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Soil Fertility Status of Forage Growing Soils of Nalgonda District, Telangana

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ABSTRACT: In Telangana 4,58,892 acres of land is under fodder crops. In which 4,54,874 acres under annual fodders and 4,018 acres under perennial fodders. In this approximately 20 % of the state forage crop cultivating area is observed in erstwhile Nalgonda district (92,230 acres) with high livestock population. Till now fertility status studies on forage growing soils were limited. So it is highly essential to study the fertility status of forage growing soils and the quality of fodder in Nalgonda district. Livestock are an important asset and livelihood option for poor people in rain fed areas. Fodder crops are the plant species that are cultivated and harvested for feeding the animals in the form of forage, silage and hay. A survey was carried out in forage growing soils of Nalgonda district of Telangana state. Seventy five representative surface soil samples (0-15 cm) were collected and analysed for their salient characteristics viz., pH, EC, OC, free $CaCO_3$, available N, P_2O_5, K_2O and micronutrients (Zn, Fe, Cu and Mn). Soil fertility maps were prepared for macronutrients. Results revealed that, soil pH ranged from 5.68 to 8.34. The soils were non-saline to slightly saline (0.06 to 1.12 dSm^{-1}). The organic carbon ranged from 0.85 to 12.03 g ka^{-1}. Free Calcium Carbonate content ranged from 1.22 to 22.41per cent. With regard to available nutrients, the values varied from 104.0 to 230.2 kg N ha^{-1} for nitrogen, 8.0 to 92.6 kg $P_2O_5 ha^{-1}$ for phosphorus, 91.9 to 399.6 kg K_2O ha^{-1} for potassium. Among the micronutrients 14.6 and 10.6 percent soils were deficient in available zinc and iron. Deficiency of Cu and Mn were negligible.

Keywords: N, P_2O_5, K_2O, Zn, Fe, Cu and Mn.

INTRODUCTION

In India the total area under cultivated fodders is 8.3 million ha on individual crop basis. Sorghum amongst the *kharif* crops (2.6 million ha) and Berseem (*Egyptian clover*) amongst the *rabi* crops (1.9 million ha) occupy about 54% of the total cultivated fodder cropped area. Lucerne (*Alfa alfa)* occupies highest productivity (60-130 tonnes ha^{-1}).

In Telangana, total area under fodder crops cultivation is 4,58,893 acres during the year 2020-21(GOI, 2021) Telangana state has very rich livestock resources. The total livestock population of the State is 264.5 lakhs, in which 48.8 lakh buffaloes, 128.3 lakh sheep and 45.7 lakh goats. As per the 20^{th} livestock census (2017) which is 4.6% over the year 2012.

Generally, fodder crops were grown in marginal to medium fertile soils. Quality of fodder (Protein and Fibre content) depends on the fertility of soils. Fertile soils produce high quality fodder. Feeding the quality green fodder to dairy animals yields high milk and meat production.

In Telangana approximate 20% of the state area is under fodder crops (92,230 acres) observed in erstwhile Nalgonda district with high livestock population (GOI, 2021). So it is highly essential to study the fertility status of the fodder growing soils of Nalgonda district. This paper deals with nutrient status (Physico-chemical and chemical properties) of forage growing soils of Nalgonda district.

MATERIAL AND METHODS

Study Area and Sample Collection. The soil survey was carried out representing the forage growing soils of the Nalgonda district (Fig. 1). A total of Seventy five soil samples (0-15 cm depth) were collected.

The soil samples were collected using GPS (Global Positioning System) and the longitude and latitude points of a particular location were recorded (Fig. 2). The soil fertility maps for N, P_2O_5 and K_2O were prepared with the help of Q.GIS.3.22.9 software using GPS points. The soil samples were packed and labelled properly in polythene bags and brought to the laboratory for further analysis.

Laboratory Analysis. All the soil samples were air dried, grounded and passed through 2 mm sieve for chemical analysis. The soils were analysed for salient characteristics viz., pH, EC, OC and free $CaCO_3$ & available nutrients (N, P_2O_5, K_2O, Zn, Fe, Cu and Mn) following standard procedures. After analysis for available nutrient status, the soils were categorised as low, medium and high for N, P_2O_5 and K_2O. The available sulphur and micronutrients (Zn, Fe, Cu and Mn) were rated as deficient and sufficient based on the critical levels as given by Tandon (2005).

Fig 1. Location of the Study Area.

S. No.	Village	Mandal	Latitude	Longitude
N 1	Molkacherla	Adavidevulapally	16.677335	79.461593
N 2	Adavidevulapally	Adavidevulapally	16.662991	79.506197
N 3	Sreerampally	Anumula	16.712572	79.311843
N 4	Haraziguda	Anumula	16.785318	79.352793
N 5	Venkatadri palem	Anumula	16.852974	79.219723
N 6	Thimmapuru	Anumula	16.819420	79.271911
N 7	Chandampet	Chandampet	16.579167	78.874230
N 8	Polepally	Chandampet	16.608620	78.925541
N 9	Pogilla	Chandampet	16.401534	79.185136
N 10	Shirdepally	Chandur	17.016857	79.062642
N 11	Angadipeta	Chandur	16.984578	79.029080
N 12	Gundrepally	Chandur	16.933117	16.933117
N 13	Chinthapally	Chinthapally	16.798928	78.816320
N 14	Gollapally	Chinthapally	16.896102	78.759397
N 15	Chakalisheripally	Chinthapally	16.917639	78.754227
N 16	Chityala	Chityala	17.231713	79.102266
N 17	Pettampally	Chityala	17.207672	79.028563
N 18	Vanipakala	Chityala	17.241892	79.148774
N 19	Damercherla	Damercherla	16.731035	79.628045
N 20	Nadigadda	Damercherla	16.623332	79.443322
N 21	Khanapur	Gundlapally	16.613933	78.820873
N 22	Veeraboinapally	Gundlapally	16.627713	78.710096
N 23	Rahmatpur	Gundlapally	16.634655	78.785978
N 24	Devarakonda	Devarakonda	16.692876	78.894511
N 25	Thatikole	Devarakonda	16.637216	78.880506
N 26	Mudigonda	Devarakonda	16.739264	78.858404
N 27	Gurrampode	Gurrampode	16.871209	79.112765
N 28	Chinthagudem	Gurrampode	16.845825	79.303322
N 29	Marriguda	Marriguda	17.087789	79.242971
N 30	Ramreddypally	Marriguda	16.967923	78.873075
N 31	Miryalaguda	Miryalaguda	16.886272	79.552409
N 32	Rudraram	Miryalaguda	16.823108	79.619865
N 33	Dondavarigudem	Miryalaguda	16.963706	79.560147
N 34	Munugode	Munugode	17.078166	79.084709
N 35	Ipparthy	Munugode	17.150591	79.049003
N 36	Nakrekal	Nakrekal	17.167087	79.408469
N 37	Chandampally	Nakrekal	17.185056	79.397894
N 38	Nomula	Nakrekal	17.201256	79.445466
N 39	Nalgonda	Nalgonda	17.043265	79.305865
N 40	Gundlapally	Nalgonda	17.051926	79.210446
N 41	Marriguda	Nalgonda	17.087984	79.242038
N 42	Kangal	Kangal	16.943932	79.211694
N 43	Dorepally	Kangal	16.994475	79.180889
N 44	Kattangur	Kattangur	17.158951	79.304184
N 45	Kurumathy	Kattangur	17.220078	79.332179
N 46	Eduloor	Kattangur	17.246472	79.301517

N 47	Kethepally	Kethepally	17.160613	79.495375
N 48	Kasangode	Kethepally	17.210929	79.508802
N 49	Korlapahad	Kethepally	17.160872	79.483631
N 50	Kondamallepally	Kondamallepally	16.707101	78.996933
N 51	Pendlipakula	Kondamallepally	16.667081	78.996314
N 52	Madgulapally	Madgulapally	16.978101	79.454366
N 53	Gajalapur	Madgulapally	16.923212	79.450408
N 54	Nampally	Nampally	16.885915	78.953187
N 55	Mustipally	Nampally	16.751459	78.970703
N 56	Pasnoor	Nampally	16.828910	78.937133
N 57	Narketpally	Narketpally	17.206982	79.182948
N 58	Shapally	Narketpally	17.249673	79.280992
N 59	Neredugommu	Neredugommu	16.619064	78.972096
N 60	Kacharajupally	Neredugommu	16.517210	79.088003
N 61	Nidamanoor	Nidamanoor	16.817580	79.356217
N 62	Marpaka	Nidamanoor	16.910421	79.314036
N 63	Peddariselapally	Peddariselapally	16.674637	79.023984
N 64	Polkampally	Peddariselapally	16.760488	79.129518
N 65	Peddavoora	Peddavoora	16.724641	79.202423
N 66	Sirsangandla	Peddavoora	16.796229	79.254581
N 67	Shaligouraram	Shaligouraram	17.297190	79.376388
N 68	Shalilingotam	Shaligouraram	17.322482	79.378376
N 69	Thipparthy	Thipparthy	17.011173	79.421123
N 70	Jangamreddygudem	Thipparthy	17.034949	79.385503
N 71	Thripuraram	Thripuraram	16.832488	79.463256
N 72	Kampa Sagar	Thripuraram	16.851433	79.454346
N 73	Thirumalagiri	Thirumalagiri	16.717952	79.342577
N 74	Jammanakota	Thirumalagiri	16.589496	79.351901
N 75	Vemulapally	Vemulapally	16.928079	79.524035

Fig. 2. Location of Sampling sites collected from Nalgonda district.

RESULTS AND DISCUSSION

Physico-chemical Characteristics. Soil reaction (pH) of the surface soils ranged from 5.68 to 8.34 indicating that, these soils are slightly acidic to alkaline in reaction. The observations on the soil pH revealed that, 2.66 percent of soils were slightly acidic (<6.5) in nature, 52 per cent samples are neutral (6.5-7.5) and 45.34 percent samples are alkaline (>7.5) in nature.

Electrical conductivity (EC) of surface soils ranged from 0.06 to 1.12 dSm^{-1} indicating that, these soils were non-saline to slightly saline in nature. The observations on EC revealed that, 96% of samples fall under the range of 0 to 1 dS m^{-1} remaining 4% samples fall under the range of 1 to 2 dS m^{-1}.

With regard to the status of organic carbon (g kg^{-1}) the values found to vary from 0.85 to 12.03 g kg^{-1}. The observations on organic carbon revealed that, 68 % of soil samples were low (<5.0 g kg^{-1}), 25.33% of soils were medium (5.0-7.5g kg^{-1}) and 6.66% (>7.5g kg^{-1}) of soils were high in organic carbon. The reason for low organic carbon content in most of the soils may be attributed to the prevalence of semi-arid condition, where the degradation of organic matter occurs at a faster rate coupled with little or no addition of organic manures and lower vegetation on the fields, there by leaving less chances of accumulation of organic carbon in the soils. Intensive cropping is also one of the reasons for low organic carbon content in soils. The similar results were also reported by Nalina *et al*. (2016).

Free Calcium Carbonate content (%) the values found to vary from 1.22 to 22.41per cent. About 38.6 per cent samples are calcareous in nature..The calcareous nature of soils may be due to semi-arid conditions because of relatively little leaching. Similar results were reported by Brady and Weil (1999); Brindha and Elango (2014).

Available Nutrients. The available nitrogen content of the soils ranged from 104.0 to 230.2 kg ha^{-1} (Table 1 and depicted in Fig. 3). Out of the 100 samples analysed, all the soil samples found to have low (<280.0 kg N ha^{-1}) available nitrogen. From the survey data, previous history of the crops grown was taken which indicated that cotton is one of the major commercial crops grown in Nalgonda district. As cotton is a heavy nitrogen feeder which may leads to nitrogen deficiency. Another reason may be due to high temperature and low organic matter content which fasten decomposition process as a result removal of organic matter can be observed which leads to N deficiency (Karthikeyan *et al.,* 2014).

The available phosphorus content of the soils varied extremely from one point to another point. The variation exists in between 8.0 to 92.6 kg P_2O_5 ha^{-1} (Table 1 and depicted in Fig. 4). The soils found to have low to very high available phosphorus. Among the soils analysed, 38.6, 32.0 and 29.4 per cent of soils registered low (<22.9 kg P_2O_5 ha^{-1}), medium (22.9 to 56.3 kg P_2O_5 ha^{-1}) and high available phosphorous (>56.3 kg P_2O_5 ha^{-1}), respectively. This may be due to continuous application of DAP to crops without soil testing might have resulted in phosphorus build up and led medium to high available phosphorus status in these soils (Sathish *et al*., 2018). Another reason for higher P in surface soils possibly might be due to P confinement to the rhizosphere due to its immobile nature in soils (Rajeshwar and Mani 2014).

The available potassium content of the soils varied from 91.9 to 399.6 kg K_2O ha^{-1} (Table 1 and depicted in Fig. 5). In analysed samples, about 8% samples recorded lower (<129.6 kg K_2O ha^{-1}) potassium content, 32%

samples recorded medium (129.6-336) kg K_2O ha^{-1}) potassium content and 60% of soils recorded high (>336 kg K_2O ha^{-1}) available potassium content. These soils may able to maintain a sufficient or even high level of exchangeable K and provide a good supply of K to plants for many years. High available K status in surface soils could be attributed to release of labile-K from organic residues, application of K fertilizers and upward translocation of K from lower depths along with capillary rise of ground water. Similar results were reported by Pal and Mukhopadyay (1992).

Table 1: Available Nutrient Status in Forage growing Soils of Nalgonda District.

Sr. No.	Village	Mandal	N (Kg ha^{-1})	P_2O_5 (Kg ha^{-1})	K_2O (Kg ha^{-1})
N 1	Molkacherla	Adavidevulapally	110.8	18.2	102.0
N 2	Adavidevulapally	Adavidevulapally	182.2	12.4	91.9
N 3	Sreerampally	Anumula	156.0	66.5	162.8
N 4	Haraziguda	Anumula	198.0	74.2	240.8
N 5	Venkatadri palem	Anumula	230.2	52.8	168.2
N 6	Thimmapuru	Anumula	162.7	60.4	228.4
N 7	Chandampet	Chandampet	192.8	23.6	368.0
N 8	Polepally	Chandampet	182.0	45.4	354.6
N 9	Pogilla	Chandampet	160.0	33.5	366.2
N 10	Shirdepally	Chandur	172.4	24.6	379.8
N 11	Angadipeta	Chandur	122.0	46.4	367.9
N 12	Gundrepally	Chandur	118.0	50.6	349.2
N 13	Chinthapally	Chinthapally	168.8	62.4	335.2
N 14	Gollapally	Chinthapally	158.0	72.8	337.8
N 15	Chakalisheripally	Chinthapally	172.0	76.8	358.1
N 16	Chityala	Chityala	200.0	18.6	185.0
N 17	Pettampally	Chityala	188.8	13.1	320.5
N 18	Vanipakala	Chityala	178.2	8.0	162.5
N 19	Damercherla	Damercherla	156.0	14.5	110.6
N 20	Nadigadda	Damercherla	108.3	18.2	97.8
N 21	Khanapur	Gundlapally	182.8	46.2	347.5
N 22	Veeraboinapally	Gundlapally	168.4	55.8	385.2
N 23	Rahmatpur	Gundlapally	172.0	32.4	338.2
N 24	Devarakonda	Devarakonda	150.8	24.8	388.8
N 25	Thatikole	Devarakonda	222.6	28.5	340.0
N 26	Mudigonda	Devarakonda	182.0	54.0	357.4
N 27	Gurrampode	Gurrampode	180.9	24.6	210.8
N 28	Chinthagudem	Gurrampode	162.0	26.8	236.4
N 29	Marriguda	Marriguda	130.0	12.6	296.5
N 30	Ramreddypally	Marriguda	126.4	18.7	196.0
N 31	Miryalaguda	Miryalaguda	188.0	13.3	361.0
N 32	Rudraram	Miryalaguda	120.0	16.2	382.0
N 33	Dondavarigudem	Miryalaguda	156.8	20.2	394.3
N 34	Munugode	Munugode	136.0	18.2	346.5
N 35	Ipparthy	Munugode	110.5	20.6	374.5
N 36	Nakrekal	Nakrekal	212.0	12.4	123.1
N 37	Chandampally	Nakrekal	182.4	16.8	118.2
N 38	Nomula	Nakrekal	152.0	18.4	182.6
N 39	Nalgonda	Nalgonda	172.0	10.8	350.4
N 40	Gundlapally	Nalgonda	162.6	12.8	348.2
N 41	Marriguda	Nalgonda	198.0	18.4	363.9
N 42	Kangal	Kangal	168.6	24.8	240.0
N 43	Dorepally	Kangal	156.0	36.8	274.0
N 44	Kattangur	Kattangur	201.0	18.0	338.2
N 45	Kurumathy	Kattangur	199.2	16.2	347.1
N 46	Eduloor	Kattangur	173.0	12.7	368.8
N 47	Kethepally	Kethepally	225.0	16.8	228.2
N 48	Kasangode	Kethepally	179.0	14.5	188.6
N 49	Korlapahad	Kethepally	163.2	11.6	266.4
N 50	Kondamallepally	Kondamallepally	190.0	35.6	382.8
N 51	Pendlipakula	Kondamallepally	172.0	64.2	353.4
N 52	Madgulapally	Madgulapally	150.6	69.2	355
N 53	Gajalapur	Madgulapally	182.0	74.8	350.2
N 54	Nampally	Nampally	156.0	58.2	375
N 55	Mustipally	Nampally	104.0	74.5	350.4
N 56	Pasnoor	Nampally	176.0	82.6	344.6
N 57	Narketpally	Narketpally	168.4	18.6	372.2
N 58	Shapally	Narketpally	198.0	14.2	384.2
N 59	Neredugommu	Neredugommu	162.2	32.8	351.1
N 60	Kacharajupally	Neredugommu	192.0	46.7	367.9
N 61	Nidamanoor	Nidamanoor	210.0	92.6	155.8
N 62	Marpaka	Nidamanoor	188.0	82.4	150.5
N 63	Peddariselapally	Peddariselapally	178.0	68.5	182.2

N 64	Polkampally	Peddariselapally	222.0	74.2	288.4
N 65	Peddavoora	Peddavoora	190.0	58.6	399.6
N 66	Sirsangandla	Peddavoora	168.8	64.8	398.2
N 67	Shaligouraram	Shaligouraram	192.0	16.5	368.4
N 68	Shalilingotam	Shaligouraram	160.0	24.8	360.7
N 69	Thipparthy	Thipparthy	182.8	44.2	358.2
N 70	Jangamreddygudem	Thipparthy	202.0	52.4	346.1
N 71	Thripuraram	Thripuraram	188.6	64.8	375.8
N 72	Kampa Sagar	Thripuraram	208.0	86.6	344.4
N 73	Thirumalagiri	Thirumalagiri	184.2	68.5	167.2
N 74	Jammanakota	Thirumalagiri	158.0	62.8	222.8
N 75	Vemulapally	Vemulapally	162.0	52.8	385.2
		Mean	**172.0**	**39.1**	**296.9**
		Minumum	**104.0**	**8.0**	**91.9**
		Maximum	**230.2**	**92.6**	**399.6**
		SD	**28.1**	**24.2**	**95.5**

Table 2: DTPA-extractable micronutrients (Zn, Fe, Cu & Mn).

Sr. No.	Zn (mg kg^{-1})	Fe (mg kg^{-1})	Cu (mg kg^{-1})	Mn (mg kg^{-1})
N 1	1.2	6.8	0.8	8.2
N 2	0.9	10.3	0.5	3.6
N 3	0.8	5.7	0.7	3.2
N 4	1.2	12.9	0.8	3.5
N 5	0.3	0.5	4.8	0.6
N 6	0.6	6.7	1.1	7.5
N 7	2.2	18.3	7.3	25.4
N 8	0.9	7.4	1.8	10.5
N 9	2.1	16.5	2.7	9
N 10	1.9	18	0.7	8.2
N 11	0.9	6.5	0.9	3.9
N 12	1.6	7.1	0.6	4.3
N 13	0.5	5.3	1.9	3.2
N 14	0.7	6.2	0.3	2.1
N 15	0.3	4.9	0.1	1.6
N 16	0.9	6.1	0.3	1.2
N 17	2.2	12.5	2.2	14.2
N 18	1.9	4.2	0.3	0.5
N 19	1.9	14.2	0.9	7.4
N 20	1.3	5.8	4.3	3.6
N 21	3.5	6	1.7	3.2
N 22	1	4.7	0.4	7.6
N 23	0.9	5.5	1	3.9
N 24	0.4	3.4	0.2	1.5
N 25	1.3	8.1	2	2.4
N 26	0.9	7.2	0.9	2.2
N 27	0.4	5.2	1.2	1.8
N 28	0.3	4.8	0.2	1.5
N 29	2.3	6.9	6.2	8.2
N 30	2.1	8.2	1.9	14.2
N 31	1.1	7.2	0.3	6
N 32	0.9	6.5	1.2	7.2
N 33	1.2	4.9	0.8	5.8
N 34	2.7	6.7	3.5	12.6
N 35	0.7	5.4	0.5	11
N 36	3.2	5.6	0.3	8.3
N 37	4.2	5.4	0.4	12
N 38	2.5	4.2	0.2	2.2
N 39	1.6	5.2	1.3	3.7
N 40	1.4	6.4	0.3	2.2
N 41	1.9	12.5	1.7	7.2
N 42	2.6	6.8	0.4	12.2
N 43	2.5	6	0.5	4.5
N 44	2	5.3	1.3	8.3
N 45	1.8	13	1.7	6.8
N 46	0.9	5.7	0.8	3.5
N 47	0.7	2.9	0.4	2.6
N 48	1.3	7.6	1.3	15
N 49	1.8	7.1	2.9	13.4
N 50	1.8	5.2	0.5	2.8
N 51	3.5	7.6	0.2	1.3
N 52	0.6	10.8	0.4	12.5

N 53	1.5	9.8	1	4.8
N 54	2.4	5.9	0.9	1.9
N 55	0.8	4.5	0.3	4.3
N 56	0.2	4.2	0.1	2.1
N 57	0.7	3.8	0.3	5.2
N 58	0.9	5.6	0.4	3.2
N 59	0.3	5.2	0.2	2.2
N 60	0.3	10.2	0.4	3.6
N 61	3.6	9.9	1.8	6.5
N 62	0.9	8.5	0.5	8.2
N 63	1.2	5.2	0.3	3.2
N 64	3.3	10.8	2.8	19.3
N 65	0.8	7.2	0.5	2.8
N 66	0.3	5.8	0.7	1.6
N 67	0.6	4.4	0.5	0.2
N 68	1.2	8.2	0.9	12
N 69	0.8	4.8	0.4	3.1
N 70	1.1	4.8	3	1.8
N 71	1.2	5.7	0.5	4.8
N 72	1.4	5.3	0.4	2.9
N 73	2.6	6.8	1.8	9.3
N 74	0.9	5.2	0.5	4.2
N 75	0.2	6.2	2.2	2.8
Mean	**1.4**	**7.1**	**1.2**	**5.9**
Minimum	**0.2**	**0.5**	**0.1**	**0.2**
Maximum	**4.2**	**18.3**	**7.3**	**25.4**
S D	**0.9**	**3.3**	**1.3**	**4.7**

Nalgonda district samples are analysed for micronutrients shown variation in the content from Soil to Soil. Zinc content which is extracted by using DTPA solution varied from 0.2 mg kg^{-1} to 4.2 mg kg^{-1} (Table 2). About 14.6 % samples are deficient in zinc content (<0.6 mg kg^{-1}) and 85.4 % samples are sufficient in zinc content (>0.6 mg kg^{-1}). Lower content of zinc was due to high pH values which have resulted in the formation of insoluble compounds of zinc (Tandon, 1995).

Soil samples analysed for Iron content varied from 0.5 mg kg^{-1} to 18.3 mg kg^{-1} (Table 2). About 10.66% samples are deficient in iron content (<4.5 mg kg^{-1}) and 89.34 % samples are sufficient in iron content (>4.5 mg kg^{-1}). Since, most of the soils are neutral to alkaline, low in organic carbon, there is a possibility of deficiency of Zn and Fe in these soils. Similar results were observed by Patil *et al*. (2016).

Soil manganese content extracted using DTPA solution varied from 0.2 mg kg^{-1} to 25.4 mg kg^{-1} (Table 2). About 4 % samples were deficient in manganese content (<1.0mg kg^{-1}) and 84% samples were sufficient in manganese content (>1.0 mg kg^{-1}). In general, calcium carbonate decreased the availabilities of micronutrients owing to their insoluble hydroxides at higher pH (Sahoo *et al*., 1995).

Available copper deficiency is negligible (Table 2) in all the soils collected from forage growing areas of Nalgonda district. Similar results were also reported by Surendra Babu *et al*. (2019).

Soil Fertility maps of Nalgonda district.

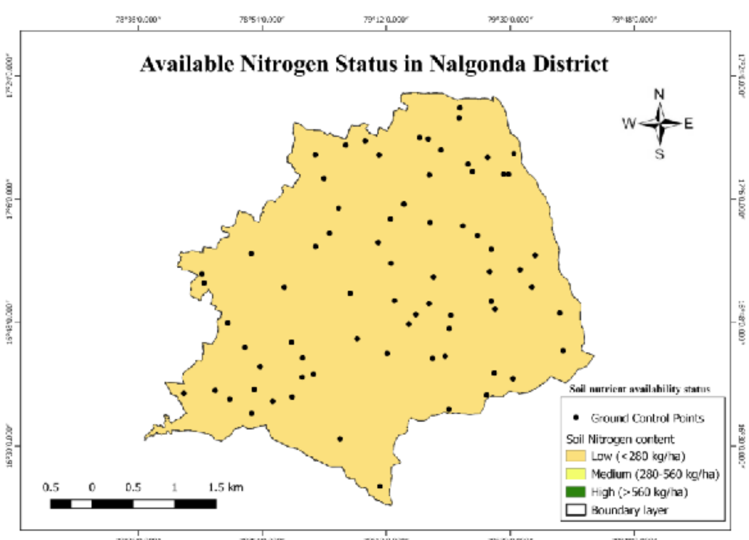

Fig. 3. Available Nitrogen content in Forage grown soils of Nalgonda district.

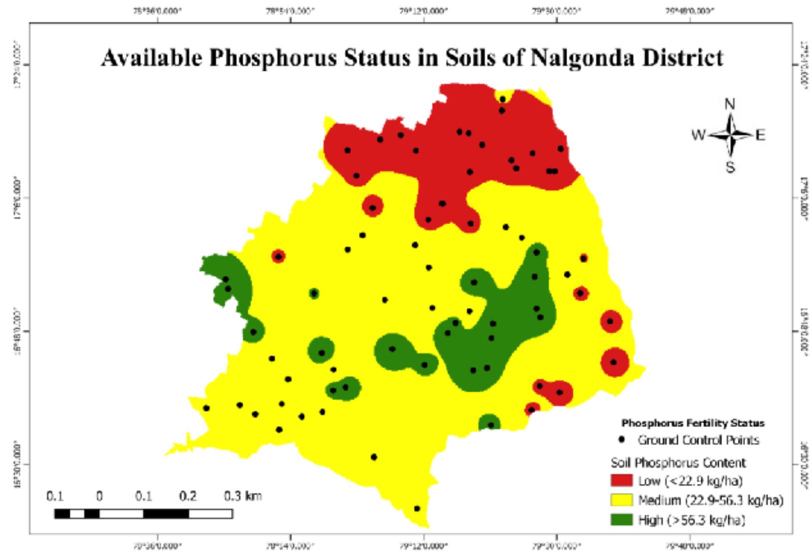

Fig. 4. Available P_2O_5 content in Forage grown soils of Nalgonda district.

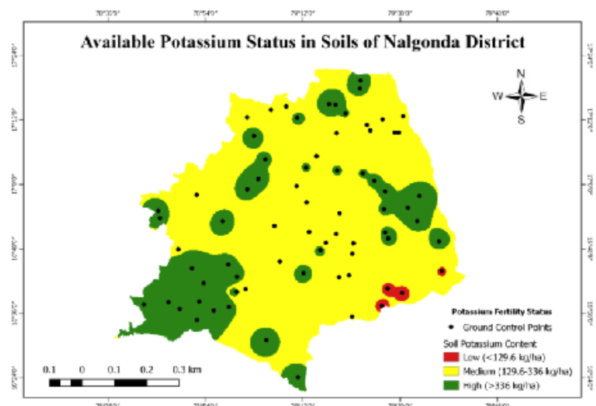

Fig. 5. Available K_2O content in Forage grown soils of Nalgonda district.

CONCLUSIONS

1. The soils of Nalgonda district are alkaline in reaction and very little were acidic. 68 % soils are low in organic carbon and only 6.6 % soils are high in Organic carbon content.
2. Electrical conductivity of soils in Nalgonda district ranged from 0.06-1.12 dSm^{-1} and about 38.6 % soils were high in calcium carbonate content.
3. Nitrogen content were low in 100 % samples collected from Nalgonda district The available N ranged from 104.0 to 230.2 kg N ha^{-1}.
4. The available phosphorus content ranged from 8.0 to 92.6 kg $P_2O_5ha^{-1}$.
38.6 % of samples collected in the district has shown lower phosphorous content and 32.0 % samples are medium in phosphorous in content. It shows 29.4 % of soils in the district were medium to high in phosphorous level.
5. The available potassium content of the soils varied from 91.9 to 399.6 kg K_2O ha^{-1}.92% samples in the district are medium to high in potassium content.
6. In Nalgonda district 14.6 % samples are deficient in Zinc nutrient, while the other micro nutrient like cu and Mn are sufficient in soils and Fe is deficient in 10.6 % soils.
7. Deficiency levels in micro nutrient content in Nalgonda district follows Zn>Fe>Mn>Cu.

FUTURE SCOPE

1. Survey studies can be carried out on aspects of irrigation water quality in fodder growing areas.
2. Studies on fodder crops and weather relations using advanced tools like Remote Sensing and GIS can be made to understand the performance of fodder crops under the light of changing climate.
3. Survey must be conducted in other districts so the fertility status of forage grown soils may be assessed.
4. Study on fodder quality assessment has to be made improved in order to enhance the quality of milk and health of animal.

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