ORIGINAL RESEARCH PAPER

Volume-7 | Issue-8 | August-2018 | PRINT ISSN No 2277 - 8179

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

AN ANALYSIS ON THE SOIL CHARACTERTICS OF ORATHANADU TALUK THANAJVUR DISTRICT USING GIS

Education

Dr. M. Sumathi	Head &Associate Professor, Asst professor, Guest Lecturer Kunthavai Naachiyaar Govt. Arts College for Women Thanjavur.
G.Hemalatha*	Head &Associate Professor, Asst professor, Guest Lecturer Kunthavai Naachiyaar Govt. Arts College for Women Thanjavur. *Corresponding Author
P.Sujatha	Head &Associate Professor, Asst professor, Guest Lecturer Kunthavai Naachiyaar Govt. Arts College for Women Thanjavur.
J.P unithavathi	Head &Associate Professor, Asst professor, Guest Lecturer Kunthavai Naachiyaar Govt. Arts College for Women Thanjavur.

ABSTRACT

In this paper, an attempt was made to assess the changes and mapping the soil charactertics of orathanadu taluk thanajvur district for the year of statistical data (2016). Soil charactertics like soil colour,soil series, soil texture ,soil permeability,soil depth, soil calcareousness,soil salinity and crops grown are analysed found.The soil of this region is generally classified as brown soil and red soil. The brown soil covered the major part of the study area. In the study area Madukkur, series, Pattukottai series,Mudukulam series and Alanthur series area the varies soil series found here. Madukkur soil series coveres about 80% of the study area. Orathanadu taluk flouristic help with agriculture paddy is the predominated up here followed by Sugarcane, Groundnut, Gingerly, Millets, Vegetable, Chillies and fruits. The soil series is suitable for the cultivation of paddy. Soil calcareousness and salinity is very measure in this region.

KEYWORDS

The soil charactertics of orathanadu taluk thanajvur district.

INTRODUCTION

Soil is the collection of natural bodies on earth's surface containing living matter and capable of supporting plants. Its upper limit is the atmosphere (air) or water, and at its lateral margins grades to deep water or barren areas of rock and ice. Its lower limit is normally considered to be the lower limit of the common rooting zone (root zone) of the native perennial plants.

Soil is a mixture of organic matter, minerals, gases, liquids, and organisms that together support life. The Earth's body of soil is the pedosphere, which has four important functions: it is a medium for plant growth; it is a means of water storage, supply and purification; it is a modifier of Earth's atmosphere; it is a habitat for organisms; all of which, in turn, modify the soil.

Soil interfaces with the lithosphere, the hydrosphere, the atmosphere, and the biosphere. The term pedolith, used commonly to refer to the soil, literally translates ground stone. Soil consists of a solid phase of minerals and organic matter (the soil matrix), as well as a porous phase that holds gases (the soil atmosphere) and water (the soil solution. Accordingly, soils are often treated as a three-state system of solids, liquids, and gases.

Soil is a product of the influence of climate, relief (elevation, orientation, and slope of terrain), organisms, and its parent materials (original minerals) interacting over time. It continually undergoes development by way of numerous physical, chemical and biological processes, which include weathering with associated erosion. Given its complexity and strong internal connectedness, it is considered an ecosystem by soil ecologists.

10 REVIEW LITRERATURE

The structural condition, texture, and packing of the soil all affect bulk density (Blake & Hartge, 1986). Soils with coarse (sand) textures tend to have a higher bulk density then soils with fine (clay) textures. The bulk density of a particular soil may vary related to the degree of packing, and thus, is often used as a measure of soil structure. In turf soils, 10 compaction is often a problem from foot and vehicle traffic (Brede, 2000).

Two approaches can be used to establish an ideal range for soil quality. The first approach is to set the ideal soil quality as the native condition of the soil. The second approach is considering what conditions are needed to maximize production, environmental performance, or any function (Granatstein & Bezdicek, 1992).

Soil microbes perform many beneficial functions as well as some detrimental impacts. The impact of soil biota is complex and difficult considering the same activity may be positive or negative depending on its location in the soil profile. Soil respiration and other microbial indicators need to be interpreted with respect to the specific function carried out by the soil microorganisms (Parkin, 1996).

STUDY AREA

Orathanadutaluk is one of the nine taluk of the Thanjavur district which was formed in 1986.It is located on the eastern part of the Thanjavur district and Tamil Nadu State. It extends latitudinal extend is from 10o33' N to 11o 13' N and Longitude from 78015' E to 790 10' E. It is borded by Pudukkoitai and Trichirappallidistrict in the west by ThanjavurTaluk in South Panpansam and Valangaiman in North. Orathandu block covered an area of 409.59 sqkm, It consists of 65 Villages and it has a plain topography Cauvery river and Grand Anaicut canal is the main sources for the development of agriculture in and around. The location maps are given fig. 1.1. Physiographical the land forms are plain area topography.

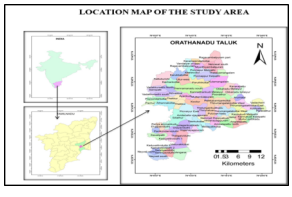

FIG NO: 1.2

1.5 AIM OF THE STUDY

To study the soil charactertics of Orathanadu taluk.

1.6 OBJECTIVES OF THE STUDY

1. To know the soil series and soil permeability present here
2. To find out the soil depth and texture
3. To understand the calcareousness and salinity of the study area
4. To study the type of crops grown here.

1.7 METHODOLOGY

To achieve the above aims and objectives the following method are use. Maps are prepared based on GIS.

1.8 SOURCES OF DATA

Secondary type of data is used for the study Soil Atlas of Thanjavur District prepared by Soil Survey of land use Department of Agriculture Tamil Nadu is used for this study.

ANALYSIS OF SOIL CHARACTERTICS

2.1 INTRODUCTION

Soil is the product of weathering of rocks. The seven charateritics used to describe soil to distinguish one soil from another soil and to distinguish one soil layer from another soil layer. The impact of soil texture, structure and organic content on soil water characteristics, Distinguish gravity water, capillary water and hygroscopic water from one another distinguish field capacity distinguish infiltration rate from infiltration capacity and classify soil texture using the texture triangle.

Unconsolidated mineral and organic matter mixed with liquid and gasses. Occur naturally on the earth's surface and is a medium capable of supporting growth of rooted plant differ substantially from the material from which it is derived.

SOIL COLOUR

Soil colours determine the parent material from which it is derived. The colour of indicator the nutrient content init.The district of Thanjavur is covered by red soil, black soil and brown soil. The study area orathanadu is predominated by brown soil. From this fig no: 2.1 1it is studied that the brown soil is the prodimanted soil type in orathanadutaluk which is covered by 95% of the area.Paddy, sugarcane, groundnut are well suited for cultivation. Red soil found in the south western part. This soil is much suitable for fruits, vegetable and millets.

TABLE NO: 2.1 SOIL COLOUR ORATHANADU TALUK

S. No	Soil Colour	Soil Series	Extent (ha)	% to total
1.	Red	Pattukkottai,Mudukulam, Budalur,andvallam	62,184	19.30
2.	Brown	Padugai,Melkadu,Adhanur, Peravurani,	2,08,618	64.73

Source: Soil Atlas Thanjavur

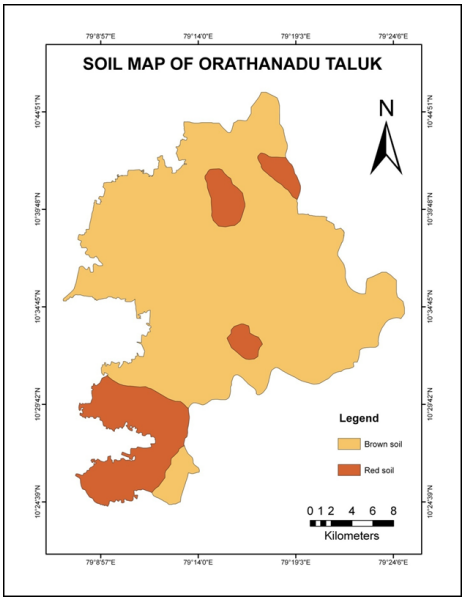

FIG NO: 2.1

SOIL SERIES

Soil series describes the nature of soil at determined depth Soil series of orathanadu is shown in fig no: 2.2.From the figure it is under stood that four types of soil series are found in Orathanadu Taluk of Thanjavur .They are madukkur soil series,Pattukkotai series . Madukkur soil series consist of very deep brown soil derived from laterite parent material .It is moderately developed and has a fine loamy texture. The permeability is moderate so the draining of the soil is moderate Madukkur Soil Series covers about 34.18% of the total area with an aerial extent of 110573 sq.km. Pattukkottai soil series is the second dominant soil series in the study area. This soil series is pale brown with fine loamy feature at great depth and not calcareous by nature. From the figure it is understood that the Pattukottai soil series is covers 10.33 % of the study area with 33424 sq.km.

Peravurani soil series ranges next with 2.06% extending up to 6672 hectares. This soil series has dark red colour with fine loamy texture and non-calcareous in nature.

Alathur series is found in a very small extent with an aerial extent of 3.74% 30642 hectare. It is greyish brown with fine loamy, strongly calcareous.

TABLE NO: 2.2SOIL SERIES ORATHANADU TALUK

S.NO	SOIL SERIES	Extent (ha)	% to total
1.	Madukkur	1,10,573	34.18
2.	Alathur	30,642	3.74
3.	Pattukkottai	33,424	10.33
4.	Peravurani	6,672	2.06

Source: Soil Atlas Thanjavur

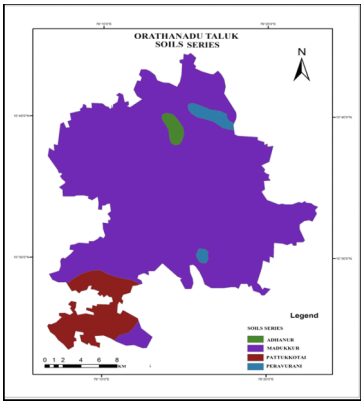

FIG NO: 2.2

SOIL TEXTURE

Soil texture indicates the relative proportion of various sizes of primary soil particles. Such as sand silt and clay. Drainage charactertics, moisture ,aeration define the texture of the Soil.In the district a Thanjavur soil texture areas are classified as fine loamy , coarse loamy and sandy. From the fig 2.3 it is understood that the whole taluk of orathanadu is covered by fine loamy texture. This texture comprise of soil with moderate clay content. (Fig no: 2.3).

TABLE NO: 2.3 SOIL TEXTURE OF ORATHANADU TALUK

S.no	Texture Class	Soil Series	Extent (sq.km)	% To Total
1.	Very deep (d5-more tha 100 cm)	Adhanur,,Mudukulam, Madukulam,Peravurani,Pattukkottai , Padugai,Kallivayal..	2,39,637	74.36

Source: Soil Atlas Thanjavur

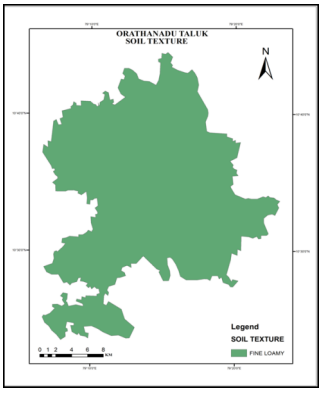

FIG NO: 2.3

SOIL PERMEABILITY

Soil permeability refers to the movement of water in a region. If the soil is soft and loose permeability of water is high. In the hard rock region and close packing of soil permeability is very slow. In Orathanadu taluk the soil series of Madukkur and Mudukkulam permeability is moderately rapid. Pattukkottai series has a very rapid flow of water. In the study area Alathur soil series has a slow permeability of water. It is

observed from the (fig no: 2.4) that the permeability water ranges from rapid to moderately rapid except. In the north western region where permeability is slow. Hence the soil permeability is favorable for cultivation of crops.

TABLE NO: 2.4 SOIL PERMEABILITY OF ORATHANADU TALUK

S.no	Permeability	Soil Series	Extent (sq.km)	% To Total
1.	Moderately Rapid (MR)	Adhanur,,Mudukulam, Madukkur,Peravurani, Pattukkottai.	1,46,005	45.31
2.	Rapid (R)	Padugai,Melkadu and Pattukkottai,Alanthur	74,936	23.26

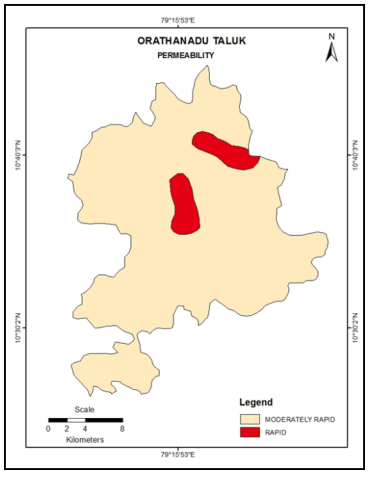

FIG NO: 2.4

SOIL DEPTH

Soil depth is determined by the parent material solid rock, water table ,salinity alkalinity of a region The depth of soil determine the good holding of roots,root,contact soil volume , moisture content, quantum of nutrient and choice of crops Variety. The district of thanjavur has the soil depth ranging from 25cm to 100cm.From the fig 2.5 it is studied that the soil series found in orathanadu taluk have a soil depth more than 100cm. Hence the soil depth is very deep in this region.

TABLE NO:2.5 SOIL DEPTH ORATHANADU TALUK

S. No	Soil Depth	Soil Series	Extent (ha)	% To Total
1.	Very deep (d5-more tha 100 cm)	Kalthur,Mudukulam, Alangudi, Pattukkottai , Padugai, Alathur, peravurani.	2,72,115	84.44

Source: Soil Atlas Thanjavur

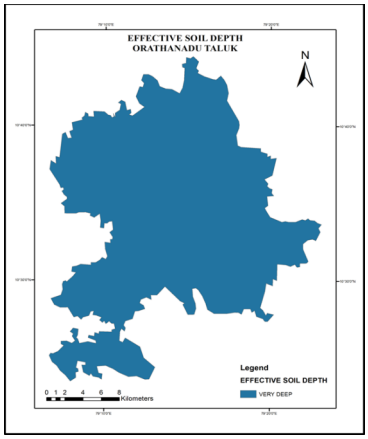

FIG NO: 2.5

SOIL CALCAREOUSNESS

Calcium carbonate range from very mild to Nil in the study area from the fig 2.6 the presence of soil calcareousness is mild in the whole taluk. High presence of calcareousness is seen in the north eastern region. Area is covered by land and fresh water the soil is free of salinity. (Fig no: 2.6)(2.7).

TABLE NO: 2.6 CALCAREOUSNESS OF ORATHANADU TALUK

S.no	Calcareousness Class	Soil Series	Extent (ha)	% to total
1.	Nil	Pattukkottai,Mudukulam, And madukur, Adhanur	239866	74.43
2.	Mild	Kalathur	51449	15.97

Sources: Soil Atlas of Thanjavur

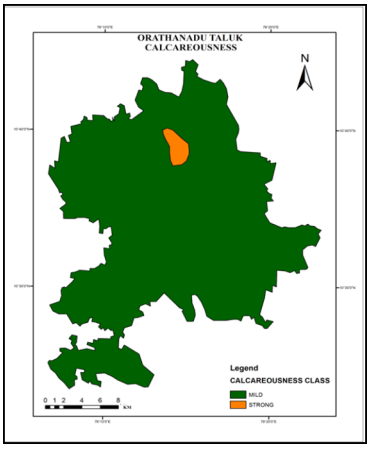

FIG NO: 2.6

SALINITY

Salinity indicats the presence of salt in the soil. Orathanadu taluk comes under the fresh water zone so the impact of salt is almost nil in the soil. From the fig no 2.8 it is understood that the study area is free from salinity and the soil is non- saline.

TABLE NO: 2.8 SOIL SALINITY OF ORATHANADU TALUK

S.no	Category	Soil Series	Extent (ha)	% To Total
1.	Non- saline	Mudukulam, Pattukkottai , Madukkur, Padugai, Alathur,	3,21,769	99.85

Sources: Soil Atlas of Thanjavur

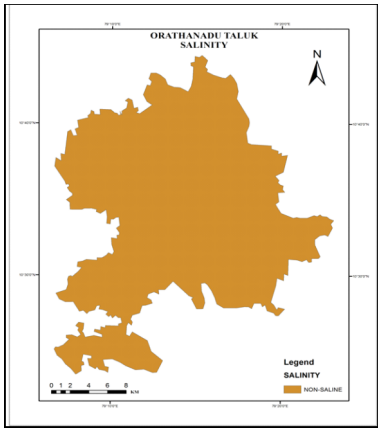

FIG NO: 2.8

CROPS GROWN

The presence of good soil series effective soil depth and fresh water promotes agriculture cultivation is done by irrigation and rain fed areas. Paddy, sugarcane, millets, groundnut, gingerly, millets vegetables of chilies' and fruits fresh are the main crops cultivated here. Eucalyptus, casuarinas, coconut, groundnut, and millets area the rain fed crops here.From the(fig no:2.7) it is studied that more than 80% of Madukkur soil series is suitable for cultivation crops grown

here are paddy, sugarcane, groundnut,millets,chillies.Pattukottai Soil series is suitable for Groundnut, Ginger, Vegetable, and chillies. Mudukulam Soil series is apt for coconut ,Flower,Vegetables, Groundnut and Millets.Hence Paddy is the predominant food crops grown in this region.

CROPS GROWN ORATHANADU TALUK

	CROPS GROWN		Soil Series
	Irrigated	**Rainfed**	
1.	Groundnut, Gingelly, Paddy, Millets and Chilies.	Groundnut	Madukkur
2.	Groundnut,Gingelly, Vegetables and Chilies.	Groundnut, Coconut, Fruit trees, Eucalyptus and Casuarina.	Pattukkottai
3.	Coconut, Flowers,and vegetables.	Groundnut, Millets and Fruit trees.	Mudukulam
4.	-	Groundnut, Millets,Cashew,Encalyp	Alathur

Source: Soil Atlas Thanjavur

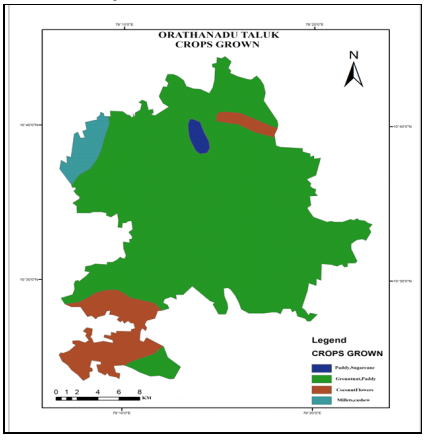

FIG NO: 2.9

SUMMARY AND CONCLUSION

Orathanadutaluk is one of the nine taluk of the Thanjavur district which was formed in 1986.It is located on the eastern part of the Thanjavur district and Tamil Nadu state. The taluk extent roughly between the segment of well drained by Cauvery river and its tributaries. The city was ruled by nayakars early days. Agriculture is the main occupation of orathanadutaluk. River water is the main source of irrigation.

Orathanadu taluk is one among the taluk of Thanjavur district is formed in 1986. It is located is to eastern part of Thanjavur district in Tamil Nadu, it extends latitudinal extend is from 10o33' N to 11o 13' N and Longitude from 78015' E to 790 10' E. It is borded by Pudukkottai and Trichirappallidistrict in the west by ThanjavurTaluk in South Panpansam and Valangaiman in North. Orathandu block covered an area of 409.59 sqkm, the population of 1, 63,742. It consists of 65 Villages and it has a plain topography Anicut river and Grand Anicut canal is the main sources for the development of agriculture in and around. The slopes are west to East. So the ground water potential is high. The main sources of Grand Anicut canal.Orathanadu have an average elevation of 7ft. The city lies on the south bank of the Cauvery River, 223 miles (359km) south of Chennai.

The soil of this region is generally classified as brown soil and red soil. The brown soil covered the major part of the study area. River waters are the main source of irrigation on orathanadutaluk.

In the study area Madukkur, series, Pattukottaiseries,Mudukulam series and Alanthur series area the varies soil series found here. Madukkur soil series coveres about 80% of the study area followed by Pattukottai soil series covering 11% of the region.Madukulam soil series of Alanthur soil series cover 5% and 2.5% in the study area respectively.

The depth of soil is determined by the good holding of root contact and soil volume, moisture content quantum of nutrient and types of crops grown in the study area. Root area able to penetrate below 100 m as the soil depth is very deep here.

Soil textures determine the movement of air, water and growth of crops. In the orathanadutaluk. Comprises of the loamy soil is a holistic nature of soil with moderate clay content. Soil permeability refers to the movement of water from one place to another. In the study area the movement of water is rapid and suitable for cultivation of crops.

Soil calcareousness refers to insoluble calcium carbonate in the surface of the soil. The Taluk of Orathanadu earth is about free of calcareous nature except in the north eastern place where the soil has high calcium content. Orathanadu taluk flouristic help with agriculture paddy is the predominated up here followed by Sugarcane, Groundnut, Gingerly, Millets, Vegetable, Chillies and fruits. The soil series is suitable for the cultivation of paddy.

The colour of the soil determine the parental material from which it is arrived orathanaduTaluk is covered by brown soil the except in general the soil characteristic are suitable for cultivation in orathanadu taluk in the south west region where red soil is found.

SUGGESTIONS AND RECOMENTATION

1. Soil monitoring, constant updating of soil, suitability and creating them afresh.
2. Promotion of subsidiary occupations such as animal husbandry, dairy and apiary.
3. Diversification of agriculture through sericulture, forestry and other agro based Industries for higher income and employment generation.
4. The inter-disciplinary approach of Agriculture Agricultural Engineering, Horticulture,
5. Forestry, Tamil Nadu Agricultural University etc. for effective and Economic land use Planning.

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