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The Pharma Innovation



ISSN (E): 2277-7695 ISSN (P): 2349-8242 NAAS Rating: 5.23 TPI 2022; SP-11(8): 1986-1992 © 2022 TPI

www.thepharmajournal.com Received: 26-06-2022 Accepted: 29-07-2022

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Characterization and classification of soils under Aurangabad district of Maharashtra

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Abstract

Aurangabad district is located in the north central part of Maharashtra between $19^{\circ}15'$ and $20^{\circ}40'$ N latitude and $74^{\circ}37'$ and $75^{\circ}52'E$ Longitude. The mean maximum temperature $39.7^{\circ}C$, the mean minimum temperature is 24.6 °C. The average annual rainfall is 619 mm. The elevation of the district was 500 meters above mean sea level. The length of growing period 145 and humidity period is 101 days. The geographical area is 10, 107 Sq.km. The soils of the study area were shallow to deep, very dark grey (10 YR 1/3) to light brown (10 YR 5/4) in colour, loamy to clay in texture and granular to angular blocky in structure, non-sticky non plastic to very sticky to very plastic in nature. The bulk density of the soil varied 1.23 to 1.63 Mg m⁻³. Hydraulic conductivity range between 1.4 to 5.13 cmhr⁻¹. Clay content varies from 14.9 to 54.00 percent. The soils of the study area alkaline in nature and it was varying from 7.8 to 8.8. The electrical conductivity varies from 0.15 to 0.46 dSm⁻¹. The maximum CEC was recorded in Typic Haplusterts (31.23 to 60.13 c.mol/(P⁺) kg⁻¹), as compared to Typic Haplustepts, and Lithic Ustorthents. The soil fertility status was found low to high. Taxonomically this soil classified into Lithic Ustorthents Typic and Calcic Haplustepts and Typic and Calcic Haplusterts.

Keywords: Characterization, classification, soil health, Maharashtra

Introduction

Soil is medium for lots of reactions in the earth ecosystem. Soil is provides life to small microorganism to all living things it is encourages biodiversity in earth and maintain equilibrium condition between different ecosystem in the earth. Quality of earth health mainly depended on the soil health. But now a days soil health India gradually decreased and degraded due to the continuous monoculture, high tillage operation, traditional method of cultivation practices like cultivation practices like biomass burning, crop residues burning (Punjab, Haryana), podu method cultivation or jhuming-jhum cultivation (North East Hills), continuous rice cultivation (South India), high grazing in cultivation land, deforestation, cement manufacturing, fossil fuels and industrial pollution. Along with that edaphic conservation method like cover crops, mulching, green manuring, ignoring soil health card results and enormously used plenty of or high doses of commercial fertilizer application causes the soil organic carbon decrease and soil health damage (Lal, 2004)^[26]. The environmental issue high ozone (O₃ strong oxidizer) concentration in the soil atmosphere causes lot of oxidations of soil organic carbon in the surface layer of soil (Taiji and Wang, 2014)^[34]. Recent methodologies like bio-char production, carbon sequestration, carbon stock or pool, crop residue, legume crop rotation, following forestry, Agro-forestry measures and biomass production management was required for restoration of soil health and soil organic carbon management. It is a major concern for the tropical soil.in this object we did research on different soils under Aurangabad district of Maharashtra with help Aurangabad Kvk-1. We went different location under Aurangabad district of Maharashtra and we did profile selection and collection soil sample from the profile for the physical and chemical analysis. Finally we classified the soils as per the USDA and soil survey staff (1975) [31] and field guide for soil survey Dhale SA, Prasad J (2009)^[1].

Material and Method

Aurangabad district is located in the north central part of Maharashtra between North Latitude 19⁰15' and 20⁰40' and East Longitude 74⁰37' and 75⁰52'. This district is surrounded by Jalgaon district of North, Nashik district in west, Ahmednagar and Beed district in south and Parbhani and Buldhana district in east (fig 1.1). Aurangabad district has been divided in 9 talukas *viz*. Aurangabad, Kannad, Soyagaon, Sillod, Phulambri, Khuladabad, Vaijapur,

Gangapur, and Paithan talukas. The district has geographical area of 10,107 sq.km, out of which 726 sq.km is occupied by forest while cultivated area is 8135.57 sq.km and net area sown is 6540 sq.km. The entire area is covered by the Deccan trap lava flows of upper cretaceous to lower Eocene age. The lava flows are overlain by thin alluvial deposits along the kham and Sukhana River. The basaltic lava flows belonging to the Deccan Trap is the only major geological formation occurring in Aurangabad. The most of the area they cultivating cotton (Gossypium hirsitum) tur or red gram (Cajanus cajana), Maize (Zea mays), Wheat (Triticum aestivum) jowar (Sorghum halopens), bajra (Pennisetum Americanum) Bengal gram (Cicer aritinium), Sugarcane (Saccharum officinalis), Ginger (zingiber offcinales), Onion (Allium sativum) and fruit crops like Guava (Psidium guajava), mosambi (Citrus limetta), Pomegranate (Punica granitium) and mulberry (Morus rubra) Production unit. we have commonly observed weeds are Mexican Prickly poppy (Argemona Mexicana), nut grass (Cyperus rotundus), garika *dactylon*) congress weed (Parthenium (Cynodon hysterophorus) celosia (Celosia argemtea), we have been found out that vegetation and plantation trees are Babul (Acacia nilotica), neem (Azadirachta indica), Tamarinds (Tamarindus indicas), Ber (Ziziphus zizube), Mango (Mangifera indica), Sapota (Acharus zapota), and moringa (Moringa oleifera). The climate of the research conduct area was coming under the hot semi-arid Tropical condition. (Fig 1.2) The mean maximum temperature of 32.45 °C, whereas the mean minimum temperature is 19.10 °C May is the hottest month with the mean maximum temperature 39.7 °C the mean minimum temperature of 24.6 °C (Table 1.5). The average

annual rainfall of the district 619 mm. The elevation of the district was 500 meters above mean sea level. The length of growing period 145 and humidity period is 101 days. The particle size distribution analysis was carried out as per the international pipette method. The bulk density was determined by clod coating method (Piper and Black, 1966) ^[27]. Hydraulic conductivity of soil was determined by constant head method as described by Richard (1954) ^[28]. The soil moisture retention and release behaviour within the available range of 33 K Pa to 1500 K Pa will be based on less than 2 mm sample using pressure plate membrane apparatus (Richard, 1954) ^[28]. Available water capacity (AWC) and plant available water capacity (PAWC) will be determined using the expression suggested by Gardner *et al.* (1984) ^[29] and latter modified by Coughlan *et al.* (1986) ^[30].

Collection of soil samples

The studied research places were selected that adopted village of KVK Aurangabad. Total seven village were selected for soil survey and profile examination. (Fig. 1.1) The village names were following this 1. Shekta (Gangapur Thaluk), 2. Gopal wadi (Gangapur Thaluk), 3. Shankarpur (Gangapur Thaluk), 4. Borgav Arj (Phulambri Thaluk), 5. Murshidabad wadi (Aurangabad Thaluk), 6. Devgaeon (Python Thaluk), 7. Hasanbad wadi (Aurangabad Thaluk). (Table No.1.1) the selected village were under different crops like cotton, red gram, maize, jowar, bajra, sugarcane by using GPS and SOI topo-sheet (Table 1.4) as per the (Soil Survey Staff, 1975)^[31]. Examine soil profile and horizon wise samples were collected for laboratory analysis.

Table 1: GPS based soil sampling data under different cropping pattern

Name of the farmer	Village name	Thaluk	Latitude and longitude	Elevation MSL
Santhosh Jadhav	Shekta	Gangapur	19 ⁰ 50' N to 75 ⁰ 1'E	492
Chadrasekhar Jagtap	Gopal wadi	Gangapur	19 ⁰ 50'16 "N to 74 ⁰ 57'22" E	490.35
Manish pol	Shankarpur	Gangapur	19° 86'21'' N to 74° 94'31'' E	495.25
Amole Bolande	Borgav Arj	Phulambri	20 ⁰ 16 ['] 19 ^{''} N to 75 ⁰ 58 ['] 15 ^{''} E	601.00
Sanjay Pawar	Murshidabad wadi	Aurangabad	20 ⁰ 05' N to 75 ⁰ 37'5'' E	680.55
Sadhasiv Githe	Devgaon	Phythan	19 ⁰ 70'96''N to 75 ⁰ 58'1''E	540.24
Kacharusingh Golawal	Hasnabadwadi	Aurangabad	19 ⁰ 87 [°] 11 ^{°°} N to 75 ⁰ 60 [°] 32 ^{°°} E	554.47

Methodology

Preparation of soil samples

The soil samples collected (Table 1.4) during the profile survey was initially air dried in laboratory at room temperature, grinded by using wooden mortar and pestle, screened through 2 mm sieve, properly labelled and stored in polythene bags for laboratory analysis. For certain soil characters like organic carbon, samples were further ground with 80 mm mesh sieve. The following determination were made on processed sample by adopting the standard procedures.

Morphological properties

Morphological properties of soil were studied in the field and profile descriptions were made as per the procedure suggested by USDA and soil survey staff (1975) ^[31] and field guide for soil survey Dhale SA, Prasad J (2009) ^[12]. The depth of the soil varies according soil type (P₁), Entisols, *Lithic Ustorthents* soil depth is 50 cm. Pedon P₂, P₄ and P₇, Vertisols, Calcic Haplusterts commonly under soil depth is 94 to 150 cm. Pedon P₃, *Vertisols*, Typic Haplusterts comes soil depth > 150 cm. Pedon P5 Inceptisols, Typic Haplustepts

comes under soil depth 91 cm. Pedon P6 and P8 Inceptisols, Calcic Haplustepts Depth of the soil varied from 30 to 150 cm. The soil colour presented in Table 4.1 Pedon (P1), Entisols, Lithic Ustorthents very dark grey 10 YR 1/3 to light yellow brown 10YR6/4. Pedon P2., P4 & P7 Vertisols, Calcic Haplusterts very dark brown 10YR3/2 to 10YR5/4 light brown in colour. Pedon P₃, Vertisols, Typic Haplusterts dark grey10 YR 3/1 to 10YR3/2 very dark brown. Whereas Pedon P5, Inceptisols, Typic Haplustepts brown 10YR4/3 to light brown 10YR5/4. Pedon P₆, & P₈ Vertisols, Calcic Haplustepts very dark greyish brown 10YR 3/2 to light brown 10YR5/4. The soil structure (Table No 1.2) of pedon P₁, *Entisols, Lithic* Ustorthent was granular to sub angular blocky, $(P_2, P_4 \text{ and } P_7,$ P₃), Vertisols, Calcic Typic Haplusterts was sub angular blocky (P₅), Inceptisols, Typic Haplustepts was granular to sub angular blocky. Pedon P_{6 and} P7 Inceptisols, Calcic Haplustepts fine granular to sub angular blocky in structure. The consistency pedon P₁, Entisols, Lithic Ustorthents soil consistency was very sticky very plastic to non-sticky to nonplastic. Pedon P2, P4, P7, Vertisols, Calcic Haplusterts varied from slightly hard, very sticky and very plastic (P₃), Vertisols (Typic Haplusterts) varies from slightly hard, very sticky and very plastic to hard, firm, very sticky to very plastic. Pedon P₅, *Inceptisols* (Typic Haplustepts) soft, friable to non-sticky

non-plastic. Pedon P6 and P8, *Inceptisols*, Calcic Haplustepts varies from soft, friable, very sticky, very plastic.

Table 1.1: Morphologica	characteristics soil	s under Aurangabad	district of Maharashtra
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Horizon	Depth(cm)	Boundary	Matrix color	Texture	Structure	Consistency	Pores	Root	Effervesces	
		Ped	on 1 Shekta, To	l. Gangap	our, Dist. Au	rangabad (<i>Lithic</i>	Ustorthents)		
Ар	0-28	CW	10 YR1/3	SIC	F, 1, SBK	S, FR, VSVP	VFM, FM	VFM, CF	ES	
AC	28-50	CW	10 YR6/3	CL	F,1, GR	L, FR, NSNP	СМ	CF	EV	
Cr	50-60	-	10YR 6/4	CL	M, 2, GR	L, FR, NSNP	CF	CF	EV	
(Weather basalt)										
		Pedon	2 Gopal wadi, '	Tq Ganga	apur, Dist, A	urangabad (Cal	cic Hapluste	rts)		
Ар	0-22	CS	10 YR 3/2	С	M, 2, SBK	SH, FR, VSVP	VFM	VFM	EV	
Bw ₁	22-40	CS	10YR 3/1	C	M, 2, SBK	SH, FR, VSVP	VFM	VFM	EV	
Bw ₂	40-54	CS	10YR3/1	CL	M, 2, SBK	SH, FR, VSVP	VFM	VFM	EV	
Bss ₁	54-72	CS	10YR3/1	CL	M, 2, SBK	SH ,FR, VSVP	VFM	VFM	EV	
Bss ₂	72-100	CS	10 YR3/1	CL	M, 2, SBK	SH, FR, VSVP	VFM	VFM	EV	
Bss ₃	100 +	CS	10YR3/1	CL	M, 2, SBK	H, FR, VSVP	VFM	VFM	EV	
				(We	ather basalt)					
		Pedon	3 shakarpur, T	'q. Ganga	pur, Dist. A	urangabad ((Typ	oic Hapluste	rts)		
Ap	o-28	CS	10YR3/2	SIC	M, 2, SBK	SH, FI, VSVP	VFM, FM	, VFM, FM, C	CF EV	
Bw ₁	28-48	CS	10yr 3/2	SIC	M, 2, SBK	H, FI, VSVP	VFM, FM	, VFM, FM, C	CF EV	
Bw ₂	48 - 60	CS	10YR3/2	SIC	M, 3, ABK	H, FI, VSVP	VFM, FM	VFM, FM	EV	
Bss ₁	68-102	CS	10YR3/2	C	M, 3, ABK	H, FI, VSVP	VFM, FM	VFM, FM	EV	
Bss ₂	102-132	CS	10 YR3/2	CL	M, 3, ABK	H, FI, VSVP	VFM, FM	VFM, FM	EV	
Bss ₃	132-150	CS	10YR3/2	CL	<u>M, 3, ABK</u>	H, FI, VSVP	VFM, FM	VFM, FM	EV	
				(We	ather basalt)					
	0.10	Pedon 4	4 Bargav. Arj,	l'q, Phula	mbri, Dist, A	Aurangabad (Ca	leie Haplust	erts)		
Ap	0-18	CS	10 YR3/2	SIC	M, 3, SBK	SH, FI, VSVP	VFM	FF, CF, VFN		
BW1 Devi	18-46	CS CS	10 YR 3/2	SIC	M, 3, ABK	H, FI, VSVP	VFM	FF,VFM	ES	
\mathbf{BW}_2	40-30	CS	10 Y K2.5/1	SIC	М, 3, АВК	H, FI, VSVP	VFIN	FF	ES	
Horizon	Depth (cm)	Boundary	Matrixcolour	Texture	Structure	Consistency	Pores	Root	Effervescences	
Bss ₁	56-75		10 YR 2.5/1	SIC	M, 3, ABK	H, FI, VSVP	VFM	FF	ES	
Bss ₂	75-94		10 YR 2.5/1	CL	M, 3, ABK	H, FI, VSVP	VFM	FF	ES	
Cr	94+		10 YR 4/4	CL	M, 3, ABK	SH, FR, SSSP	CF,FM	VF	EV	
		Pedon 5 M	lurshidabad wa	di, Tq. Pl	<u>ulambri, Di</u>	st. Aurangabad	(Typic Hapl	usterts)		
Ар	0-23	CS	10YR3/2	SIC	M, 1, SBK	SV, FR, SSSP	VFM	VFM, FM, CF	ES	
Bw ₁	23-42	CW	10YR3/3	SICL	M, 2, SBK	SV, FS, SSSP	VFM	VFM, FM, CF	EV	
Cr	42-130	-	- 10 YR 6/4	CL	F, 1, GR	S, 1, NSNP	VFM	FF, CM	EV	
		Pedo	on 6 Devgaon, T	'q. Phyth	an, Dist. Au	angabad (Calcio	: Haplustept	s)		
Ар	0-15	CS	10YR4/3	С	F, 1, SBK	S, FR, SSSP	VFM, FM	VFM, CF	EV	
Bw ₁	15-30	CW	10YR4/2	CL	F, 1, SBK	S, FR, SSSP	FM	VFM, CF	EV	
Cr	30-60			CL	F, 0, GR	L, FR, NSNP	CM	CF	EV	
Pedon 7 Hasnabadwadi, Tq. & Dist, Aurangabad (Calcic Haplustepts)										
Ар	0-21	CS	10YR3/2	SIC	M, 2, SBK	SH, FR, VSVP	VFM	VFM, FM, CF	EV	
Bw ₁	21-42	CW	10YR3/3	SIC	M, 2, SBK	SH, FR, VSVP	VFM	VFM, FM, CF	EV	
Bw ₂	42-71	CW	10YR3/3	CL	M, 2, SBK	SH, FR, VSVP	VFM	VFM, FM, CF	EV	
Cr ₁	71-85	CW	10YR5/3	CL	M, 2, SBK	SH, FR, SSSP	VFM	VFM, FM, CF	EV	
Cr ₂	85-100	CW	10YR5/4	CL	F, 1, GR	S, FR, NSNP	FM	FF, CF	EV	
		Pedon	8 Hasnabadwa	di. Tq. ar	nd district A	urangabad (Calc	cic Hapluste	pts)		
Ар	0-23	CS	10 YR3/2	SIC	M, 1, SBK	SV, FR, SSSP	VFM	VFM, FM, CF	ES	
Bw ₁	20-42	CW	10 YR3/3	SIC	M, 2, SBK	SV, FR, SSSP	VFM,	VFM, FM, CF	EV	
	42 130	-	10 YR6/4	CL	F. 1. GR	S. 1NSNP	CM	FF. CM	EV	

Physical characteristics of soil under aurangabad district of Maharashtra

The Pedon P₁, Entisols, Lithic Ustorthents coarse fragment was content 17.12 to 50 per cent, Pedon P₂, P₄, P₇, Vertisols, Calcic Haplusterts was content 14.2 to 46.71 per cent, (P₃), Vertisols (Typic Haplusterts) was contains 13.5 to 46.29 per cent. Pedon P₅, Inceptisols (Typic Haplustepts) was contains 19.5 to 44.19 per cent (Table No. 1.3). Pedon P6 and P8, Inceptisols, Calcic Haplustepts 21.7 to 45.02 per cent.

The Bulk density of Pedon P₁ Entisols, lithic Ustorthents was varies from 1.44 to 1.6 Mg m⁻³ (P₂, P₄, P₇) Vertisols, Calcic Haplusterts was ranged from 1.2 to 1.63 Mg m⁻³, Pedon P₃ Vertisols (Typic Haplusterts) varies from 1.2 to 1.53 Mg m⁻³,

Pedon P₆, P₈, Inceptisol (Calcic Haplustepts) varies from 1.23 to 1.62 Mg m⁻³, pedon P₅ Inceptisols, (Typic Haplustepts) was varies from 1.2 to 1.4 Mg m⁻³. The hydraulic conductivity under different soil and cropping pattern varies from 1.53 to 5.45 cm ha⁻¹. The pedon P₁Entisols (Lithic Ustorthents) HC was 2.2 to 3.44 cm hr⁻¹., Pedon P₂, P₄, P₇ Vertisols, (Calcic Haplusterts) was hydraulic conductivity varies from 1.4 to 5.13cm hr⁻¹. Pedon P₃Vertisols, (Typic Haplusterts) HC was varies from 1.21 to 3.84cm hr⁻¹., whereas P₅, Inceptisols (Typic Haplustepts) was hydraulic conductivity 1.2 to 1.48 cm hr⁻¹ and Pedon P₆ and P₈. Inceptisols (Calcic Haplustepts) HC varies with 2.8 to 3.90 cm hr⁻¹. The particle size distribution Table No. 4.2 under different soil and cropping

pattern and soil P₁ Lithic Ustorthents sand, silt and clay varies from 14.9 to 27 per cent, 49.5 to 52 per cent and 21 to 35 per cent respectively. Pedon P₂, P₄, and P₇ Calcic Haplusterts sand, silt and clay, varies from 6 to 29, 28.8 to 54.00 and 22.6 to 40.2 per cent. Pedon P₃), Vertisols, (Typic Haplusterts) sand, silt and clay varies from 13.24 to 30.2, 28.8 to 48.8 and 20.2 to 40.2 per cent respectively. Pedon P₅ Inceptisols, (Typic Haplustepts) sand, silt and clay varies from 15.6 to 33, 40 to 47.1 and 27 to 37 per cent respectively, Pedon P₆, and P₈ Calcic Haplustepts, sand, silt and clay vary from 12 to 32, 34 to 49 and 25 to 35.5 per cent respectively. Moisture retention (Table 1.3) under different cropping pattern of Aurangabad district viz. (P₁), Entisols (*Lithic Ustorthents*) showed 8.63 to 22.28 at 33kpa and 4.35 to 12.24 at 1500 kpa, P₂, P₄ and P₇ (Calcic Haplusterts) showed 10.1 to 34.48 per cent at 33kpa and 5.01to 18.44 per cent at 1500 kpa. P₃ (Typic Haplusterts) showed 7.69 to 33.25 per cent at 33 kpa, whereas 3.1 to 23.14 per cent at 1500 kpa. Pedon P5 (Calcic Haplusterts) showed 10.94 to 38. 35 per cent at 33 kpa and 5.52 to 24.15 per cent at 1500 kpa. Whereas, P ₆ and P₈ (Calcic Haplustepts) noted 7.46 to 26.98 per cent at 33 kpa and 4.23 to 18.44 per cent at 1500kpa. Plant available water capacity under different type of soil and cropping pattern under Aurangabad viz. (P₁), Entisols (*Lithic Ustorthents*) showed PAWC 44.82 mm, P2, P4 and P7 (Calcic Haplusterts) varies from 135.26 to 206.12 mm. P₃ (Typic Haplusterts) showed 197.59 mm Pedon P₅ (Calcic Haplusterts) showed 183mm whereas, P₆ and P₈ (Calcic Haplustepts) noted 43.45 to 139.15 mm.

Table 1.2: Physical characteristics of soils under Aurangabad district of Maharashtra

TTaninan	Depth Coarse B D H C Particle size analysis (%)				6)	Moistur	e retention (%)	AWC	PAWC		
norizon	(cm)	Fragment (%)	(Mg m ⁻³)	(Cm hr ⁻¹)	Sand	Silt	Clay	33kPa	1500kPa	(%)	(mm)
		Pe	don 1 Shekt	a, Tq Ganga	pur, Aurangabad distri	ct (Lit	hic Usto	rthents)			
Ар	0-28	17.12	1.4	2.2	14.9	49.5	35.6	22.28	12.24	10.04	
Ac	28-50	40.19	1.44	2.3	21.1	47.4	31.5	17.82	9.41	8.41	44.82
Cr	50-60	50	1.6	3.44	27	52	21	8.63	4.35	4.28	
		Pedo	n 2 Gopalw	adi, Tq Gang	apur, Aurangabad dist	rict (C	alcic Ha	plusterts	5)		
AP	0-22	14.74	1.3	1.53	27.2	28.8	44	32.48	16.24	16.24	
Bw ₁	22-40	33.07	1.34	3.43	24	39.6	36.9	29.88	18.44	11.44	
Bw_2	40-64	34.75	1.43	4.91	30.6	35.9	33.5	21.93	10.83	11.1	105 54
Bss ₁	64-72	35.5	1.46	4.13	21.7	48.8	29.5	17.77	8.43	9.27	195.54
Bss ₂	72-100	40.59	1.46	5.0	27	49	24	14.09	7.03	7.06	
Bss ₃	100 +	46.29	1.50	5.13	29	48.4	22.6	12.68	6.38	6.3	
		Pedo	n 3 shankar	pur Tq Gang	gapur, Aurangabad dist	trict (7	ypic Ha	plusterts	5)		
Ар	0-23	13.5	1.2	1.89	13.24	46	40.2	33.25	23.14	10.11	
Bw1	23-48	29.60	1.23	2.21	15	47	38	22.02	1201	10.11	
Bw ₂	48-68	33.5	1.24	2.46	16.20	45.9	37.9	19.2	9.1	10.1	107 50
Bss ₁	68-102	37.42	1.33	2.90	20.4	42.8	36.8	12.7	6.2	6.5	197.39
Bss ₂	102-132	40.59	1.52	3.00	21.2	44.4	34.4	11.05	5.2	6.3	
Bss ₃	132-150	46.29	1.53	3.84	30.2	49.6	20.2	7.69	3.1	4.59	
		Pedon	4 Borgav A	RJ, Tq, phul	ambri, Aurangabad dis	strict (Calcic H	lapluster	ts)		
Ap	0-18	19.72	1.2	4.28	6.0	54	40	32.74	14.32	18.42	
Bw ₁	18-40	21.5	1.29	4.18	12.8	48	39.2	23.4	11.2	12.2	135.26
Bw ₂	40-56	22.6	13	4 16	13.5	49	37.5	193	8.1	11.2	

Howizon	Depth	Coarse	CoarseB DH CParticle size analysis (%)		Moisture	retention (%)	AWC	PAWC			
HOLIZOII	(cm)	Fragment (%)	(Mg m ⁻³)	(Cm hr ⁻¹)	Sand	Silt	Clay	33kPa	1500kPa	(%)	(mm)
Bss1	56-75	28.43	1.35	3.2	15	49	36	14.2	7.1	7.1	
Bss ₂	75-94	34.75	1.40	2.83	21.6	46.4	32	13.6	6.91	6.69	
Cr	94 +	36.85	1.46	2.79	27	46	27	10.1	5.01	5.09	
Pedon 5 Murshidabadwadi, Tqphulambri, Aurangabad district (Typic Haplustepts)											
Ар	0-26	19.5	1.2	3.56	15.6	47.1	37	38.35	24.15	14.2	
Bw_1	26-50	27.8	1.3	4.01	17	49	34	29.04	18.02	11.02	102
Bw ₂	50-91	28.01	1.4	4.032	25	44	31	18.65	8.32	10.33	165
Cr	91-150	44.19	1.48	3.35	33	40	27	10.94	5.52	5.42	
Pedon 6 Devgaon, Tq. Python, district Aurangabad (Calcic Haplustepts)											
Ap	0-15	25.4	1.23	3.90	21	42	37	20.43	10.22	10.21	
Bw1	15-30	28.9	1.35	3.63	32	34	34.	20.06	10.03	10.57	43.45
Cr	30-60	45.4	1.57	2.8	31	40	29	7.46	4.23	3.23	
		Pedo	n 7 Hassanl	badwadi, Tq	& district	Auranga	bad (Calci	c Hapluster	ts)		
Ар	0-21	14.2	1.31	1.95	19	45	35.5	32.29	16.18	16.11	
Bw_1	21-42	27.8	1.34	2.6	20	46	34	23.5	12.51	10.99	
Bw ₂	42-71	28.6	1.5	3.6	22	47	31	21.5	11.25	10.25	206.12
Cr	71-83	34.7	1.57	5.1	27	46	27	21.4	11.22	10.2	
Cr ₂	83-100	41.9	1.63	5.45	29	46	25	14.5	7.41	7.09	
Pedon 8, Hasnabadwadi. Tq. And district Aurangabad (Calcic Haplustepts)											
Ap	0-23	21.7	1.4	3.08	12	49	39	26.98	18.44	8.54	
$\mathbf{B}\mathbf{w}_1$	23-42	30.9	1.6	2.97	18	47	34.5	24.21	16.15	8.06	139.15
Cr	42-130	45.02	1.62	2.92	26	46	28	19.22	11.25	7.97	

Location	Elevation	Landform	Parent Material	Slope (%)	Runoff	Drainage	Erosion
Pedon 1 – Shekta village, Gangapur tq. Aurangabad district. 19 ⁰ 50' N to 75 ⁰ 1"E	492 MSL	Very gently sloping	Sandstone	1-3%	Medium	Well drained	Moderate
Pedon -2. Gopalwadi village, Gangapur tq. Aurangabad district., 19 ⁰ 50'16 "Nto74 ⁰ 57'22" E	490.35 MSL	level to nearly level)	Weathered basalt	0-1%	Medium	Well drained	Moderate
Pedon – 3 Shankarpur village, Gangapur tq. Aurangabad district. 19° 86'21'' N to 74° 94'31'' E	495.25 MSL	Level to nearly level	Weathered basalt	0-1%	Medium	Well drained	Moderate
Pedon- 4 Borgavarj village, Pulambritq. Aurangabad, district. 20 ⁰ 16' 19 '' N TO 75 ⁰ 58' 15'' E	601 MSL	Very gently sloping	Weathered basalt	1-3%	Medium	Well drained	Moderate
Pedon-5 murshidabadwadi village, tq. & District Aurangabad. 20 ⁰ 05' N to 75 ⁰ 37'5" E	680.55 MSL	Very gently sloping	Weathered sandstone	1-3 %	Medium	Well drained	Moderate
Pedon-6 Devgaon village,Phythantq. Aurangabad district. 19 ⁰ 70'96''N to 75 ⁰ 58'1''E	540.24 MSL	Very gently sloping	Weathered sandstone	1-3%	Medium	Well drained	Moderate
Pedon- 7, Hassanbadwadi village,tq& district Aurangabad. 19 ⁰ 87' 11'' N to 75 ⁰ 60' 32'' E	554.47MSL	Very gently sloping	Weathered basalt	1-3%	Medium	Well drained	Moderate
Pedon- 8, Hassanbadwadi village,tq& district Aurangabad. 19 ⁰ 86' 32" N to 75 ⁰ 60' 58E	558.5 MSL	Very gently sloping	Weathered basalt	1-3%,	Medium	Well drained	Moderate

Table 1.3: Soil site characteristics under Aurangabad district of Maharashtra



Fig 1.1: Location sites of different cropping and soil profiles of Aurangabad



Fig 1.2: Last 30-year climatic data and water balance of Aurangabad district of Maharashtra

Month	Doinfall (mm)	Relative hu	midity (%)	Monthly temperat	Monthly temperature (Mean of daily)			
Month	Kaiman (iiiii)	AM	PM	MAX °C	MIN °C			
January	2	70	40	29.0	12.3			
February	1	64	36	32.0	14.9			
March	5	57	31	35.3	18.7			
April	1	56	28	38.8	22.9			
May	2	67	31	39.7	24.9			
June	112	81	44	34.4	23.0			
July	134	87	59	29.7	21.7			
August	141	89	61	29.1	21.2			
September	141	88	58	30.2	21.4			
October	55	78	45	31.8	19.7			
November	18	72	41	30.3	15.5			
December	7	70	40	29.1	13.0			
	Total rainfall	Mean max. RH	Mean min. RH	Mean max temp.	Mean min. Temp.			
	619	73.25	42.83	32.45	19.10			

Table 1.4: Climatic data and water balance of Aurangabad district (30 Years)

Source: Agroclimatic Atlas Maharashtra (Book), VNMKV, Parbhani

Conclusion

The soils under Aurangabad area were shallow to deep, dark brown (10 YR3/3) to light brown (10 YR 5/4) in colour, loamy to clay in texture and granular to subangular in structure. The bulk density of the studied soil varied from (1.2-1.62 Mg/m⁻³), the soil moisture retention at 33kpa varied from (8-38%). The lithic Ustorthents soils place were sandstone parent material, the Typic Haplusterts soils places were Basalt parent material, Lithic Ustorthepts soil places were cambic surface and k bearing elite. The taxonomically the soils of the studied area classified as Typic Haplusterts, Typic Haplustepts, lithic Ustorthents.

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