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Characterization of soil physico-chemical status in rice growing areas of Chintapalli mandal of Alluri Sitharama Raju District, Andhra Pradesh

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ABSTRACT

The present study entitled "Characterization of Soil Physico-Chemical Status in Rice growing area of Chintapalli Mandal of Alluri Sitharama Raju District, Andhra Pradesh" was undertaken to assess the fertility status of soils and generate baseline information for sustainable soil management. A total of 200 surface soil samples (0–15 cm) were collected from different villages of Chintapalli Mandal and analyzed for important physico-chemical properties, namely soil pH, electrical conductivity (EC) and organic carbon (OC). The results revealed considerable variation in soil properties across the study area. Soil pH ranged from 5.52 to 7.92, indicating that the soils varied from moderately acidic to neutral in reaction. Electrical conductivity values ranged from 0.02 to 1.09 dS m^{-1}, indicating that the soils were non-saline and suitable for crop cultivation. Organic carbon content varied from 0.52 to 2.0 per cent, reflecting low to high levels of soil organic matter. The higher organic carbon content observed in some locations may be attributed to the continuous addition of organic residues and slow decomposition under the cool climatic conditions and high rainfall prevalent in the hilly regions.

Key Words: *Electrical conductivity, Organic carbon, Soil characterization, Soil pH and Soil fertility*

Soil is one of the most valuable natural resources and serves as the foundation for agricultural productivity, environmental sustainability and ecosystem functioning. The physical and chemical properties of soil play a crucial role in determining its fertility, productivity and suitability for various crops. Understanding the physico-chemical characteristics of soil is essential for developing appropriate soil management practices, improving crop yields and ensuring sustainable agricultural development.

The physico-chemical properties of soil, such as pH, electrical conductivity (EC), organic carbon and the availability of essential nutrients like nitrogen, phosphorus and potassium, directly influence plant growth and soil health. Variations in these properties occur due to differences in parent material, topography, climate, vegetation, land-use patterns and management practices. Therefore, periodic assessment of soil properties is necessary to evaluate soil fertility status and identify nutrient constraints affecting crop production. Such information helps farmers, researchers and policymakers formulate site-specific nutrient management strategies and adopt suitable conservation measures. "Chintapalli was selected as the study area because majority of farmers practice organic farming, making it an ideal location to evaluate the soil organic carbon status". Therefore, the present study was undertaken to characterize the physico-chemical status of soils in Chintapalli Mandal of Alluri Sitharama Raju District, Andhra Pradesh.

MATERIAL AND METHODS

The study was conducted in Chintapalli Mandal of Alluri Sitharama Raju District, Andhra Pradesh. The region is situated in the Eastern Ghats and is characterized by undulating topography, tribal agricultural systems and diverse soil types. The rice growing area of the chintapalli mandal is 6200 acres (2480 ha). The area experiences a tropical climate with moderate to high rainfall, predominantly during the southwest monsoon season. Agriculture is the major occupation of the local population, with crops

such as paddy, millets, pulses, vegetables and plantation crops being cultivated.

A field survey was conducted to collect representative soil samples from different villages of rice growing areas of Chintapalli Mandal. A total of 200 surface soil samples (0–15 cm depth) were collected from rice growing areas of across 16 villages by random sampling technique based on (Table 1). The collected soil samples were labeled, packed in clean polythene bags and transported to the laboratory for analysis. The soil samples were air-dried under shade, crushed gently using a wooden mortar and pestle and passed through a 2-mm sieve to remove stones, roots and other debris. The processed samples were stored in clean containers until further analysis.

Soil pH and electrical conductivity were measured in a 1:2.5 soil-water suspension using a digital pH meter and conductivity meter, respectively (Jackson, 1973). Organic carbon content was determined by the Walkley and Black (1934) wet oxidation method outlined by Jackson (1973) and results expressed as percentage. The analytical data obtained for various soil parameters were compiled and subjected to descriptive statistical analysis. Mean, Range and standard deviation values were calculated and represented in table 4. for each parameter. Soil fertility status was interpreted using standard soil fertility rating criteria to categorize nutrient levels as low, medium or high and presented in Table 2.

Table 1. The soil samples were collected depending on rice growing area of that particular village

S. No	Village name	Area (ha)	No. of samples collected
1	Balapam	179.515	10
2	Tajangi	675.4473	20
3	Kudumsari	170.9338	10
4	Tammangula	201.252	10
5	Lambasingi	69.988	7
6	Annavaram	245.849	10
7	Lothugedda	235.844	7
8	Bennavaram	410.035	20
9	Kothapalem	505.4185	19
10	Kommangi	323.035	10
11	Chintapalli	493.059	20
12	Chowdupalli	563.349	10
13	Yerrabommalu	922.801	15
14	Gondipakalu	186.525	7
15	Kitumula	572.835	15
16	A. Senivaram	223.159	10

RESULTS AND DISCUSSION

Soil Physico-chemical properties

Soil pH

Table 2. Ratings of soil parameters

S. No.	Parameter	Rating			References
1	Soil pH	Slighty acidic	Neutral	Slightly alkaline	Jackson (1973)
		< 6.5	6.5 – 7.5	>7.5	
2	Electrical conductivity (EC)	Non saline		Saline	
		< 2 dS m^{-1}		>2 dS m^{-1}	
3	Organic Carbon (%)	Low	Medium	High	Ramamoorthy and Bajaj (1969)
		< 0.5	0.5 - 0.75	> 0.75	

The soil pH of the study area ranged from 5.52 to 7.92, indicating that the soils varied from moderately acidic to neutral in nature. The highest value of pH was recorded with 7.9 in bennavaram village and lowest value was recorded with 5.5 in annavaram village (Table 3 and 4). This variation in pH may be attributed to differences in parent material, topography, rainfall intensity, organic matter decomposition and management practices prevailing across the sampling locations. The acidic reaction observed in some soils could be due to the leaching of basic cations under high rainfall conditions, which is a common characteristic of hilly regions such as Chintapalli Mandal. The relatively low standard deviation with 0.35 presented in Table 4, indicates limited variability in soil pH among the sampled sites, suggesting a fairly uniform soil reaction throughout the study area. Similar observations have been reported in tropical and subtropical soils where soil acidity is strongly influenced by climatic conditions and pedogenic processes (Brady and Weil, 1984; Havlin *et al*., 2014). The observed pH range is generally suitable for the cultivation of most agricultural crops, although soils with lower pH values may require corrective measures such as liming to improve nutrient availability and enhance crop productivity. Overall, the soil reaction of the study area reflects favorable conditions for agricultural production with localized occurrences of soil acidity.

Electrical conductivity (EC)

The electrical conductivity (EC) of soils in the study area ranged from 0.02 to 1.09 dS m^{-1}, with a mean value of 0.13 dS m^{-1}, indicating that the soils were generally non-saline in nature (Table 4). The low mean EC value suggests the presence of a very low concentration of soluble salts, which is favorable for normal plant growth and nutrient uptake. The

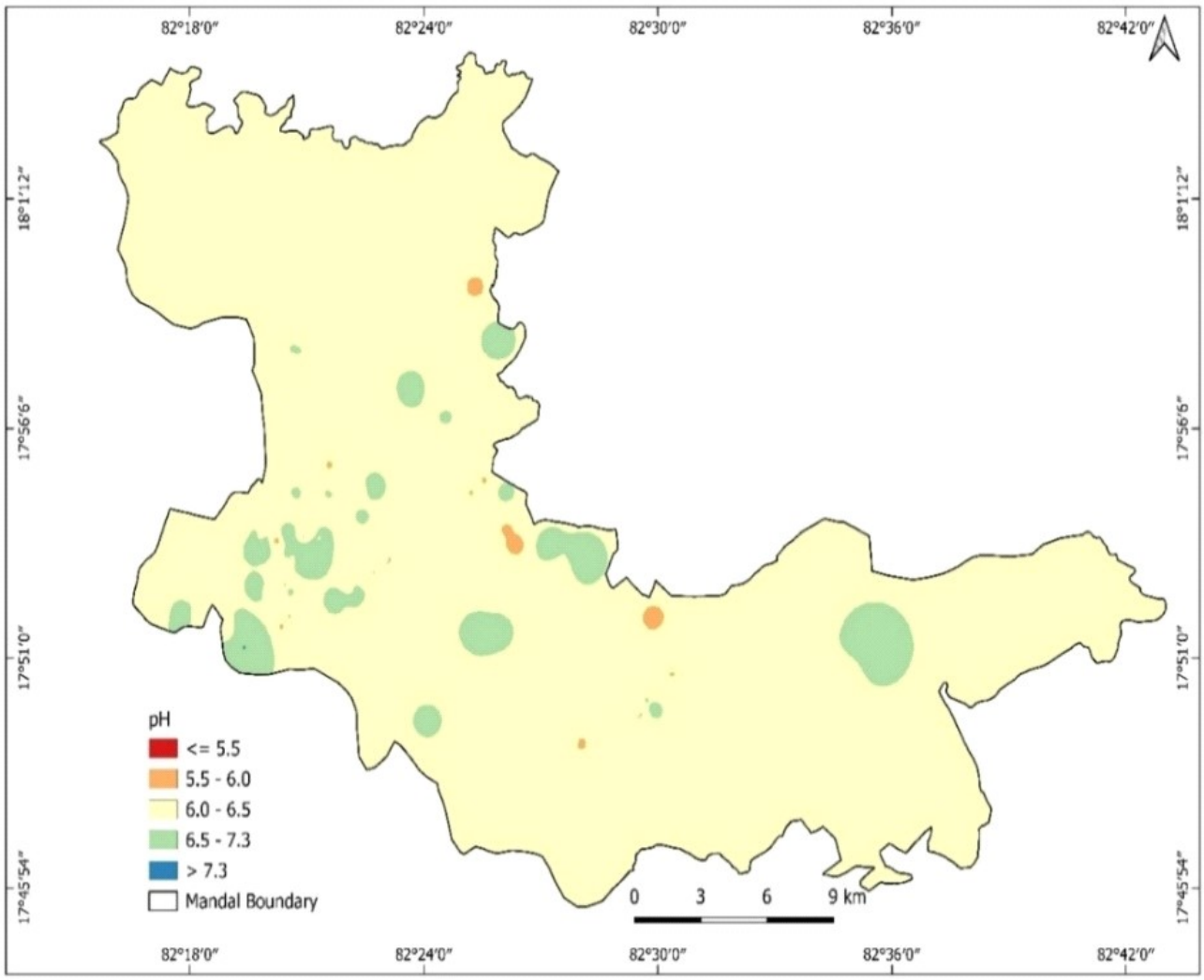


Fig. 1. Spatial variability of soil reaction (pH) of the study area

observed variation in EC among sampling locations may be attributed to differences in soil texture, drainage conditions, fertilizer application, organic matter content and local topographic influences. The standard deviation of 0.11 indicates relatively low variability in EC across the study area represented in Table 3, reflecting a fairly uniform distribution of soluble salts. Since all the observed EC values were below the critical limit of 4.0 dS m^{-1} for saline soils (Richards, 1954), salinity is not considered a constraint to agricultural production in the region. Similar observations have been reported in non-saline agricultural soils where low EC values are associated with good soil health, adequate drainage and favorable conditions for crop growth (Brady and Weil, 1984; Havlin *et al*., 2014). These findings suggest that the soils of Chintapalli Mandal are suitable for cultivating a wide range of crops without the risk of salinity-related yield reduction.

Organic carbon (OC)

Soil organic carbon (SOC) content in the study area varied from 0.52 to 2.0 per cent, with a mean value of 1.05 per cent and a standard deviation of organic carbon is 0.27 (Table 4), indicating moderate spatial variability. The highest level of organic carbon 2 per cent was recorded in Tajangi village (Table 3). The relatively high mean soil organic carbon of content suggests substantial organic matter accumulation study area might be due to continuous

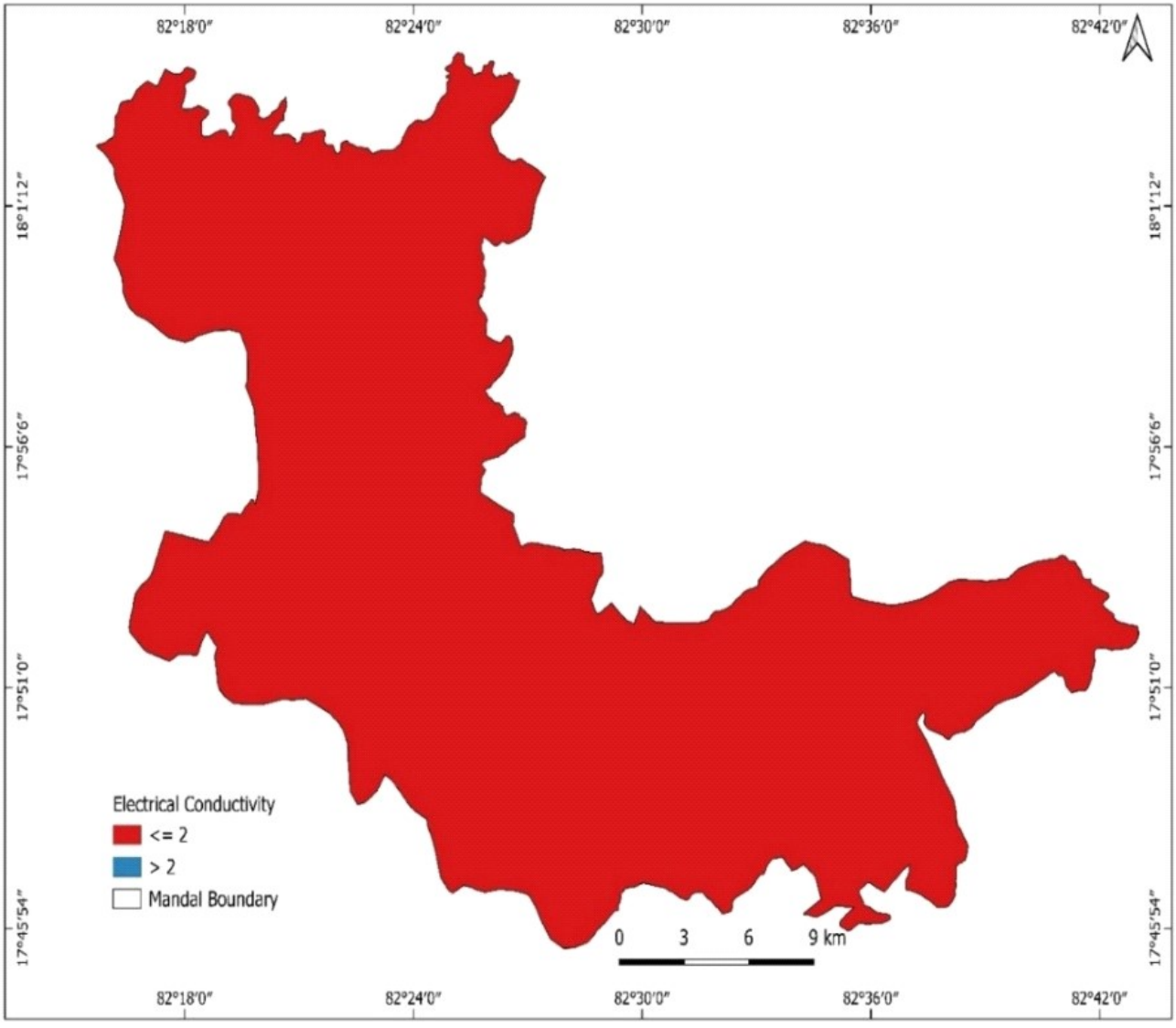


Fig. 2. Spatial variability of soil electrical conductivity of the study area

addition of crop residues, root biomass, stubbles and favorable climatic conditions prevailing in the high-altitude tribal regions may have contributed to enhanced carbon sequestration in these soils. Similar findings were reported by Sahrawat (2004), who observed greater organic matter accumulation in submerged rice soils due to slower decomposition under anaerobic conditions. The high soil organic carbon levels may also be attributed to the application of farmyard manure and other organic amendments, along with higher biomass production. Lal (2004) emphasized that climate, vegetation, soil type and management practices strongly influence soil organic matter accumulation and carbon dynamics. High soil organic carbon status is beneficial as it improves soil physical, chemical and biological properties, thereby enhancing soil productivity and sustainability (Hoyle *et al*., 2011). Overall, the predominance of medium to high levels of soil organic carbon reflects favorable soil fertility conditions in the study area.

Table 3. Soil physico-chemical properties of the study area

S. No.	Village name	Latitude	Longitude	pH(1:2.5)	EC (1:2.5) (dS m^{-1})	O.C (%)
1	Balapam	17.863625°N	82.34061°E	6.1	0.07	0.72
2	Balapam	17.86399°N	82.34089°E	5.86	0.03	0.79
3	Balapam	17.864003°N	82.34091°E	6	0.05	0.71
4	Balapam	17.864227°N	82.34117°E	6.12	0.11	1.07
5	Balapam	17.864576°N	82.34115°E	6.07	0.06	0.99
6	Balapam	17.864634°N	82.34098°E	6.14	0.14	2
7	Balapam	17.864634°N	82.34098°E	6.13	0.1	1.01
8	Balapam	17.864635°N	82.34099°E	5.9	0.04	0.62
9	Balapam	17.864659°N	82.3413°E	6.05	0.05	1.54
10	Balapam	17.864657°N	82.3413°E	6.23	0.14	1.61
11	Tajangi	17.864695°N	82.34155°E	6.21	0.11	1.25
12	Tajangi	17.864867°N	82.34175°E	6.19	0.1	1.04
13	Tajangi	17.865064°N	82.34184°E	6.09	0.06	1.45
14	Tajangi	17.86517°N	82.3422°E	6.1	0.05	1.49
15	Tajangi	17.865471°N	82.3424°E	5.82	0.04	0.96
16	Tajangi	17.886838°N	82.34331°E	6.02	0.08	0.95
17	Tajangi	17.886838°N	82.34331°E	5.95	0.08	0.7
18	Tajangi	17.886965°N	82.34386°E	5.96	0.09	0.74
19	Tajangi	17.886762°N	82.34425°E	6.43	0.18	0.95
20	Tajangi	17.886969°N	82.34431°E	6.52	0.13	0.9
21	Tajangi	17.887227°N	82.34408°E	5.89	0.02	0.82
22	Tajangi	17.887217°N	82.34374°E	5.62	0.04	1.07
23	Tajangi	17.887254°N	82.34353°E	5.72	0.12	0.78
24	Tajangi	17.887639°N	82.34355°E	6.09	0.05	0.66
25	Tajangi	17.887762°N	82.34335°E	6.12	0.08	0.75
26	Tajangi	17.887751°N	82.34359°E	6.72	0.18	2
27	Tajangi	17.887626°N	82.34402°E	6.65	0.19	0.9
28	Tajangi	17.887678°N	82.34436°E	6.92	0.3	0.86
29	Tajangi	17.887865°N	82.34408°E	7.13	0.4	0.98
30	Tajangi	17.888131°N	82.34366°E	6.52	0.1	0.96
31	Kudumsari	17.892424°N	82.33117°E	6.82	0.19	1.04
32	Kudumsari	17.892666°N	82.33077°E	6.94	0.22	1.22

S. No.	Village name	Latitude	Longitude	pH (1:2.5)	EC (1:2.5) (dS m^{-1})	O.C (%)
33	Kudumsari	17.892901°N	82.33075°E	6.79	0.19	1.14
34	Kudumsari	17.893051°N	82.33071°E	6.52	0.14	0.94
35	Kudumsari	17.893168°N	82.33052°E	6.41	0.12	0.9
36	Kudumsari	17.856387°N	82.32785°E	6.77	0.13	1.01
37	Kudumsari	17.856318°N	82.32755°E	7.27	0.24	0.71
38	Kudumsari	17.856419°N	82.3274°E	6.52	0.06	0.54
39	Kudumsari	17.856678°N	82.32729°E	6.57	0.08	0.6
40	Kudumsari	17.856598°N	82.32848°E	7.39	0.26	0.62
41	Tammangula	17.856512°N	82.32879°E	6.64	0.17	0.86
42	Tammangula	17.857018°N	82.32898°E	7.14	0.3	0.81
43	Tammangula	17.856959°N	82.3287°E	6.43	0.11	1.04
44	Tammangula	17.857246°N	82.4917°E	6.72	0.12	0.7
45	Tammangula	17.857304°N	82.3287°E	7.29	0.19	1.22
46	Tammangula	17.837956°N	82.4917°E	6.23	0.1	1.4
47	Tammangula	17.837867°N	82.49169°E	6.03	0.04	1.4
48	Tammangula	17.848105°N	82.49112°E	6.31	0.14	1
49	Tammangula	17.848305°N	82.49065°E	6.27	0.1	1.3
50	Tammangula	17.848195°N	82.49037°E	6.48	0.3	1.1
51	Lambasingi	17.848276°N	82.49007°E	5.68	0.08	0.74
52	Lambasingi	17.847812°N	82.48985°E	6.12	0.11	1.26
53	Lambasingi	17.847841°N	82.48946°E	6.18	0.1	1.51
54	Lambasingi	17.847517°N	82.48927°E	6.24	0.11	0.98
55	Lambasingi	17.847137°N	82.48911°E	6.09	0.08	0.88
56	Lambasingi	17.847129°N	82.48954°E	6.35	0.13	0.93
57	Lambasingi	17.84695°N	82.49043°E	6.2	0.11	1.03
58	Annavaram	17.82865°N	82.4912°E	5.85	0.07	0.74
59	Annavaram	17.828756°N	82.49192°E	6.43	0.1	1.33
60	Annavaram	17.82839°N	82.49197°E	6.79	0.11	0.67
61	Annavaram	17.82805°N	82.49224°E	5.86	0.12	1.12
62	Annavaram	17.828382°N	82.49242°E	6.52	0.13	0.85
63	Annavaram	17.828856°N	82.49263°E	6.71	0.13	0.84
64	Annavaram	17.82877°N	82.49219°E	6.82	0.14	1.03
65	Annavaram	17.818516°N	82.4665°E	5.52	0.08	1.38
66	Annavaram	17.81867°N	82.46634°E	5.7	0.09	1.12
67	Annavaram	17.818627°N	82.46627°E	6.05	0.06	0.95
68	Lothugedda	17.818747°N	82.46616°E	6.21	0.08	1.36
69	Lothugedda	17.818856°N	82.46607°E	6.19	0.18	1.22
70	Lothugedda	17.818853°N	82.46579°E	6.2	0.11	1.11
71	Lothugedda	17.819066°N	82.46539°E	6.15	1.09	1.27
72	Lothugedda	17.818904°N	82.46525°E	6.19	0.11	1.48
73	Lothugedda	17.818652°N	82.46511°E	6.21	0.08	1.16
74	Lothugedda	17.8185°N	82.46446°E	6.19	0.18	1.07

S. No.	Village name	Latitude	Longitude	pH (1:2.5)	EC (1:2.5) (dS m^{-1})	O.C (%)
75	Bennavaram	17.818874°N	82.46423°E	6.2	0.11	0.96
76	Bennavaram	17.819208°N	82.46376°E	6.15	0.09	0.9
77	Bennavaram	17.8194°N	82.46357°E	6.19	0.11	1.18
78	Bennavaram	17.819704°N	82.46337°E	5.95	0.08	0.8
79	Bennavaram	17.819479°N	82.46308°E	6.43	0.11	0.9
80	Bennavaram	17.819349°N	82.46313°E	6.22	0.1	0.88
81	Bennavaram	17.819118°N	82.46328°E	6.12	0.06	0.8
82	Bennavaram	17.818836°N	82.46339°E	6.32	0.15	1.06
83	Bennavaram	17.818407°N	82.46356°E	6.09	0.05	1.2
84	Bennavaram	17.818287°N	82.46397°E	6.31	0.12	1.3
85	Bennavaram	17.861319°N	82.43178°E	7.84	0.26	1.4
86	Bennavaram	17.860956°N	82.43107°E	7.92	0.23	0.66
87	Bennavaram	17.861011°N	82.43086°E	7.27	0.28	1.03
88	Bennavaram	17.860998°N	82.43041°E	6.71	0.14	1.17
89	Bennavaram	17.860813°N	82.42969°E	6.21	0.11	1.17
90	Bennavaram	17.860455°N	82.42999°E	6.17	0.09	1.1
91	Bennavaram	17.860145°N	82.4305°E	6.1	0.08	1.33
92	Bennavaram	17.881115°N	82.3784°E	5.9	0.13	1.19
93	Bennavaram	17.881313°N	82.3783°E	6.11	0.11	1.2
94	Bennavaram	17.88158°N	82.37832°E	5.65	0.11	1
95	Kothapalem	17.881726°N	82.37819°E	5.92	0.14	0.78
96	Kothapalem	17.881925°N	82.37827°E	6.12	0.13	0.76
97	Kothapalem	17.881944°N	82.37849°E	6.29	0.12	1.48
98	Kothapalem	17.881844°N	82.37858°E	6.81	0.16	0.78
99	Kothapalem	17.881727°N	82.37852°E	6.64	0.14	1
100	Kothapalem	17.881536°N	82.37847°E	6.52	0.14	1.16
101	Kothapalem	17.881444°N	82.37853°E	7.04	0.29	1.16
102	Kothapalem	17.893759°N	82.35514°E	6.2	0.08	1.03
103	Kothapalem	17.893854°N	82.35511°E	6.24	0.11	1.1
104	Kothapalem	17.893942°N	82.35504°E	6.38	0.13	1.29
105	Kothapalem	17.894021°N	82.35502°E	6.72	0.15	1.02
106	Kothapalem	17.894108°N	82.355°E	6.38	0.15	0.69
107	Kothapalem	17.894205°N	82.355°E	6.89	0.16	1.44
108	Kothapalem	17.894277°N	82.35547°E	6.42	0.12	1.57
109	Kothapalem	17.894349°N	82.35563°E	6.57	0.12	0.86
110	Kothapalem	17.89432°N	82.35587°E	6.32	0.13	1.09
111	Kothapalem	17.894499°N	82.35626°E	6.6	0.14	1.33
112	Kothapalem	17.894588°N	82.35626°E	6.64	0.14	0.81
113	Kothapalem	17.89455°N	82.35589°E	6.51	0.12	0.74
114	Kommangi	17.894499°N	82.3556°E	6.48	0.13	1.03
115	Kommangi	17.894426°N	82.35524°E	6.38	0.09	1.1
116	Kommangi	17.894397°N	82.3551°E	6.24	0.06	0.93
117	Kommangi	17.894335°N	82.35485°E	6	0.04	1

S. No.	Village name	Latitude	Longitude	pH (1:2.5)	EC (1:2.5) (dS m^{-1})	O.C (%)
118	Kommangi	17.894341°N	82.35462°E	6.19	0.08	0.93
119	Kommangi	17.894295°N	82.3544°E	5.98	0.03	0.75
120	Kommangi	17.8941°N	82.35412°E	6.78	0.18	0.76
121	Kommangi	17.89392°N	82.3544°E	7.02	0.24	1.31
122	Kommangi	17.893966°N	82.35471°E	6.89	0.16	1.15
123	Kommangi	17.887678°N	82.35051°E	6.81	0.18	0.95
124	Chintapalli	17.887577°N	82.35036°E	7.09	0.21	0.99
125	Chintapalli	17.887715°N	82.35026°E	6.7	0.12	1.52
126	Chintapalli	17.887594°N	82.35011°E	7.03	0.16	0.77
127	Chintapalli	17.887668°N	82.34991°E	6.83	0.13	1.13
128	Chintapalli	17.887788°N	82.34985°E	6.82	0.15	1.38
129	Chintapalli	17.887537°N	82.34975°E	6.59	0.22	0.89
130	Chintapalli	17.887358°N	82.34979°E	6.44	0.12	0.92
131	Chintapalli	17.887376°N	82.34991°E	6.81	0.13	0.52
132	Chintapalli	17.887429°N	82.35007°E	6.38	0.22	1.34
133	Chintapalli	17.911323°N	82.35935°E	6.37	0.22	1.11
134	Chintapalli	17.911531°N	82.35922°E	6.7	0.2	1.19
135	Chintapalli	17.91173°N	82.3592°E	6.81	0.1	0.9
136	Chintapalli	17.911867°N	82.35926°E	6.44	0.12	1.37
137	Chintapalli	17.911999°N	82.35937°E	6.81	0.13	1.42
138	Chintapalli	17.912203°N	82.35948°E	6.31	0.13	0.8
139	Chintapalli	17.912319°N	82.35915°E	6.25	0.11	0.87
140	Chintapalli	17.91251°N	82.35907°E	5.89	0.05	1.05
141	Chintapalli	17.912799°N	82.35923°E	6.15	0.09	0.72
142	Chintapalli	17.912877°N	82.35944°E	6.06	0.8	1.28
143	Chintapalli	17.913107°N	82.35933°E	6.45	0.12	1.16
144	Chowdupalli	17.913°N	82.3591°E	6.36	0.13	1.03
145	Chowdupalli	17.912878°N	82.35891°E	6.28	0.11	0.96
146	Chowdupalli	17.912652°N	82.35883°E	6.19	0.09	1.53
147	Chowdupalli	17.912454°N	82.35877°E	6.8	0.15	0.87
148	Chowdupalli	17.912256°N	82.35872°E	5.91	0.07	1.02
149	Chowdupalli	17.912044°N	82.35857°E	6.74	0.14	1.11
150	Chowdupalli	17.911889°N	82.35869°E	6.5	0.11	0.71
151	Chowdupalli	17.911813°N	82.3589°E	5.98	0.09	0.9
152	Chowdupalli	17.911714°N	82.35921°E	6.28	0.11	0.9
153	Chowdupalli	17.896197°N	82.34893°E	6.39	0.1	0.88
154	Yerrabommalu	17.896163°N	82.34876°E	6.35	0.12	1.39
155	Yerrabommalu	17.896057°N	82.34862°E	6.2	0.06	0.96
156	Yerrabommalu	17.895958°N	82.34842°E	6.58	0.18	1.25
157	Yerrabommalu	17.895771°N	82.3483°E	6.13	0.11	1.2
158	Yerrabommalu	17.895629°N	82.34841°E	6.17	0.11	0.94
159	Yerrabommalu	17.895545°N	82.34855°E	6.43	0.13	1.6
160	Yerrabommalu	17.895444°N	82.34857°E	6.12	0.1	0.54

S. No.	Village name	Latitude	Longitude	pH(1:2.5)	EC (1:2.5) (dS m^{-1})	O.C (%)
161	Yerrabommalu	17.895281°N	82.34858°E	6.58	0.18	0.81
162	Yerrabommalu	17.895281°N	82.34858°E	6.2	0.12	0.76
163	Yerrabommalu	17.895524°N	82.34902°E	6.35	0.12	1.6
164	Yerrabommalu	17.895495°N	82.34919°E	6.41	0.16	1.04
165	Yerrabommalu	17.895568°N	82.34932°E	6.17	0.11	0.52
166	Yerrabommalu	17.895658°N	82.34933°E	6.45	0.16	0.84
167	Yerrabommalu	17.895885°N	82.3494°E	6.39	0.12	1.42
168	Yerrabommalu	17.874143°N	82.33566°E	6.69	0.3	1.42
169	Gondipakalu	17.874264°N	82.33569°E	6.23	0.11	1.33
170	Gondipakalu	17.87432°N	82.33577°E	6.66	0.21	1.33
171	Gondipakalu	17.874448°N	82.33566°E	6.22	0.1	1.07
172	Gondipakalu	17.87451°N	82.33552°E	6.6	0.14	1.3
173	Gondipakalu	17.874571°N	82.33534°E	5.98	0.08	1.16
174	Gondipakalu	17.874456°N	82.33529°E	6.21	0.1	1.28
175	Gondipakalu	17.874351°N	82.33522°E	6.13	0.05	0.98
176	Kitumula	17.874281°N	82.3351°E	6.71	0.14	1.19
177	Kitumula	17.874157°N	82.33512°E	6.62	0.12	0.97
178	Kitumula	17.874142°N	82.33514°E	6.46	0.1	0.69
179	Kitumula	17.885917°N	82.385°E	6.64	0.15	0.79
180	Kitumula	17.885883°N	82.38482°E	6.77	0.14	1.02
181	Kitumula	17.886016°N	82.38466°E	6.39	0.1	0.87
182	Kitumula	17.88591°N	82.38466°E	6.18	0.09	1.3
183	Kitumula	17.885981°N	82.38455°E	6.76	0.25	1.1
184	Kitumula	17.885909°N	82.38452°E	6.58	0.09	0.78
185	Kitumula	17.886259°N	82.38477°E	6.42	0.1	0.66
186	Kitumula	17.886494°N	82.38481°E	6.81	0.21	0.78
187	Kitumula	17.886639°N	82.38463°E	6.72	0.14	0.87
188	Kitumula	17.886642°N	82.38448°E	6.43	0.13	1.01
189	Kitumula	17.886655°N	82.38439°E	6.31	0.12	1.22
190	Kitumula	17.88652°N	82.38433°E	6.4	0.18	1.6
191	A. senivaram	17.886434°N	82.38434°E	6.21	0.1	1.07
192	A. senivaram	17.886214°N	82.3844°E	6.48	0.13	1.57
193	A. senivaram	17.885982°N	82.38443°E	6.18	0.11	1.47
194	A. senivaram	17.885856°N	82.38442°E	6.05	0.05	1.54
195	A. senivaram	17.885639°N	82.38447°E	6.12	0.8	1.25
196	A. senivaram	17.885496°N	82.38441°E	6.78	0.15	1.33
197	A. senivaram	17.885274°N	82.38438°E	6.61	0.13	1.09
198	A. senivaram	17.869189°N	82.37872°E	5.75	0.13	1.07
199	A. senivaram	17.868965°N	82.3786°E	6.46	0.15	1.19
200	A. senivaram	17.86905°N	82.37853°E	6.24	0.1	1.25

Table 4. Summary and statistics of soil physico-chemical properties of the study area.

	pH	EC	OC
	(1:2.5)		(%)
Range	5.52 – 7.92	0.02 – 1.09	0.52 – 2.00
Mean	–	0.13	1.05
Standard deviation	0.35	0.11	0.27

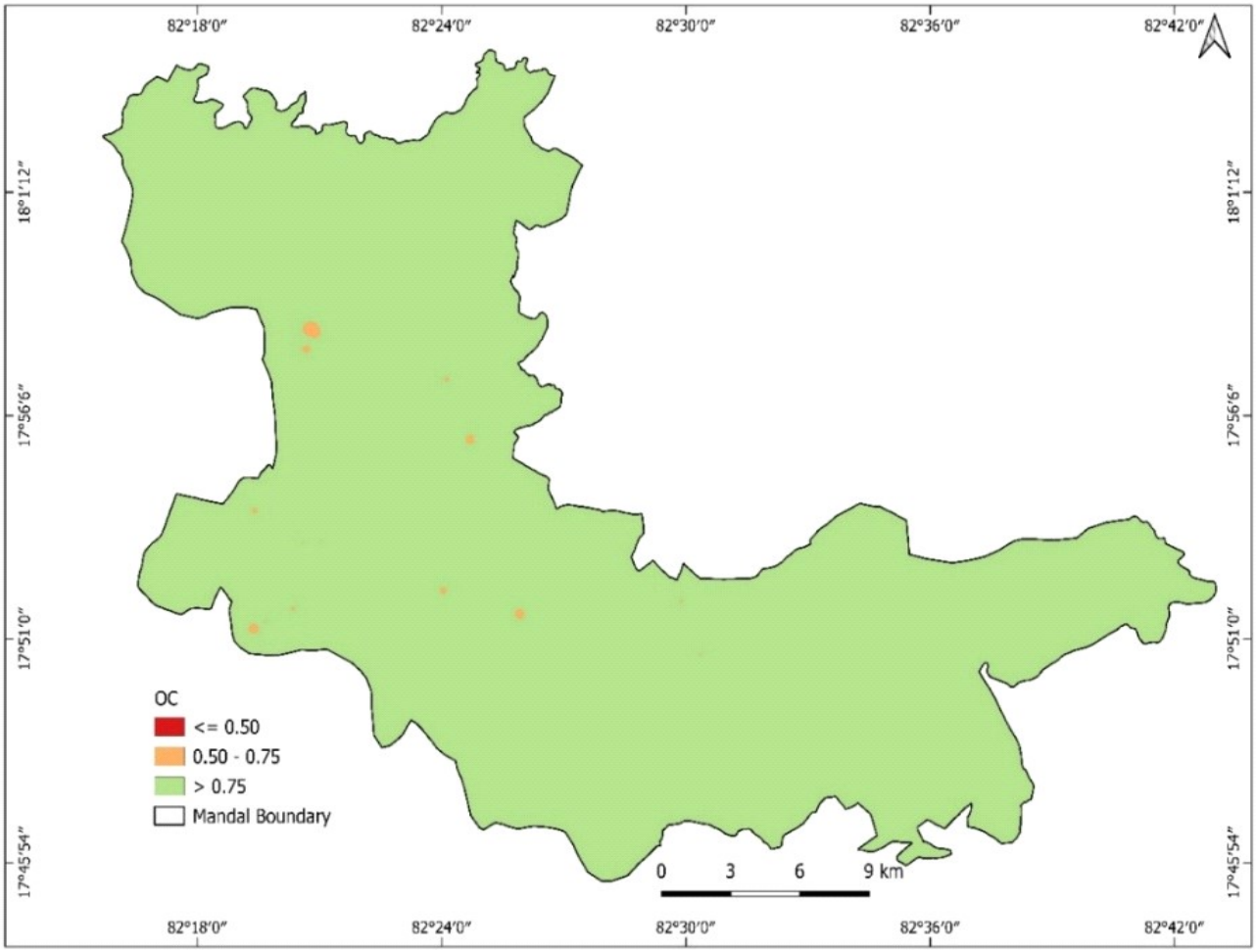


Fig. 3. Spatial variability of soil organic carbon of the study area

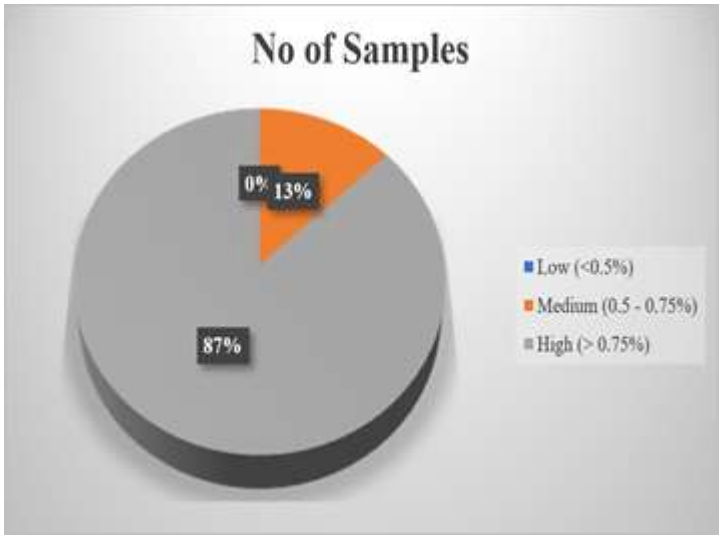


Fig. 4. Percentage Distribution of Organic Carbon Samples

CONCLUSION

The study revealed that the soils were characterized by moderately acidic to neutral reaction (pH 5.52–7.92), low electrical conductivity (0.02–1.09 dS m{ ¹) and moderate to high soil organic carbon content (0.52–2.0 per cent). The mean values of pH (6.48), EC (0.13 dS m^{-1}) and soil organic carbon (1.05 per cent) with relatively low standard deviations indicate limited variability and generally favorable soil conditions across the study area. The non-saline nature of the soils and the relatively high organic carbon status suggest good soil health, enhanced nutrient availability and improved soil physical and biological properties. Overall, the soils exhibit favorable properties, including pH, electrical conductivity (EC) and organic carbon content, making them generally suitable for rice cultivation and supporting agricultural productivity. However, areas with acidic soils may require corrective measures, such as liming to improve soil conditions and enhance crop growth and yield.

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