

## STATISTICAL ANALYSIS FOR TECHNICAL COMPOSITIONS OF THE SOILS OF RENIGUNTA REGION

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**Abstract :** Soil is the most important natural resource for the human beings. Soil is many types like clay, sand and slit. Soil contains many types of chemical compositions  $\text{SiO}_2$ ,  $\text{R}_2\text{O}_3$ ,  $\text{Fe}_2\text{O}_3$ ,  $\text{Al}_2\text{O}_3$ ,  $\text{P}_2\text{O}_5$ ,  $\text{K}_2\text{O}$ ,  $\text{Na}_2\text{O}$ ,  $\text{CaO}$  and  $\text{MgO}$ . Chemical compositions in soils vary from place to place. In this paper we analyzed 7 different places in Renigunta Region Chittor of Andhra Pradesh for chemical compositions of the soils.

**Introduction :** India mainly depends upon the cultivation. Type of cultivation depends upon the soil in that places. Soil is also changing from place to place and year to year. Andhra Pradesh mainly depend upon the agriculture. Subba Rao and Rao MV (1998) in this paper "on Red Soils of Andhra Pradesh (India) and their management for sustainable agriculture" Presents that Andhra Pradesh covers nearly 274.4 lakh ha land area, and is accounting for 8.4 percent of the country's area. There are many types soils, Red Soil, Brown Soil, etc. Red soils are found in all most all the districts of the State, the majority of them being present in Telengana and Rayalaseema regions.

The analysis of soil is important and because of growing population the cultivation of land is decreases. "Salient features of geology in relation to soils of India" given by Wadia D N 1960. He given that Indian red soils were developed from acid granite and allied Cuddapah and vindhyam sandstones with colour grading from brown, chocolate, yellow and gray. Climate plays an important factor for the type and rate of soil formation. Temperature also plays an important role for development of soil. Piper C.S. has presented in his article on "Soil and plant analysis". "Characterization and classification of some rice growing soils of palam valley, Himachal Pradesh" was given by Pradeep Kumar and Verma T.S. For analysis of 8 chemical composition data into different groups according to their occurrence percentage in soils by cluster analysis and description statistics of pedons are also listed.

Empirical Investigations;

We have eight chemicals Silicon dioxide ( $\text{SiO}_2$ ), Radiam oxide ( $\text{R}_2\text{O}_3$ ), Ferric oxide ( $\text{Fe}_2\text{O}_3$ ), Aluminium oxide ( $\text{Al}_2\text{O}_3$ ), Phosphorous Pentaoxide ( $\text{P}_2\text{O}_5$ ), Potassium oxide ( $\text{K}_2\text{O}$ ), Sodiumoxide ( $\text{Na}_2\text{O}$ ), Calciumoxide ( $\text{CaO}$ ) and Magnesium oxide ( $\text{MgO}$ ). We took 7 different places called pedons of Renigunta Mandal for analyzing the data. From pedon we have different depths vary from

0.20 meters to 0.48 meters. We are taking these depths also from 4 to 7 for each and every pedon. In this paper we analyzing each and every pedon for grouping of chemicals. Components in soils are analysed using cluster analysis.

Pedon 1: Pedon 1 contains 8 chemicals broadly classified into 3 groups.

Group 1:  $\text{Fe}_2\text{O}_3$ ,  $\text{Al}_2\text{O}_3$

Group 2:  $\text{Na}_2\text{O}$ ,  $\text{K}_2\text{O}$ ,  $\text{MgO}$ ,  $\text{CaO}$ ,  $\text{P}_2\text{O}_5$

Group 3:  $\text{SiO}_2$ ,  $\text{R}_2\text{O}_3$

From the dendrogram we recognized that in soil of pedon 1 having very low percentage of  $\text{Na}_2\text{O}$ ,  $\text{K}_2\text{O}$ ,  $\text{MgO}$ ,  $\text{CaO}$  and  $\text{P}_2\text{O}_5$  chemicals where as  $\text{Fe}_2\text{O}_3$  and  $\text{Al}_2\text{O}_3$  are with some high percentage and  $\text{SiO}_2$  and  $\text{R}_2\text{O}_3$  is very high percentage.

Pedon 2: Pedon 2 contains 4 groups of chemical compositions according to the percentages in soils.

Group 1:  $\text{Na}_2\text{O}$ ,  $\text{K}_2\text{O}$ ,  $\text{MgO}$ ,  $\text{CaO}$ ,  $\text{P}_2\text{O}_5$

Group 2:  $\text{Fe}_2\text{O}_3$ ,  $\text{Al}_2\text{O}_3$

Group 3:  $\text{R}_2\text{O}_3$

Group 4:  $\text{SiO}_2$

From the dendrogram we observed that  $\text{Na}_2\text{O}$ ,  $\text{K}_2\text{O}$ ,  $\text{MgO}$ ,  $\text{CaO}$  and  $\text{P}_2\text{O}_5$  chemical compositions exist at low percentage in soil. With medium level percentage,  $\text{Fe}_2\text{O}_3$ ,  $\text{Al}_2\text{O}_3$  chemical present in soil.  $\text{R}_2\text{O}_3$  chemical composition present in soil with high level where as  $\text{SiO}_2$  present in soil with very high level.

Pedon 3: Chemical components of pedon 3 is also divided into 4 groups

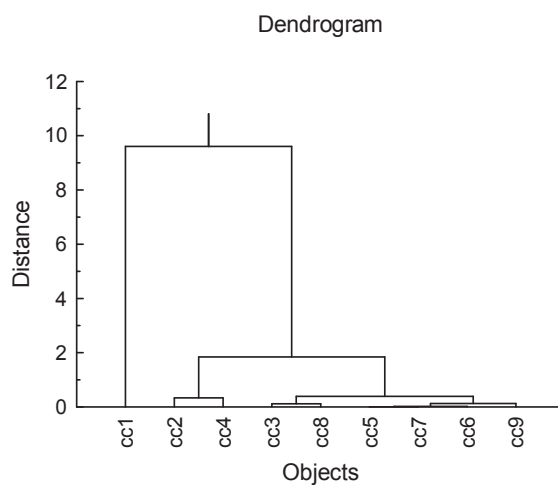
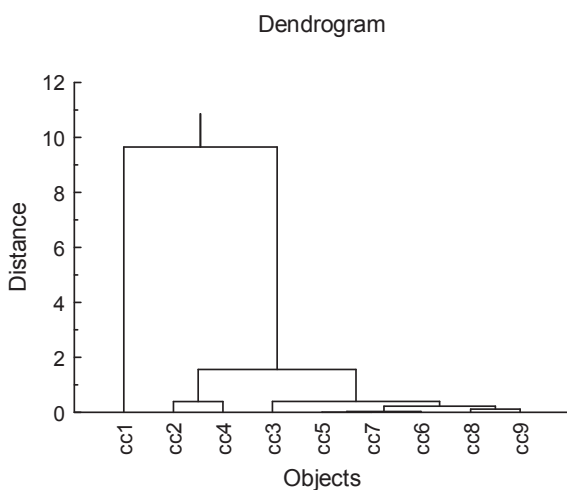
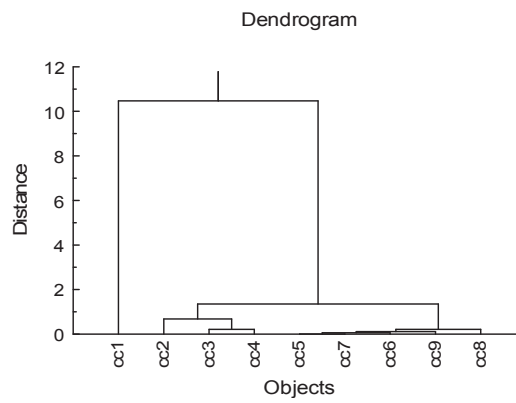
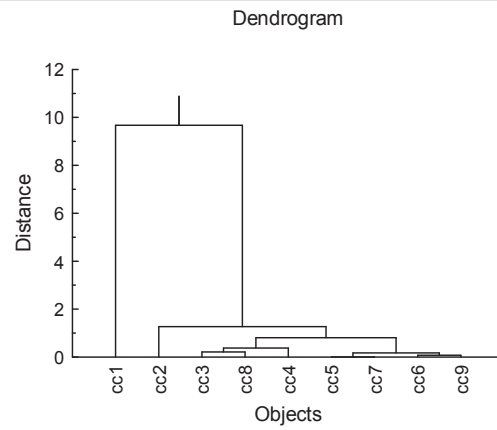
Group 1:  $\text{Na}_2\text{O}$ ,  $\text{K}_2\text{O}$ ,  $\text{MgO}$ ,  $\text{CaO}$ ,  $\text{P}_2\text{O}_5$

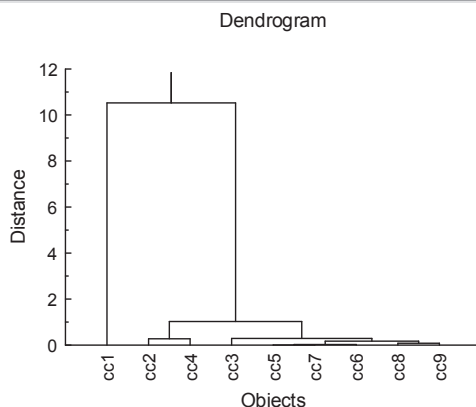
Group 2:  $\text{Fe}_2\text{O}_3$ ,  $\text{Al}_2\text{O}_3$

Group 3:  $\text{R}_2\text{O}_3$

Group 4:  $\text{SiO}_2$

From the below dendrogram we observed that  $\text{Na}_2\text{O}$ ,  $\text{K}_2\text{O}$ ,  $\text{MgO}$ ,  $\text{CaO}$  and  $\text{P}_2\text{O}_5$  chemical compositions exist at low percentage in soil. With medium level percentage,  $\text{Fe}_2\text{O}_3$ ,  $\text{Al}_2\text{O}_3$  chemicals present in soil.  $\text{R}_2\text{O}_3$  chemical composition present in soil with high level where as  $\text{SiO}_2$  present in soil with very high level.





Pedon 4, 5, 6 and 7 also grouped into 4, in similar manner as pedon 1,2 &3 and  
 Group 1: Na<sub>2</sub>O, K<sub>2</sub>O, MgO, CaO, P<sub>2</sub>O<sub>5</sub>  
 Group 2: Fe<sub>2</sub>O<sub>3</sub>, Al<sub>2</sub>O<sub>3</sub>  
 From the above dendrograms, we observe that Na<sub>2</sub>O, K<sub>2</sub>O, MgO, CaO and P<sub>2</sub>O<sub>5</sub> chemical compositions exist at low percentage in soil. Fe<sub>2</sub>O<sub>3</sub>, Al<sub>2</sub>O<sub>3</sub> With medium level percentage chemical, present in soil. R<sub>2</sub>O<sub>3</sub> chemical composition present in soil with high level, where as SiO<sub>2</sub> present in soil with very high level.

Group 3: R<sub>2</sub>O<sub>3</sub>  
 Group4 :SiO<sub>2</sub> and their respective dendrograms are as follows:

Dendrogram 4, 5, 6 and 7.  
 Where CC<sub>1</sub> is SiO<sub>2</sub>, CC<sub>2</sub> is R<sub>2</sub>O<sub>3</sub>, CC<sub>3</sub> is R<sub>2</sub>O<sub>3</sub>, CC<sub>4</sub> is Al<sub>2</sub>O<sub>3</sub>, CC<sub>5</sub> is P<sub>2</sub>O<sub>5</sub>, CC<sub>6</sub> is K<sub>2</sub>O, CC<sub>7</sub> is Na<sub>2</sub>O, CC<sub>8</sub> is CaO, CC<sub>9</sub> is MgO are used all dendrograms.

Descriptive Statistics:  
 Descriptive statistics like mean, variance, standard deviation and coefficient of variation for 8 chemical components i.e. SO<sub>2</sub>, RO<sub>3</sub>, Fe<sub>2</sub>O<sub>3</sub>, Al<sub>2</sub>O<sub>3</sub>, P<sub>2</sub>O<sub>5</sub>, K<sub>2</sub>O, Na<sub>2</sub>O, CaO and MgO is listed below.

Pedon - I

	SiO <sub>2</sub>	R <sub>2</sub> O <sub>3</sub>	Fe <sub>2</sub> O <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Na <sub>2</sub> O	CaO	MgO
Mean	83.13	214.2	5.0367	6.8717	0.433	0.5867	0.0934	2.2151	1.1767
S.D	0.9999	495.1897	0.6834	0.8806	0.1501	0.3108	0.0103	0.5546	0.6539
V	0.9998	245212.8	0.4669	0.7757	0.0227	0.0966	0.0001	0.3075	0.4275.
CV	0.0120	2.3118	0.1357	0.1282	1.0522	0.5299	0.1106	0.2504	0.5557

Pedon - II

	SiO <sub>2</sub>	R <sub>2</sub> O <sub>3</sub>	Fe <sub>2</sub> O <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Na <sub>2</sub> O	CaO	MgO
Mean	81.0833	12.6667	5.2467	7.4367	0.1117	0.985	0.1	3.0533	1.6983
S.D	3.0759	1.9426	0.5495	1.4811	0.0508	0.3372	0.0141	0.891	0.2094
V	9.4617	3.7737	0.3019	2.1935	0.0026	0.1137	0.0002	0.7940	10.5128
CV	0.0379	0.1537	0.1047	0.1992	0.4546	0.3123	0.14142	0.2918	0.3020

Pedon - III

	SiO <sub>2</sub>	R <sub>2</sub> O <sub>3</sub>	Fe <sub>2</sub> O <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Na <sub>2</sub> O	CaO	MgO
Mean	86.4	9.55	4.44	5.11	0.08667	0.6267	0.07667	2.1533	0.9467
S.D	0.5	0.3464	0.4276	0.7119	0.0404	0.2801	0.0058	0.4614	0.0907
V	0.25	0.12	0.1828	0.5068	0.0016	0.0784	0.0003	0.2129	0.0082
CV	0.0058	0.0363	0.09629	0.1393	0.4663	0.4469	0.0753	0.2143	0.0958

Pedon - IV

	SiO <sub>2</sub>	R <sub>2</sub> O <sub>3</sub>	Fe <sub>2</sub> O <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Na <sub>2</sub> O	CaO	MgO
Mean	84.2014	11.8143	4.9	6.7714	0.0829	0.5329	0.0943	2.0857	1.1171
S.D	1.7413	1.5750	0.6438	1.3298	0.0180	0.2838	0.0183	0.6604	0.2718
V	3.0320	2.4806	0.4145	1.7684	0.0003	0.0805	0.0003	0.4362	0.0739
CV	0.0207	0.1333	0.1314	0.1964	0.2172	0.5325	0.1923	0.3167	0.2433

Pedon - V

	SiO <sub>2</sub>	R <sub>2</sub> O <sub>3</sub>	Fe <sub>2</sub> O <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Na <sub>2</sub> O	CaO	MgO
Mean	82.2367	13.0917	4.0867	8.8883	0.125	0.3933	0.1683	2.3133	1.1117
S.D	1.7761	1.2714	0.6686	1.6861	0.0764	0.2183	0.1111	0.4403	0.6666
V	3.1545	1.6164	0.4471	2.8430	0.0058	0.0477	0.0123	0.1939	0.4444
CV	0.0216	0.0971	0.1636	0.1897	0.6108	0.5551	0.0660	0.1903	0.5997

Pedon - VI

	SiO <sub>2</sub>	R <sub>2</sub> O <sub>3</sub>	Fe <sub>2</sub> O <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Na <sub>2</sub> O	CaO	MgO
Mean	81.95	14.275	3.3033	10.9717	0.0733	0.28	0.1217	2.2033	1.1083
S.D	2.9528	1.5585	1.3792	1.0112	0.0258	0.0341	0.0387	0.9213	0.6345
V	8.719	2.4288	1.9021	1.0023	0.0007	0.0012	0.0015	0.8489	0.4026
CV	0.0360	0.1092	0.4175	0.0922	0.3521	0.1216	0.3180	0.4182	0.5725

## Pedon - VII

	SiO <sub>2</sub>	R <sub>2</sub> O <sub>3</sub>	Fe <sub>2</sub> O <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Na <sub>2</sub> O	CaO	MgO
Mean	88.75	8.5671	2.9386	5.6286	0.0729	0.25	0.1043	1.5657	0.8029
S.D	2.7699	1.9790	0.5948	1.7841	0.0269	0.18	0.0276	0.7052	0.5941
V	7.6725	3.9166	0.3538	3.1831	0.0007	0.0324	0.0008	0.4973	0.3529
CV	0.0312	0.2310	0.2024	0.3170	0.3693	0.72	0.2647	0.4504	0.7399

**Conclusions:** Soil plays an important role for cultivation purpose. Temperature, rain fall and precipitation are also important for formation of soils. Soils are many types, red soil, brown soil and so on. There are many chemical components present in soil and some important Components are SiO<sub>2</sub>, R<sub>2</sub>O<sub>3</sub>, Fe<sub>2</sub>O<sub>3</sub>, Al<sub>2</sub>O<sub>3</sub>, P<sub>2</sub>O<sub>5</sub>, K<sub>2</sub>O, Na<sub>2</sub>O, CaO, MgO. The

chemical components are grouped broadly into 4 groups i.e. group<sub>1</sub> having Na<sub>2</sub>O, K<sub>2</sub>O, MgO, CaO, P<sub>2</sub>O<sub>5</sub> chemical components at low percentage exists in soil, group 2 having Fe<sub>2</sub>O<sub>3</sub>, Al<sub>2</sub>O<sub>3</sub> and are in medium percentage in soil, group 3 having R<sub>2</sub>O<sub>3</sub> with high percentage in soil and group 4 contains only one chemical component SiO<sub>2</sub> with very high percentage.

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