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Characterization, classification and evaluation of cotton growing soils of Nanded District, Maharashtra

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Abstract

Seven representative soil profiles from different physiographic unit of Nanded district were characterized and classified. The cotton growing soils of Nanded district are shallow to deep, black (10 YR 2.5/1) to very pale brown (10 YR 7/4) in colour, granular to angular blocky in structure, loam to clay in texture (13.4 to 70.77 %). The bulk density of these soils varied from 1.29 to 1.88 Mg^m⁻³, PAWC varied from 101.3 to 366.2 mm and saturated hydraulic conductivity varied from 1.30 to 23.10 cm hr⁻¹. The soils are slightly to moderately alkaline in nature (pH 7.2 to 8.5), the electrical conductivity varied from 0.1 to 0.4 dSm⁻¹. Low to high in organic carbon (0.1 to 0.9%) whereas low to very high in calcium carbonate content (5.3 to 36.1 %) and high in cation exchange capacity (35.40 to 66.30 cmol (P⁺) kg⁻¹). The calcium was the dominant cation followed by magnesium, sodium and potassium. The base saturation percent was 74.89 to 99.70 percent. The fertility status of cotton growing soils of Nanded district was low to high. Taxonomically these soils were classified as Typic Ustorthents, Typic Haplustepts and Typic Haplusterts and Calcic Haplusterts. The soil-site suitability indicated that the Typic Ustorthents soils were marginally suitable whereas Typic Haplustepts were moderately suitable and Typic Haplusterts soils were highly suitable for cotton crop.

Keywords: Soil classification, morphological, physical and chemical characteristic of soil, soil site suitability, cotton

Introduction

Nanded is one of the district of Maharashtra states which, belongs to sub-tropical region, with an average annual rainfall 890 mm. The soils of Nanded are formed from weathering of Deccan basalt rock which is rich in Ca, Mg and carbonates but poor in N, P and K. Cotton, (*Gossypium spp.*) is the most important fiber and cash crop not only of India but also of the entire world, grown widely in the tropical and sub-tropical areas and requires uniformly high temperature varying between 21°C and 30°C. Cotton is commonly called "White Gold". Cotton (*Gossypium hirsutum*) is grown in varied pedo-edaphic agro-ecoregions of the country under different agro-management. The rainfed cotton is frequently grown mostly in shrink-swells of central India, southern states and Gujarat. These soils are generally productive, but difficult to manage. In Marathwada, cotton is grown predominantly as a rainfed crop in Vertisols (black or regur) and associated soils. These soils are characterized by dark gray to black in colour, high clay content, particularly of smectitic type, neutral to alkaline in reaction, high cation exchange capacity with exchangeable position dominated by Ca²⁺ and Mg²⁺ and in some cases by Na⁺. The importance of soil survey and mapping for preparing an inventory of a region, the soil properties are used for evaluation of soil for different crop. The value of soil resource inventory for increasing food production and conservation of natural resources has been receiving significant importance not only for soil resource data base generated but also its quality (Eswaran and Gathrie, 1982). For the proper land resource management in this area, investigation on the land properties and their constraints is a prerequisite. A documentation of soil properties in systematic manner is one of the vital components in formulating effective land use planning programme (Deshmukh and Bapat, 1993). Through the present investigation on soils resources of Nanded district have been evaluated for land use planning.

Materials and Methods

Geographically Nanded district of Maharashtra state is located between 18° 15' to 19° 55' North Latitude and 77° 07' to 78° 15' East Longitude with the total geographic area is about 10528 sq. Kms. Nanded district is located exactly in between 18° 01' 35" to 18° 25' 49" North latitude and 75° 55' 36" to 76° 19' 10" East longitude at an altitude of 640 to 660 m above MSL. The total geographical area is 10,528 sq. Kms. In the area received mean annual rainfall of 873 mm and mean maximum and mean minimum temperature are 36.6 °C and

21.53°C respectively. The area has Ustic soil moisture regime, Hyperthermic temperature regime and length of growing period is 149 days. Seven representative pedons were selected from different physiographic unit of the study area. Morphological study of the soil was described as per soil survey manual (Soil survey staff, 2002) The soil samples were collected horizon wise, air dried ground and sieved using 2 mm sieve. Particle size analysis of the sample was carried out by international pipette method (Jackson 1979). Water retention characteristics were determined by pressure plate apparatus and PAWC determined by expression suggested by Gardner *et al.* (1984). Bulk density of the soil was determined by clod coating technique (Black 1965). EC, pH, organic carbon, CaCO₃, exchangeable cations and cation exchange capacity (CEC) were determined by standard procedure (Jackson, 1973). The soils were classified as per soil Taxonomy (Soil Survey Staff, 1994). Soil site suitability were made as per the criteria suggested by Sys *et al.* (1991) and modified by NBSS & LUP (1994). In addition, suitability classes were also derived based on the actual yield as suggested by FAO (1983).

Results and Discussion

Morphological characteristics

The morphological characteristics of soils were presented in table 1. The depth of the soil ranged from shallow (<47cm) to deep (>107cm) and which was gradually decreases with increasing elevation of the soil profile. The shallow soil were found in elevated area were as deep soils are in low lying area black (10 YR 2.5/1) to very pale brown (10 YR 7/4) in colour. The soil structure of the pedon located on elevated area (P6) are granular in structure where as pedon located on gently sloping (P1, P2 & P4) are sub angular blocky and low lying area (P3, P5 & P7) were sub angular blocky to angular blocky in structure.

Physical properties

Physical properties of soils were presented in table 2. The soil situated in elevated area P6 are sandy clay loam in texture and high amount of coarse fragments varies from 0.11 to 81.49 per cent. The soils developed on sloping land P1, P2 and P4 are clay loam to clayey in texture where as pedon located on low lying area P3, P5 and P7 are clayey in texture. Topography and slope were found to affect particle size distribution. Bulk density of soil ranged from 1.29 to 1.88 Mg m⁻³. The available water content (AWC) of the soil ranged from 7.3 to 29.1 per cent followed the trend of clay distribution. The maximum available water content at soils of Typic Haplusterts followed by Typic Haplustepts and Typic Ustorthents (Table 2). The capacity of soil to store moisture for plant use is largely a function of their clay content, depth of soil and mineralogy of soil. Therefore a significant positive linear correlation of soil depth with PAWC ($r = 0.99$) and clay content with PAWC ($r = 0.95$) were obtained. This suggests that the soil depth, texture and PAWC are interrelated to each other and in turn influence the crop yield. The saturated hydraulic conductivity of soil varies from 1.30 to 23.10 cm hr⁻¹, this variation attributed to textural variation. This variation may be attributed to application of irrigation water; similar observation was reported by Vaidya *et al.* (2007).

Chemical properties of soil

The pH data are presented in table 2. The soils are slightly to moderately alkaline in nature. The pH ranged from 7.2 to 8.5. The pH of the soil was decreased with increasing altitude. The surface soil layers were moderately in nature. This is due to leaching of appreciable amount of exchangeable bases. The CaCO₃ content in soils ranged from 5.6 to 36.1 per cent indicating soils are calcareous in nature. High CaCO₃ affects the physical and chemical properties of soil and which has a great influence on crop production under rainfed condition. These soils were low to high in organic carbon varied from 0.1 to 0.9 per cent and which was decreased with depth. The cation exchange capacity (CEC) ranged from 35.40 to 66.30 cmol(p+) kg⁻¹. The maximum cation exchange capacity in Calcic Haplusterts. The high CEC of black soil is attributed to the high amount of clay and smectitic clay mineralogy (Pal and Deshpande, 1987). The relationship of cation exchange capacity (CEC) with crop yield suggested that the yield of crop was influenced by the CEC of soil and it was positively correlation between CEC of soil and yield of cotton ($r = 0.96$). The exchangeable Ca⁺⁺, Mg⁺⁺, Na⁺ and K⁺ ranged between 11.6 to 43.8, 9.40 to 22.32, 0.66 to 1.96 and 0.12 to 0.62 cmol (p+) kg⁻¹ respectively. The exchangeable sodium percent were < 5 indicating there is no sodicity.

Soil classification

The pedon located on elevated topography (P6) does not have any diagnostic horizon and thus these soil are qualified as order Entisols and due to the presence of Ustic moisture regime soils were grouped into Ustorthents. At subgroup level, these soils classified as Typic Ustorthents because these soils do not key out for other subgroup. The pedon located on sloping topography (P1, P2 and P4) having ochricepedons followed by cambic sub-surface diagnostic horizons and hence, grouped under Inceptisols. Due to ustic moisture regime, these pedons qualify for ustepts suborder. These pedons do not have duripan horizon and hence are classified under Haplustepts great group. At subgroup level these soil classified as Typic Haplustepts. The pedon located on lower topographic position (P3, P5 & P7) were deep to very deep black colour, clayey (>50%) and characterized by deep, wide cracks and well developed slickenside and pressure faces. Therefore, these soils were classified under the order Vertisols and due to presence of Ustic moisture regime soils are group into Haplusterts and subgroup Typic Haplusterts.

Soil site suitability evaluation

Soil site suitability evaluation were presented in table 5 and it was carried out by using criteria suggested by NBSS and LUP, 1994. The soils of Typic Ustorthents (P₆) are currently not suitable; Typic Haplustepts (P₁, P₂ and P₄), Typic Haplusterts (P₃) and Calcic Haplusterts (P₅ and P₇) were moderately suitable (S₂) for cotton in Nanded district. According to FAO 1983, the suitability based on optimum yield basis the soils of Typic Ustorthents (P₆) were marginally suitable and Typic Haplustepts (P₁, P₂ and P₄) were moderately suitable (S₂) and Typic Haplusterts (P₃) and Calcic Haplusterts (P₅ and P₇) were highly suitable (S₁) for cotton crop.

Table 1: Morphological properties of cotton growing soils of Nanded district.

Horizon	Depth (cm)	Boundary	Matrix colour	Texture	Structure	Consistency	Pores	Roots	Effervescence
Pedon 1 Chenapur, Tq. Ardhapur, (Typic Haplustepts)									
Ap	0-17	cs	10YR3/2	sic	m1sbk	s,fr,ss, sp	vfm, ff	vfm, ff	e
Bw ₁	17-33	cs	10YR4/3	c	m1sbk	s,fr,ss, sp	vfm, ff	vfm, ff	e
Bw ₂	33-45	cw	10YR4/3	c	m1sbk	s,fr,vs, vp	fm	vfm	e
Ck ₁	45-60	cw	10YR6/4	l	gr	s,fr,nsnp	cf	fm	es
Ck ₂	60-80	--	10YR7/4	l	gr	s,fr,ns, np	cf	fm	es
Pedon 2 Pingali, Tq. Hadgaon (Typic Haplustepts)									
Ap	0-12	cs	10YR3/2	c	m1sbk	sh,fr, ss, sp	vfm, fm	vfm, fm	e
Bw ₁	12-27	cs	10YR3/3	c	m1sbk	s,fr,sssp	vfm, fm	vfm, fm	e
Bw ₂	27-40	cs	10YR4/3	c	m1sbk	s,fr,sssp	vfm, fm	fm	e
Ck ₁	40-55	cs	10YR6/3	l	m1sbk	s,fr, ns, np	vff, ff	ff	es
Ck ₂	55-65	--	10YR7/2	l	gr	sh, l, ns, np	ff	ff	ev
Pedon 3 Hadsani, Tq. Hadgaon (Typic Haplusterts)									
Ap	0-18	cs	10YR3/2	c	m1sbk	sh, l,ss, sp	vfm, fm	vfm, fm	e
Bw ₂	18-32	cs	10YR2.5/1	c	m1sbk	s, l,ss, sp	vfm, fm	vfm, fm	e
Bss ₁	32-65	ai	10YR3/1	c	m3abk	h,fr,ss, sp	vfm, fm	vfm, fm	e
Bss ₂	65-100	ai	10YR4/1	c	m3abk	h,fr,ss, sp	ff, cf	vff, ff	e
Cr	100-115	--	10YR5/4	l	gr	fr, ns, np	ff, cf	ff, c	es
Pedon 4 Borgadi, Tq. Himayatnagar (Typic Haplustepts)									
Ap	0-25	ai	10YR3/2	c	m3sbk	h,vs, vp	vfm, fm	vfm, fm	e
Bw	25-35	cs	10YR4/2	c	m3sbk	vh,fi,vs, vp	vfm, fm	vff, fm	e
Ck ₁	35-56	cb	10YR4/3	l	gr	fr, ns, np	vff, cf	ff, cc	es
Ck ₂	56-70	--	10YR5/4	l	gr	fr, ns, np	ff, cf	cc	es
Pedon 5 WarangTakali, Tq. Himayatnagar (Calcic Haplusterts)									
Ap	0-17	cs	10YR3/1	c	m1sbk	s,fr,sssp	vfm, fm	vfm	e
Bw ₁	17-35	cs	10YR3/2	c	m2sbk	sh,fr,ss, sp	vfm, fm	vfm, fm	e
Bw ₂	35-60	cs	10YR2.5/1	c	m3sbk	sh,fr, ss, sp	vfm, fm	vfm, fm	e
Bss	60-90	ai	10YR3/2	c	m2sbk	h,fi,ss, sp	fm	ff, cf	e
Ck ₁	90-113	ai	10YR3/2	sl	gr	s,fr, ns, np	ff	ff, cf	es
Ck ₂	113-120	--	10YR5/2	sl	gr	s,fr, ns, np	ff	ff, cf	es
Pedon 6 Umari, Tq. Hadgaon (Typic Ustorthents)									
Ap	0-17	cs	10YR3/2	c	m1sbk	s,fr,ss, sp	vfm, fm	vfm, fm	e
Ac	17-47	cs	10YR7/2	c	gr	s, fr, ns, np	vfm	vff, fm	ev
Cr	47-70	--	10YR6/4	sl	gr	s, fr, ns, np	ff, cf	ff, cc	ev
Pedon 7 Koli, Tq. Hadgaon (Calcic Haplusterts)									
Ap	0-16	cs	10YR3/4	c	m1sbk	s,fr,sssp	vfm, fm	vfm, fm	e
Bw ₁	16-35	cs	10YR4/3	c	m1sbk	s,fr,sssp	vfm, fm	vfm, fm	e
Bss ₁	35-65	cs	10YR3/2	c	m2abk	sh,fr,ss, sp	vfm, fm	fm, vfm	e
Bss ₂	65-83	cs	10YR4/3	c	m3abk	sh,fr,ss, sp	fm, ff	ff, ff	e
Bss ₃	83-107	cs	10YR4/4	c	m1abk	sh,fr,ss, sp	ff, cf	ff, cf	es
Cr	107-115	--	10YR5/3	l	gr	s, fr, ns, np	ff, cf	fm, cm	es

Table 2: Physical properties of cotton growing soils of Nanded district

Horizons	Depth (cm)	Coarse Fragment (%)	BD (Mgm ⁻³)	HC (cm hr ⁻¹)	Particle size analysis (%)			Moisture retention (%)		AWC (%)	PAWC (%)
					sand	silt	clay	33kPa	1500kPa		
Pedon 1 Chenapur, Tq. Ardhapur, (Typic Haplustepts)											
Ap	0-17	3.45	1.80	3.4	6.47	41.03	52.5	40.2	24.3	15.9	176.4
Bw ₁	17-33	2.54	1.70	4.0	3.20	38.20	58.6	37.1	26.7	10.4	
Bw ₂	33-45	1.58	1.79	9.6	3.12	33.68	63.2	38.3	20.2	18.1	
Ck ₁	45-60	15.48	1.79	17.1	40.12	40.60	19.25	26.4	16.7	9.7	
Ck ₂	60-80	30.41	1.76	20.1	39.30	41.00	19.70	26.9	17.1	9.8	
Pedon 2 Pingali, Tq. Hadgaon (Typic Haplustepts)											
Ap	0-12	1.93	1.57	3.9	2.50	38.15	58.95	39.1	23.5	15.6	138.4
Bw ₁	12-27	2.86	1.57	3.2	2.3	39.30	58.4	37.2	18.9	18.3	
Bw ₂	27-40	0.94	1.50	1.3	2.9	37.1	60.0	39.7	19.1	18.1	
Ck ₁	40-55	2.27	1.52	22.1	39.50	38.9	21.65	25.7	18.1	07.6	
Ck ₂	55-65	8.38	1.66	20.1	38.90	38.8	22.30	26.3	18.3	08.0	
Pedon 3 Hadsani, Tq. Hadgaon (Typic Haplusterts)											
Ap	0-18	4.26	1.57	4.32	6.8	24.50	68.7	42.1	22.1	20.0	340.4
Bw ₂	18-32	5.87	1.69	14.0	3.7	31.50	64.76	43.9	22.5	21.4	
Bss ₁	32-65	4.48	1.69	13.7	2.85	28.80	68.33	45.7	28.3	17.4	
Bss ₂	65-100	4.49	1.68	12.8	5.3	29.30	69.12	46.3	26.1	20.2	
Cr	100-115	38.85	1.43	23.1	44.9	36.20	18.89	25.9	17.8	08.1	
Pedon 4 Borgadi, Tq. Himayatnagar (Typic Haplustepts)											
Ap	0-25	0.11	1.59	4.1	9.82	26.87	63.3	28.4	15.7	12.7	123.4

Bw	25-35	2.62	1.83	4.4	11.02	26.25	62.72	29.5	15.9	13.6	
Ck ₁	35-56	58.26	1.72	17.4	56.32	25.50	18.18	22.6	15.3	7.3	
Ck ₂	56-70	55.88	1.86	22.2	57.21	23.20	19.50	23.2	14.9	8.3	
Pedon 5 WarangTakali, Tq. Himayatnagar (Calcic Haplusterts)											
Ap	0-17	0.11	1.65	4.6	5.44	35.60	58.9	37.6	21.3	16.3	366.2
Bw ₁	17-35	0.12	1.61	5.8	6.25	22.20	66.1	37.7	21.8	15.9	
Bw ₂	35-60	0.02	1.81	6.0	7.12	32.20	66.6	43.1	23.6	19.5	
Bss	60-90	0.45	1.88	4.6	3.12	26.11	70.77	45.2	27.2	18.0	
Ck ₁	90-113	47.24	1.55	19.1	50.19	29.60	20.12	45.9	27.1	18.8	
Ck ₂	113-120	58.82	1.51	23.1	50.50	28.80	20.70	44.5	27.8	16.7	
Pedon 6 Umari, Tq.Hadgaon (Typic Ustorthents)											
Ap	0-17	5.83	1.29	7.6	12.13	35.49	52.37	20.8	8.8	12.0	101.3
Ac	17-47	35.71	1.53	8.1	33.61	23.13	43.25	18.4	10.3	08.1	
Cr	47-70	52.84	1.8	20.4	62.14	24.45	13.4	17.4	9.9	07.5	
Pedon 7 Koli, Tq. Hadgaon (Calcic Haplusterts)											
Ap	0-16	1.31	1.66	5.3	6.54	24.80	68.65	44.2	30.0	14.2	345.3
Bw ₁	16-35	0.83	1.44	7.2	5.98	29.39	64.62	44.3	28.0	16.3	
Bss ₁	35-65	1.38	1.77	9.1	4.58	29.39	66.01	45.2	24.3	20.9	
Bss ₂	65-83	3.37	1.73	9.4	5.21	28.30	66.48	40.77	21.2	19.57	
Bss ₃	83-107	5.79	1.79	8.4	6.27	39.20	54.49	49.89	20.7	29.1	
Cr	107-115	81.49	1.83	19.7	30.12	46.10	23.7	22.6	15.3	07.3	

Table 3: Chemical properties of cotton growing soils of Nanded district.

Horizons	Depth (cm)	pH	EC (dSm ¹)	OC (%)	CaCO ₃ (%)	CEC (cmol(P ⁺) kg ¹)	Exchangeable Cations (cmol(P ⁺)kg-1)				Sum of cations	B.S. (%)
							Ca ⁺⁺	Mg ⁺⁺	K ⁺	Na ⁺		
Pedon 1 Chenapur, Tq. Ardhapur, (Typic Haplustepts)												
Ap	0-17	7.9	0.3	0.4	08.5	48.12	28.8	11.7	0.45	1.1	42.05	87.38
Bw ₁	17-33	8.1	0.2	0.4	14.2	51.41	26.4	18.7	0.35	1.04	46.49	90.42
Bw ₂	33-45	8.1	0.2	0.5	11.3	54.50	31.2	17.1	0.37	1.03	49.70	91.19
Ck ₁	45-60	8.2	0.3	0.1	27.9	41.35	19.6	10.2	0.29	0.88	30.97	74.89
Ck ₂	60-80	8.2	0.3	0.1	36.1	40.70	22.0	10.5	0.20	0.66	33.38	82.01
Pedon 2 Pingali, Tq. Hadgaon (Typic Haplustepts)												
Ap	0-12	8.0	0.3	0.7	16.2	49.32	30.0	17.2	0.32	0.96	48.48	98.29
Bw ₁	12-27	7.9	0.3	0.6	17.2	50.14	32.0	16.5	0.33	0.96	49.79	99.30
Bw ₂	27-40	8.0	0.3	0.6	12.5	58.89	35.2	21.4	0.31	0.89	57.80	98.14
Ck ₁	40-55	8.1	0.4	0.4	25.4	39.23	11.6	3.4	0.24	0.73	15.97	78.95
Ck ₂	55-65	8.1	0.3	0.4	26.4	38.71	17.6	8.4	0.25	0.66	26.91	86.23
Pedon 3 Hadsani, Tq. Hadgaon (Typic Haplusterts)												
Ap	0-18	7.8	0.2	0.8	10.7	63.00	33.1	20.3	0.43	1.13	54.96	87.23
Bw ₂	18-32	7.8	0.2	0.8	09.5	59.52	31.8	19.7	0.39	1.18	53.07	89.16
Bss ₁	32-65	7.9	0.2	0.7	05.6	60.93	38.0	21.0	0.36	1.14	60.50	99.29
Bss ₂	65-100	7.9	0.3	0.7	06.1	55.20	35.7	17.2	0.36	1.54	54.80	99.27
Cr	100-115	7.8	0.2	0.6	13.6	58.20	37.0	17.6	0.20	1.56	56.36	96.83
Pedon 4 Borgadi,tq. Himayatnagar (Typic Haplustepts)												
Ap	0-25	7.2	0.3	0.9	08.1	58.76	30.0	19.2	0.44	1.31	60.95	86.70
Bw	25-35	7.7	0.3	0.8	09.4	59.72	36.2	17.7	0.36	1.37	55.63	93.15
Ck ₁	35-56	7.8	0.4	0.5	29.0	44.90	26.3	10.2	0.24	1.40	38.14	84.94
Ck ₂	56-70	7.9	0.4	0.3	30.6	43.52	25.7	10.5	0.22	1.40	37.82	86.90
Pedon 5 WarangTakali, Tq. Himayatnagar (Calcic Haplusterts)												
Ap	0-17	7.9	0.2	0.5	08.2	58.40	40.2	16.5	0.53	1.0	58.23	99.70
Bw ₁	17-35	7.5	0.1	0.5	18.6	66.22	42.8	17.7	0.46	0.97	61.93	93.52
Bw ₂	35-60	7.9	0.1	0.4	21.0	64.12	42.0	17.2	0.45	1.04	60.69	94.65
Bss	60-90	7.9	0.1	0.6	05.3	64.48	43.8	18.6	0.42	1.19	64.01	94.64
Ck ₁	90-113	7.6	0.4	0.4	26.6	55.23	31.2	19.9	0.23	1.24	52.57	95.18
Ck ₂	113-120	8.0	0.4	0.2	24.0	48.90	26.2	15.9	0.24	1.28	43.62	89.20
Pedon 6 Umari, Tq.Hadgaon (Typic Ustorthents)												
Ap	0-17	8.0	0.4	0.3	11.5	48.20	30.6	12.6	0.29	1.08	44.57	92.46
Ac	17-47	8.1	0.3	0.4	35.9	40.50	24.0	13.4	0.13	1.04	38.62	95.35
Cr	47-70	8.1	0.1	0.2	31.3	35.40	21.0	11.7	0.12	1.13	33.95	95.90
Pedon 7 Koli, Tq. Hadgaon (Calcic Haplusterts)												
Ap	0-16	7.7	0.3	0.5	15.0	63.0	36.40	20.80	0.62	1.59	59.41	94.30
Bw ₁	16-35	8.0	0.3	0.5	16.2	59.52	32.80	22.00	0.60	1.41	56.81	95.44
Bss ₁	35-65	8.1	0.2	0.4	13.1	60.92	33.40	20.00	0.20	1.41	55.01	90.29
Bss ₂	65-83	8.2	0.3	0.4	05.6	65.20	38.9	17.60	0.18	1.52	58.2	89.26
Bss ₃	83-107	8.5	0.3	0.4	06.3	66.30	36.90	22.32	0.17	1.72	61.35	92.53
Cr	107-115	8.0	0.3	0.4	27.0	36.40	18.60	9.40	0.24	1.96	30.56	83.95

Table 4: Soil site suitability classes and yield of cotton in Nanded district.

Pedon	Suitability and limitations, NBSS & LUP (1994)	Soil site suitability class (with limitation) FAO (1983)		Suitability class
		Yield (q/ha)	% yield of optimum yield (24 q/ha)	
P ₁	S2(dt,oc)	13.6	56.66	S2
P ₂	S2(dt,oc)	15.3	63.75	S2
P ₃	S2(oc,dr)	22.5	93.75	S1
P ₄	S2(dt,oc)	14.9	62.08	S2
P ₅	S2(oc,dr)	21.7	90.41	S1
P ₆	N1(sl,dt, k,oc)	9.4	39.16	S3
P ₇	S2(oc,dr)	20.9	87.08	S1

1. Latter in parentheses show limitation as s- slope, dt- soil depth, c- coarse fragment, e- erosion, t- texture, dr-Drainage, w- plant available capacity, k- CaCO₃ and p- pH
2. Suitability class: S1 – Highly suitable, S2- moderately Suitable, S3- marginally suitable, N1- currently not suitable and N2- unsuitable.

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