and the morphology was described (Soil Survey Staff, 1951). The soils were classified as per the USDA system of soil taxonomy (Soil Survey Staff, 1975). The land capability classification, soil irrigability and land irrigability classifications were computed on the basis of Soil Survey Staff (1970). The Storie Index soil rating was done as per the method of Storie (1964). The

soil productivity, potential productivity and co-efficient of improvement were evaluated according to the method of Riquier *et al.* (1970).

RESULTS AND DISCUSSION

The detailed soil survey map of Tamil Nadu Agricultural University main campus farm, Coimbatore depicted in Fig. 1, reveals six mapping units as

$\frac{\text{Pth} - \text{sl} - \text{d5}}{\text{B} - \text{c2}}$ $\frac{\text{Smy} - \text{cl} - \text{d4}}{\text{A} - \text{c2}}$ $\frac{\text{Plm} - \text{cl} - \text{d5}}{\text{B} - \text{c2}}$

$\frac{\text{Pyk} - \text{cl} - \text{d5}}{\text{B} - \text{c2}}$ $\frac{\text{Pmt} - \text{c} - \text{d5}}{\text{B} - \text{c2}}$ $\frac{\text{Cvp} - \text{sl} - \text{d5}}{\text{B} - \text{c2}}$

Where,

Pth = Palathurai series, Smy = Somayanur series, Plm = Peclamedu series, Pyk = Perianaickanpalayam series, Pmt = Panaimarathupatti series and Cvp = Chavadiparai



Fig. 1. Detailed soil survey map of Tamilnadu Agricultural University main campus farm Coimbatore

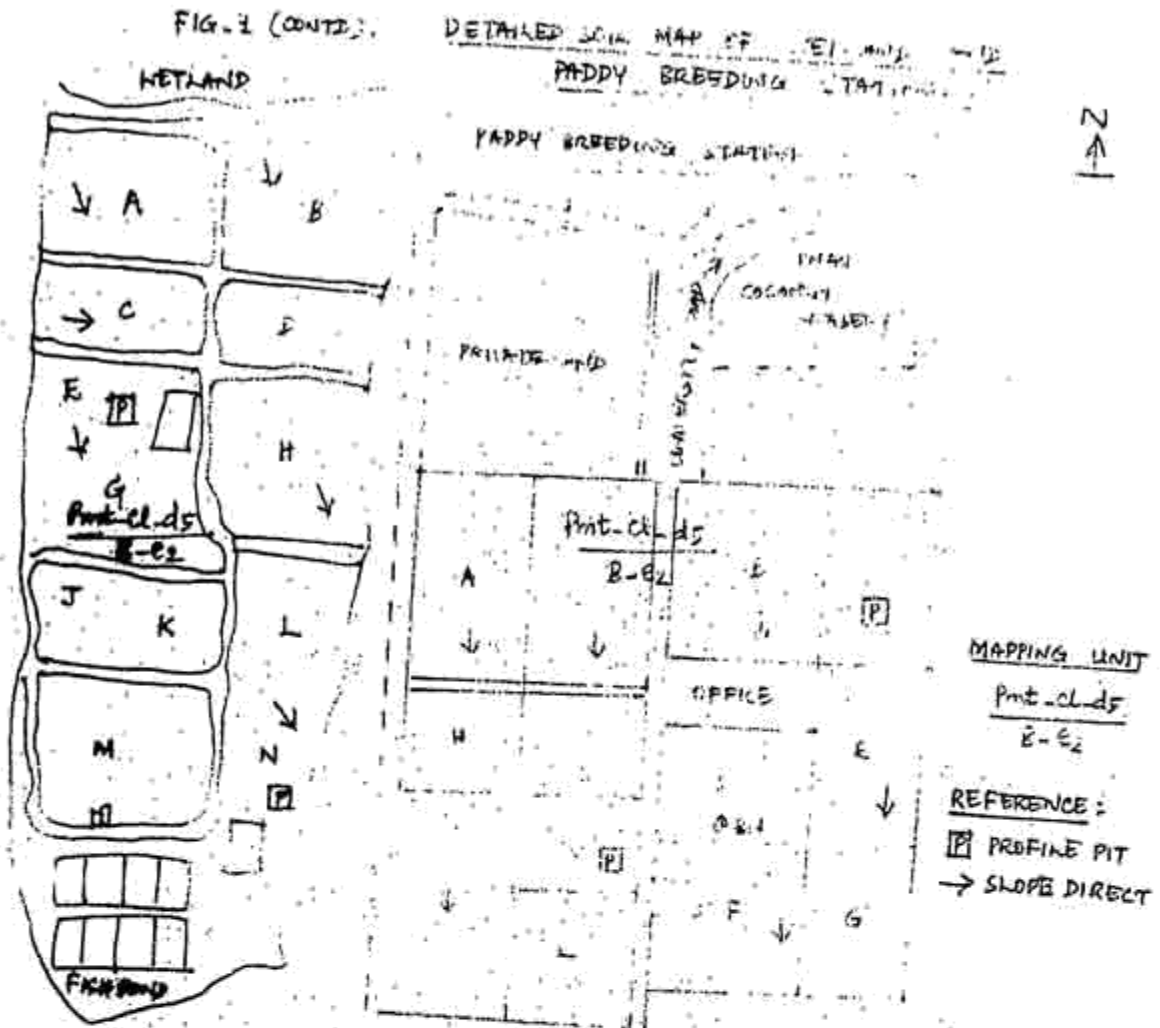


Fig. 1. (Contd.) Detailed soil map of Wetland and Paddy Breeding Station

series occupying 25.17, 28.62, 35.31, 11.92, 32.16 and 13.52 ha respectively. The Pth series in this farm has very deep solum (d5), sandy clay loam (SCL) textured surface, 1 to 3 per cent slope (B) having moderate erosion hazard (e2). The Smy series in this farm has deep solum (d⁴), clay loam textured surface (cl), less than 1 per cent slope (A) with moderate erosion hazard (e2). The Plm series has very deep solum (d5), clay loam textured surface (cl) with calcium carbonate nodules found distributed throughout the profile, 1 to 2 per cent slope (B) and moderate erosion hazard (e2). The Pyk series of this farm has very deep solum (d5) with varying sizes of calcium carbonate nodules found distributed throughout the profile, clay loam textured surface (cl), 1 to 3 per cent slope (B) and moderate erosion hazard (e2). The Pmt soil series in this farm has very deep solum (d5), clay textured surface (C), 1 to 3 per cent slope (B) and moderate erosion hazard (e2) fully occupying the wetland and paddy breeding station farms as seen in Fig. 1.

The comparative morphology of the soils is presented in Table 1.

The Pth series is red, calcareous, medium textured, well developed, deep and well drained soil distributed in basin physiography. The Smy series is dark brown to reddish brown, calcareous, medium textured, well drained and well developed with very deep solum occupying low level flat land plain. The Plm series is dark grey to very dark greyish brown, calcareous, very deep, fine textured, secondarily formed and slow permeable soils occupying basin topography position. The soil has few vertical cracks in pedons during summer. The Pyk series is fine textured, calcareous, very deep and poorly drained soil distributed in basin topography. The Pmt series is dark brown, very deep, non-calcareous, poorly drained, poorly developed and fine textured soil occupying basin physiography. The Cvp series is coarse textured, non calcareous, very deep and excessively drained soil distributed in upper terrace region.

Table 1. Comparative statement of morphology of the six soil series of the study area

Morphological features	Palathurai series (Pth)	Somayanur series (Smy)	Pelamedu series (Plm)	Periyanaickanpalayam series (Pyk)	Panaimarathupatti series (Pmt)	Chavadipparai series (Cvp)
Parent materials	Weathered charnockites	Weathered gneisses	Basalt and gneisses	Basalt and gneisses	Mixed	Weathered charnockites
Mode of formation	secondary	secondary (colluvium)	secondary	secondary	secondary	secondary (colluvium)
Depth of Solum	Very deep (ds)	Deep (d ₁)	Very deep (ds)	Very deep (ds)	Very deep (ds)	Very deep (ds)
Physiographic position	Basin	Low level flat land plain	Basin	Basin	Basin	Foot hill region
Soil colour						
i. Surface	5YR 3/4	7.5YR 4/4	10YR 4/1	5YR 4/1	10YR 3/3	7.5YR 4/4
ii. Sub-surface	5YR 4/2	5YR 4/2	10YR 3/3	5YR 5/1	10YR 4/3	7.5YR 6/4
Textural class						
i. Surface	scl	cl	cl	cl	c	l to sl
ii. Sub-surface	cl to scl	cl	cl	cl to l	cl to scl	scl to ls
Structure						
i. Surface	Moderate, medium sub-angular blocky	Weak, medium sub-angular blocky	Strong, Coarse sub-angular blocky	Moderate, medium sub-angular blocky	Massive, strong, coarse prismatic to strong sub-angular blocky	Coarse, granular to medium sub-angular blocky
ii. Sub-surface	Moderate, medium sub-angular blocky	Weak medium sub-angular blocky	Moderate, medium sub-angular blocky	Moderate to weak medium, sub-angular blocky	Weak to medium, moderate sub-angular blocky	Medium, weak granular to sub-angular blocky
Clay skins	Thin clay skins on ped faces and inner pore walls	Clay films on pores	nil	nil	nil	nil
Consistency sub-surface	Hard, firm, sticky and slightly plastic	Hard, firm, sticky and plastic	Hard, firm slightly sticky and slightly plastic	Hard, firm sticky and slightly plastic	Very hard, very firm sticky and slightly plastic	Loose, slightly firm, slightly sticky and non-plastic
Calcareousness	Highly calcareous	Calcareous	Calcareous	Calcareous	Non-calcareous	Non-calcareous
Internal drainage	Moderately rapid	Moderately slow	Slow	Slow	Slow	Rapid
Soil reaction						
i. Surface	Alkaline	Alkaline	Alkaline	Alkaline	Neutral	Slightly Alkaline
ii. Sub-surface	Alkaline	Alkaline	Alkaline	Alkaline	Neutral	Slightly Alkaline

Based on the morphology and physical and chemical properties of Tamil Nadu Agricultural University farm soils, the interpretative groupings of Storie Index rating (Storie, 1964) land use capability classification (Soil Survey Staff, 1951), soil and land irrigability classifications (Anon, 1970) and productivity and potential productivity classification along with coefficient of improvements (Riquier *et al.*, 1970) were accurately worked out and the data are furnished in Table 2.

It is revealed that the Storie index rating for Tamil Nadu Agricultural University farm soils are 45.54% (grade 3), 49.88% (grade 3), 40.48% (grade 3), 46.95% (grade 3), 40.35% (grade 3) and 38.30% (grade 4) in Pth, Smy, Plm, Pyk, Pmt and Cvp series respectively. The relatively highest score for Smy series has been contributed by the desirable soil depth, physical condition and chemical behaviour of this series resulting in good productivity. The Pyk, Pth, Pmt and Plm soil series are all grouped under the grade 3 (Fair) pointing

Table 2. Interpretive Groupings of Soils of TNAU-Main Campus Farm - Coimbatore.

Interpretive grouping	Soil Series					
	Pth	Smy	Plm	Pyk	Pmt	Cvp
Storie Index Rating (per cent)	45.54	49.88	40.48	46.95	40.35	38.20
Grade	3(average)	3(average)	3(average)	3(average)	3(average)	4(poor)
Land use Capability Classification. (class, sub-class, unit)	IIIe-1	Ile-2	IIIs-5	IIs-1	IIIs, w-3	IVe,s-1.9
Soil irrigability	B	A	B	A	B	C
Land irrigability Classification	2 s,t	1 d	2 d	1 d	1 s,t	3 s,t
Productivity Rating (per cent)	40.12	46.36	38.86	33.59	40.33	18.56
Grade	2(Good)	2(Good)	2(Good)	3(Average)	2(Good)	4(Poor)
Potential Productivity Rating (per cent)	62.99	70.83	60.89	63.13	53.88	65.5
Grade	II(Good)	I(excellent)	II(Good)	II(Good)	II(Good)	I(excellent)
Coefficient of improvement	1.57	1.53	1.57	1.88	1.34	3.53

out near marginality of them for sustained use under agriculture. The least grade (4-poor) was secured by Cvp series due to its coarse texture, low nutrient and erodibility problems, thus making it poorly suited and uneconomical for many of the agricultural crops.

The soil and land irrigability classification were worked out as per the criteria given by Riquier *et al.*, (1970). The Pth, Plm and Pmt series were falling under the soil irrigability class 'B' indicating moderate soil limitation for sustained use under irrigation. The Smy and Pyk series secured the soil irrigability class 'A' because of no potential hazards if continued irrigated agriculture is followed. The Cvp series secured relatively the minimum soil irrigability class ('C') denoting its poor suitability for sustained use under irrigation.

The land irrigability class of Pth and Plm series worked out to class '2' due to the soil and topographic effects in Pth series indicating the desirability for sustained irrigation. The Plm series is having the sub-class level limitation of 'd' (slow permeability and poor drainage). The Smy, Pyk and Pmt series fall under the land irrigability class 1 due to minimum soil limitation for sustained use under irrigation is rated as class 3 pointing out its poor suitability for continued irrigation practice due to poor water and nutrient use efficiencies in them.

The productivity ratings of Pth, Smy, Plm, Pyk, Pmt and Cvp series were 40.12 (good), 46.36 (good), 38.86 (good), 33.59 (average), 40.33 (good) and 18.56 (poor) per cent respectively. The potential productivity ratings after making the scientific improvement by the additional investments on soil and land will be 62.99 (good), 53.88 (good) and 65.56 per cent (excellent) in Pth, Smy, Plm, Pyk, Pmt and Cvp series respectively. In Cvp series, after minimising the hazards by suitable extra investments, the productivity could be improved to a greater extent when compared to other series. These are in the light of inferences drawn by Naidu *et al.*, (1986) and Balasubramanian (1987) for some other soils.

Considering the morphological, physical and chemical properties of the series, the taxonomy of the soils arrived at was as follows. The Palathurai series is a member of fine loamy, non-acid, kaolinitic, megathermic family of Typic Haplustalfs. The Somayanur series is a member of fine loamy, non-acid, kaolinitic, megathermic family of Typic Haplustalfs. The Peelamedu series is a member of fine montmorillonitic, megathermic family of Typic Pellusterts. The Periyanaickenpalayam series is a member of the fine, montmorillonitic, megathermic family of Typic Chromusterts. Panaimarathupatti series is a member of fine loamy, mixed, non-acid, megathermic family of Vertic Ustifluents. Chavadiparai series is a member of coarse loamy,

kaolinitic, megathermic family of Typic Haplustorthents.

REFERENCES

- ANONYMOUS. (1970). *Soil Survey Manual*. All India Soil and Land Use Organisation, New Delhi, 196 pp.
- BALASUBRAMANIAN, R. (1987). *Pedological Characterisation of some Tamil Nadu Agricultural University Research farm Soils : Periyakulam, Paramakudi and Srivilliputhur*. M.Sc. (Ag.) Thesis, Tamil Nadu Agricultural University, Madurai, 146 pp.
- NAIDU, L.G.K., VERMA, K.S., JAIN, S.P., RANA, K.P.C. and SIDHU, G.S. (1986). An appraisal of the productivity potential of dominant soils of Delhi Territory. *J. Indian Soc. Soil Sci.*, 34: 558-567.
- RIQUIER, J., BRAMO, D.L. and CORNET, J.P. (1970). A new system of soil appraisal in terms of actual and potential productivity. F.A.O - AGL. TESR/70/6, Rome.
- SOIL SURVEY STAFF (1951). *U.S.D.A. Hand Book 18*, U.S. Govt. Printing Office, Washington, 265 pp.
- SOIL SURVEY STAFF (1970). *Soil Survey Manual*, All India Soil Survey and Land Use Organisation, New Delhi, 163 pp. SOIL SURVEY STAFF (1975). *Soil Taxonomy : A Basic System of Soil Classification for Making and Interpretative Soil Survey*. Agrl. Hand Book, U.S.D.A.
- STORIE, R.E. (1964). *Hand Book of Soil Evaluation*. Associated Students Store, U.C. Berkelay, California, U.S.A. 157 pp.

(Received : January 1997 Revised : June 1997)

Madras Agric. J., 85(5.6): 285 - 289 May, June 1998

INFLUENCE OF BIOCHEMICAL CONSTITUENTS ON THE SEX EXPRESSION OF PAPAYA

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ABSTRACT

Studies were made on the biochemical substances of papaya, in two varieties (CO 5 and SRS) at three stages of crop growth in eight different seed groups. It was found that the leaf protein content was higher in the black and bold seeds; and also in the males followed by hermaphrodites and low in females. Phenol content was lower in females than males and hermaphrodites. The reverse was true with RNA and DNA contents. IAA oxidase activity was higher in the leaves of male papaya followed by the hermaphrodites and the lower in females. The females had more cytokinin and lower GA than the males and hermaphrodites.

KEY WORDS : Papaya, seed groups, sex expression, biochemical constituents

Sex in papaya seems to be highly influenced by the biochemical substances present in the plants before flowering. Many workers have tried sex forecast in papaya on the basis of colour reaction of dried tissue through chemical tests. However, 100 per cent forecast has not been possible. Jindal and Singh (1976) observed specific patterns of protein in the male and female flowers and plants of papaya and also changes in the patterns, specific to each sex, as the flowers developed. Dutta and Mazumdar (1989) reported that the leaf protein content was higher in the female trees of papaya over male trees. Jindal and Singh (1975) reported that the amounts of free - acid and alkali hydrolysable phenolic compounds were considerably higher in male plants. A comparison was attempted between the typically dioecious male and female trees of papaya by Nandi and Mazumdar (1990), who reported a higher level of

endogenous RNA and histone protein content in the female plants. Hasdiseve *et al.*, (1989) reported that male papaya had the highest levels of auxin - and gibberellin - like substances while females had the lowest. Khryanin (1989) reported that in hemp and spinach cytokinin activity was greater in female plants than males ; GA activity was more in males than in females.

MATERIALS AND METHODS

The study was conducted at the Agricultural College and Research Institute, Madurai during 1991-92. Two varieties of papaya were taken up for study namely, SRS (V₁) and CO 5 (V₂). The seeds were grouped into eight classes based on their size as extra large (S₁), large (S₂), medium (S₃), and small (S₄) using BSS wire mesh sieves, and based on their colour as black (C₁) and brown (C₂). The biochemical constituents of papaya leaves such as