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Classification and Characterization of Soil Resources of Experimental Farm of School Of Agriculture, Lovely Professional University, Phagwara, Punjab

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Abstract *Understanding Of Soil Morphological, Physical And Chemical Properties Is Necessary For Appropriate Utilization Of Soil Resources And Hastening Technology Transfer. A Study Was Conducted On Soils Of Experimental Farm Of School Of Agriculture In Lovely Professional University Phagwara, Punjab To Know The Type And Extent Of Soils Prevailing In This Area And To Map The Soils. Five Profiles Were Collected. These Soils Were Examined In Field For Morphological, Physical And Chemical Characteristics In Laboratory And Classified Up To Family Level As Well As Soil Mapping. The Farm Is Situated At Longitude 31014.796′ N And Latitude 750 41.725′E. Distribution Of Clay Across The Soils Ranged From 5.3 To 33.6 %. The Percentage Of Silt Ranged From 12.5 To 35.0 %. The Sand Values Of These Soils Ranged From 42.90 To 80.20 %. Content Calcium Carbonate Ranged From Nil To 3.07 %. The Soil Ph Ranged From 7.5 To 9.1. The EC Values Of These Soils Were Below 1ds M-1 , The OC Content Of These Soils Was Recorded Low Except The Surface Layer Of Pedon Two Where It Is Medium (0.420 %). The Available Nitrogen Ranged From 30.80 To 457.856 Kg/Ha, Phosphorus Low To Very High, Potassium Was High In All Pedons. The Availability Of Zinc Ranged From 0.08 To 2.98 Mg/Kg Of Soil, Iron, Manganese And Copper Ranged From 0.76 To 13.06 Mg/Kg, 0.70 To 5.96 Mg/Kg, And 0.18 To 1.80 Mg/ Kg Of Soil Respectively.These Soils Were Classified As Pedon 1, 2 And 3 As Family Of Typicustorthents While Pedon 4 And 5 As Family Of Typichaplustepts.*

Key Words*: Soil Characterization, Soil Classification, Soil Mapping*

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I. Introduction

The Present Study Is Conduct To Understand The Soil Resource Of Experimental Farm Of School Of Agriculture Of Lovely Professional University, Phagwara, Punjab. These Soils Have Remained Uncultivated For Decades Together. Actual Cultivation Of These Soils Has Started From 2015 Onward When The Experimental Farm Of School Of Agriculture Was Established. As Such It Is Of Highest Importance That These Soils Are Studied In Field, Characterized In Laboratory And Classified As Per Soil Taxonomy, So That Experimental Results Are Interpreted In A Rational Manner.

The Soil Survey Has Been Conduct To Study The Classification And Characterization Of Soil Resource Of Experimental Farm Of School Of Agriculture, Lovely Professional University With The Following Objective.

II. Material And Method

The Present Investigation Were Carried Out At The Experimental Farm Of School Of Agriculture In Lovely Professional University. It Involved Study Of Morphology Of Five Pedons In The Field And Horizon Wise Soil Samples Were Collected And Analysed In The Laboratory. The Soils Were Classified As Per Soil Taxonomy

1 General Description Of The Area: The Study Was Conducted At The Experimental Farm Of School Of Agriculture, Lovely Professional University, Phagwara, Punjab-14411. The Farm Is Situated At Latitude 31.25^0N And Longitude 75^0E Along With Altitude Of Above 232m Above Mean Sea Level.

2 Climate: The Experiment Site Enjoyed Subtropical Type Of Weather Conditions With Hot Summers,Cool Winters, And A Distinct Rainy Season With Annual Rainfall Of 1919.5 Mm. The Maximum Winter Temperature Rises Up To 27^0C. In Hottest Months Of Year (April, May And June) The Maximum Temperature Goes As High As 42^0C. In General, The Site Received Ample Rainfall During Rainy Season Which Started From June And Continued Up To September. The Minimum Temperature Never Goes Down To Freezing Point Eve During The Coldest Months "December- January" And The Range Of Low Temperature Was 6 To 10^oc. And The Highest Amount Of Rainfall Received On The Month Of June: July The Month June- July.

5 Preparation Of Soil Samples: Soil Samples Collected From The Each Horizon Of The Profiles And Dried. The Air-Dried Samples Were Passed Through 2 Mm Sieve To Separate The Coarse Fragments (>2 Mm). The Fine Earth Samples Were Stored In Separate Containers And Used For Various Analyses In Laboratory.

III. Result And Discussion

Five Pedonssamples Were Collected From The Soils Of Experimental Farm Of School Of Agriculture For Their Morphological, Physical And Chemical Characteristics. Location Of All The Samples Was Recorded With The Help Of Global Positioning System (GPS). And Soils Classified Us Per Soil Taxonomy Up To Family Level. A Map Of Soil Classification Was Prepared.

Electrical Conductivity

The Electrical Conductivity (EC) Values Of The Experimental Farm Of School Of Agriculture Were Below 1ds M-1. The Electrical Conductivity Values Obtained In Surface Horizon Ranged From 0.013 Ds M-1 In Pedon 1 In Ap Horizon To 0.121 Ds M-1 In Pedon 4 In Ap Horizon. The Electrical Conductivity In Surface And Subsurface Horizon Of All Pedons Ranged From 0.01 Ds M-1 To 0.121 Ds M-1. The Highest Electrical Conductivity Value Was Recorded In Profile 4 Ap Horizon And The Lowest Electrical Conductivity Value Was Recorded In Profile 1 In AC Horizon. Electrical Conductivity Values In All Profiles Were Rated As Very Low.

Generally, The Electrical Conductivity Values Measured Throughout The Depths Of The Soils In The Study Area Indicated That The Concentrations Of Soluble Salts Are Below The Levels At Which Growth And Productivity Of Most Agricultural Crops Are Affected Due To Soil Salinity.

Soil Reaction

The Data On Soil Reaction (Ph) Determined In A 1:2 Soils To Water Ratio Suspension. The Surface Soil Ph Ranged From 7.5 In Profile 4 To 9.1 In Profile 2. The Ph For All Horizons Of Pedons Was Varied From 7.5 To 9.1, The Highest Ph Range 9.1 Was Recorded In Pedon 2 In Ap Horizon And The Lowest Ph Range 7.5 Was Recorded In Profile 4 In Ap Horizon, The Ph Mean For All Pedons Is 8.6. The Highest Mean Value Was Recorded In Pedon 2 As 8.9 And The Lowest Mean Value Was Recorded In Pedons 4, 5 As 8.4. The Ph For All Horizons Ranged From Natural To Strongly Alkaline In All Pedons. The High Ph May Be Due To Their Calcareous Nature And The Accumulation Bases In The Solum As They Were Poorly Leached (Satyanarayana Et Al, 1970). The Ph Was High At Surface And Then Decreased With Depth In Pedon 2; This May Be Attributed To High Base Status Of These Horizons Resulting From The Recycling Of Bases. In Pedon 1 The Ph Recorded In Surface Horizon Was 8.2 And It Increased With Depth This Increase In Soil Reaction Could Be Due To Leaching Of Based From Higher Topography And Getting Deposited At Lower Elevations (Sitanggang Et Al 2006).

Calcium Carbonate

Content Of Calcium Carbonate Ranged From 0.52 Per Cent In The Surface Horizon Of Profile 2 To 3.07 Per Cent In Profile 4. On Other Hand It Ranged From Nil In Profile 1 At C3 Horizon To 3.07 In Profile 4 In Ap Horizon. According To FAO (1998), Soils Having More Than 2 Per Cent Calcium Carbonate Content In Their Subsurface Horizons Show The Presence Of Calcareous Soil Material. Calcium Carbonate Content Is More Than Two Per Cent In Pedon 4 In B1, B21 And B22 Horizons, And Pedon 5 Have In B1, B2, BC1 And BC2 Horizons. Profile 1, 2 And 3 Comes Under The Non-Calcareous Soil Class. For These Profiles Content Of Calcium Carbonate Followed Inconsistent Pattern With Soil Depth.

Organic Carbon

The Organic Carbons Content Of Soils Of Experimental Farm Of School Of Agriculture Lovely Professional University Were In The Ranges Of 0.165 Percent To 0.420 Percent In All The Pedons. The Highest Value Of Organic Carbon Was Recorded In Pedon 2 In The Depth Of 0-22 Cm And The Lowest Value Of Organic Carbon Was Recorded In Pedon 5 In The Depth Of 85-120 Cm. The Mean Organic Carbon For All Horizon Of Pedons Is 0.272 Percent. Generally, The Organic Carbon Content Of All Pedons Were Recorded Low In Surface And Subsurface Horizons Except The Surface Layer Of Pedon 2, Where It Was Medium. The Organic Carbon Content Of Surface Soil Was Greater Than The Subsurface Soils In Profile 1, 2, 4 And 5, May Be Due To High Amount Of Litter And Crop Residues At The Surface And This Was Attributed To The Addition Of Farmyard Manure And Plant Residues To Surface Horizons Which Resulted In Higher Organic Carbon Content In Surface Horizons Than That Of Lower Horizons.These Observations Are In Accordance With Results Of (Basavaraju Et Al. 2005) In Soils Ofchandragirimandal Of Chittor District Of Andhra Pradesh. In Midland Pedons Organic Carbon Content Was Low Throughout The Profile Except Slight Increase In Sub-

Surface Layer. This Is Attributed To Sparse Vegetative Cover.Organic Carbon Content Of The Soils Of Profile 2 And 4, Followed By Decreasing Trend With Depth. It Reflects The Rapid Rate Of Organic Matter Mineralization In These Soils. Similar Findings Were Reported By (Mruthynjaua Et Al. 1993) In Vanivilas Command Area And In Malaprabha Command Area (Shadaksharappaet Al.1995).

Available Nitrogen

Most Of The Nitrogen Present In Soils Is Associated With Organic Compounds Like Proteins, Amino Acids And Amino Sugars. Soil Nitrogen Also Occurs In Inorganic Forms Like Ammonium, Nitrate, And Nitrite. As The Nitrogen In Organic Compounds Is Not Easily Available, It Has To Be Mineralized To Ammoniacal And Nitrate Forms Before Plants Can Utilize It. So The Soil Available Nitrogen Which Represents The Fraction Of Total Nitrogen That Can Be Easily Used By The Plants Comprises Ammoniacal, Nitrate And The Easily Oxidizable Organic Forms (Sawhney Et Al 2002). The Available Nitrogen Content In Surface Layers Of Pedons Varied From 72.264 Kg/Ha To 457.856 Kg/Ha. The Highest Content Of Available Nitrogen Was Recorded In Surface Layer Of Profile 4 And The Lowest Available Nitrogen Content Was Recorded In Surface Layer Of Profile 2. The Available Nitrogen In All Horizons Of Profiles Ranged From 30.800 Kg/Ha In Profile 5 In BC2 Horizon To 457.856 Kg/Ha In Profile 4 In Ap Horizon. The Mean Available Nitrogen Is 153.252 Kg/Ha In The Soils Of Experimental Farm Of School Of Agriculture, Lovely Professional University. Available Nitrogen In All Soil Horizon Of Pedons Were Recorded Low Except Surface Layer Of Pedon 4 And Pedon 5, It Could Be Due To Use Of Nitrogen Fertilizers. Low Available Nitrogen In Other Horizons Of All Pedons Could Be Attributed To Low Amount Of Organic Carbon In The Soil Of Experimental Farm Of School Of Agriculture, Lovely Professional.

Available Phosphorus

Phosphorus (P) Occurs In Soils Both In Organic And Inorganic Forms. Organic Fraction Is Present In Humus And Other Organic Compounds Like Phytins And Nucleic Acid. Inorganic Fraction Occurs In Combination With Calcium, Iron, Almonium And Other Elements. Plant Absorbs P From The Soil As $H_2PO_4^-$ And HPO_4^{-2} Ions (Sawhney Et Al. 2002). The Available Phosphorus Status In Soils Of Experimental Farm Of School Of Agriculture, Lovely Professional University Is Determined By Olsen Et Al (1954) Method Was High To Very High In All Surface Horizons Except Pedon 3 Where It Was Recorded Medium Table ( ). The Available Phosphorus Content In Surface Horizons Ranged From 13.44 Kg/Ha In Profile 3 To 123.20 Kg/Ha In Profile 4. (Awdenegestet Al. 2013) Who Reported That The Higher Available Phosphorus In The Top Soil Layer Of Farmland May Be Related To The Application Of Animal Manure, Compost, Household Wastes Like Ashes And DAP Fertilizer For Soil Fertility Management. (Girma Et Al. 2013) Also Support This Finding By Indicating That The High Phosphorus In Top Soil Might Be Attributed To External Phosphorus Supply, And Phosphorus Carried Over From Fertilization. The Available Phosphorus Content In The Subsurface Horizons Ranged From 8.96 Kg/Ha In Profile 1 In AC Horizon To 163.50 Kg/Ha In Profile 3 In C1 Horizon. The Mean Phosphorus Content For All Pedons Was 71.20 Kg/Ha. The Highest Concentration Of Available Phosphorus 163.5 Kg/Ha Was Recorded In C1 Horizon Of Profile 3, Followed By 145.6 Kg/Ha In B2 Horizon Of Profile 5 And 123.20 Kg/Ha In Surface Layer Of Profile 4 And BC1 Horizon Of Profile 5 Respectively. The Available Phosphorus Is Low In AC Horizon Of Profile 1 And B1 Horizon Of Profile 4. According To (Ekwoanya Et Al. 2001) The Low Available Phosphorus In The Area Could Be Due To The Nature Of Parent Material In The Area And To A Limited Extend Erosion Leaching And Low Organic Content On The Area. According To Rating Set By Olsen Et Al (1945) Available Phosphorus Observed In All Surface Horizons Are Categorized As Low To Very High Levels.

Available Potassium

The Readily Available Potassium Constitutes About 1-2 Percent Of Total Potassium In Mineral Soils. It Consists Of Soil Solution And Exchangeable Potassium Adsorbed On Soil Colloidal Surfaces. The Neutral Normal Ammonium Acetate Solution, (Merwin Et Al. 1950) Which Extracts Both Exchangeable And Water Soluble Potassium Is Most Commonly Used For Determination Of Available Potassium. According To That Method They Have Given Available Potassium Observed In All Profiles Were High, It Ranges From 184.6 Kg/Ha In Profile 1 In C2 And C3 Horizons And Profile 5 In BC2 Horizon To 453.8 Kg/Ha In Profile 5 In Ap Horizon. The Mean For All Pedons Is 240.8 Kg/Ha. The Value Of Available Potassium For Surface Layer Of Pedons Was Ranged From 212.8 Kg/Ha To 453.8 Kg/Ha, The Highest Value Was Recorded In Profile 5 And The Lowest Value Was Recorded In Profile 2. The Profile 2 Has The Same Value 212.8 In Ap, AC, C2 And C3.

Micronutrients

The Availability Of Zinc Content In The Surface Layers Of Pedons Ranged From 0.2 Mg/Kg Of Soil To 2.98 Mg/Kg Of Soil. The Highest Contend Of Zinc 2.98 Mg/Kg Of Soil Was Recorded In Pedon 4 And The Lowest Content Of Zinc Was Recorded In Profile 1. The Availability Of Zinc In All Horizons Of The Pedons Were Ranged From 0.08 Mg/Kg Of Soil In Pedon 1 In C2 And C3 Horizon And C2 Horizon Of Pedon 2 With C2 Horizon Of Pedon 3 Respectively To 2.98 Mg/Kg Of Soil In Pedon 1 In Ap Horizon. According To Nutrient Critical Value Level Suggested By FAO (1983), The Content Of Zinc Was Less In C1 And C2 And C3 Horizons Of Pedon 1 And In AC, C1, C2 And C3 Horizons Of Pedon 2. Pedon 3 Also Showed Less Content Of Zing In AC, C1 And C2 Horizons And Pedon 5 Showed Less Zinc In B1, B2, BC1 And BC2 Horizons. The Amount Of Zinc Was Recorded Less At All Layers Of Pedon 4. The Availability Of Zinc Was High In Surface Horizons Of All Pedon Except Pedon 4, And It Decreased At Sub Surface Horizons, Did Not Follow Specific Trend. The Result Of The Studied Area Was Unlike (Jones 2003) Who Showed Low Zinc Content In All Subsurface Horizons Of All Pedons With The All Layers Of Pedon 4 It Could Be Due To Ph And Soil Type. (Barghouthi Et Al 2012) Indicated That Availability And Abundance Of Micronutrient Is High In Acid Soils.

The Availability Of Iron In The All Soil Pedons Ranged From 0.76 Mg/Kg Of Soil In Profile 1 In C1 Horizon With Pedon 3 In AC Horizon To 13.06 Mg/Kg Of Soil In Pedon 2 In AC Horizon. According To Nutrient Critical Value Levels Suggested By FAO (1983) The Studied Iron Is Above The Respective Critical Level In The Surface Horizons Of Pedon 1, 2, And 5. And The Result Showed High Level Of Iron In The C2, C3 Horizon Of Pedon 1, AC Horizon Of Pedon 4 With BC2 Horizon Of Pedon 5 Respectively.

The Availability Of Manganese Content In All Soil Pedons Ranged From 0.70 Mg/Kg Of Soil In Profile 3 In C2 Horizon And Profile 4 In B21 Horizon To 5.96 Mg/Kg Of Soil In Pedon 3 In Ap Horizon. The Result Of Manganese Content In The Studied Area Showed That It Is Low In All The Horizons Except In The Ap And AC Horizon Of Pedon 1 And In The Surface Horizon Of Pedon 3. When Compared With The Critical Levels. The Effect Of Ph On The Availability Of Manganese Was Observed In The Current Study. Unlike Result Was Reported By (Nazila Et. Al 2007).

The Concentration Of Extractable Copper In Surface Horizons Of The Studied Profiles Ranged From 0.76 Mg/Kg Of Soil In Pedon 4 To 1.22 Mg/Kg In Pedon 1. And It Is Ranged In All Horizons Of Pedons From 0.18 Mg/Kg Of Soil To 1.80 Mg/Kg Of Soil. The Heights Value Of Copper Was Recorded In B21 Horizon Of Pedon 4 And The Lowest Was Recorded In C3 Horizon Of Pedon 1. The Depth Wise Distribution Pattern Of Cu In Profiles 1, 2, 3 And 5 Decreased With Soil Depth, But In The Profile 4 Profiles It Did Not Follow Specific Trend. The Distribution Of Available Copper Decreased Consistently From The Surface To Subsurface Horizons In Profiles 1, 2 3, And 5 May Be Due To Its Strong Correlation With Soil Organic Matter Content.

Table 1: Morphological And Physiochemical Characteristic Of Profile 1

Horizon	Depth (Cm)	Color	Texture	Structure	Consistence		Re-Action	Bound Ary
		Moist			Moist	Wet		
Ap	0-15	4/4 10YR	Loamy Sand	1m Sbk	Mfr	Wss, Wsp	Es	Cs
AC	15-25	4/4 10YR	Loamy Sand	1m Sbk	Mfr	Wss, Wsp	E	Gs
C1	25-65	5/6 10YR	Loamy Sand	M/1msbk	Mfr	Ws, Wp	E	Cs
C2	65-125	4/6 10YR	Loamy Sand	M	Mfr	Ws, Wp	E	Gs
C3	125-145	5/6 10YR	Loamy Sand	M	Mfr	Ws, Wp	E	-

Horizon	Depth (Cm)	Ph (1:2)	EC (Ds/M)	Calcium Carbonate (%)	Texture			
					Sand (%)	Silt (%)	Clay (%)	Soil Type
Ap	0-15	8.2	0.013	0.87	78.00	13.00	9.90	Loamy Sandy
AC	15-25	8.7	0.010	1.12	78.00	15.00	6.90	Loamy Sandy
C1	25-65	8.4	0.012	1.00	77.00	15.40	7.60	Loamy Sandy
C2	65-125	8.8	0.013	0.92	68.50	16.20	5.30	Loamy Sandy
C3	125-145	8.9	0.021	Absent	76.60	14.80	8.50	Loamy Sandy

Depth (Cm)	Organic Carbon (%)	Available Nitrogen Kg/Ha	Available Phosphorus Kg/Ha	Available Potassium Kg/Ha	Saturation (%)
0-15	0.370	75.264	26.88	347.2	29.8
15-25	0.225	50.176	8.96	319.2	27.4
25-65	0.307	37.632	35.84	212.8	30.4
65-125	0.247	68.992	89.60	184.8	29.0
125-145	0.217	81.536	42.56	184.8	31.6

Depth (Cm)	Zinc Mg/Kg Soil	Iron Mg/Kg Soil	Manganese Mg/Kg Soil	Copper Mg/Kg Soil
0-15	2.98	5.48	7.81	1.22
15-25	2.02	2.84	3.56	0.72
25-65	0.20	0.76	1.56	0.40
65-125	0.08	7.36	1.22	0.20
125-145	0.08	4.66	1.54	0.18

Table 2: Morphological And Physiochemical Characteristic Of Profile 2

Horizon	Depth (Cm)	Color	Texture	Structure	Consistence		Re-Action	Bound Ary
		Moist			Moist	Wet		
Ap	0-22	4/6 10YR	Loamy Sand	1w Sbk	Mfr	Ws, Wsp	Es	Gs
AC	22-55	4/4 10YR	Loamy Sand	1w Sbk	Mfr	Ws,Wsp	Es	Gs
C1	55-50	4/4 10YR	Loamy Sand	1w Sbk	Mfr	Ws,Wsp	Es	Gs
C2	80-10	5/4 10YR	Loamy Sand	M	Mfr	Ws,Wsp	Es	Cs
C3	110-155	4/4 10YR	Loamy Sand	M	Mfr	Ws,Wsp	Es	-

Horizon	Depth (Cm)	Ph (1:2)	EC (Ds/M)	Calcium Carbonate (%)	Texture			
					Sand (%)	Silt (%)	Clay (%)	Soil Type
Ap	0-22	9.1	0.048	0.52	75.40	15.20	9.40	Loamy Sand
AC	22-55	8.9	0.032	0.77	76.50	15.00	8.50	Loamy Sand
C1	55-80	8.9	0.031	0.90	80.20	12.50	7.30	Loamy Sand
C2	80-110	8.9	0.029	1.12	79.10	14.10	6.80	Loamy Sand
C3	110-155	8.9	0.018	1.25	72.70	19.00	8.30	Loamy Sand

Depth (Cm)	Organic Carbon (%)	Available Nitrogen Kg/Ha	Available Phosphorus Kg/Ha	Available Potassium Kg/Ha	Saturation (%)
0-22	0.420	72.264	28.88	212.8	29.0
22-55	0.270	50.176	125.44	212.8	30.2
55-80	0.262	37.632	24.64	347.2	31.2
80-110	0.240	68.992	44.80	212.8	30.6
110-155	0.307	81.536	94.08	212.8	29.8

Depth (Cm)	Zinc Mg/Kg Soil	Iron Mg/Kg Soil	Manganese Mg/Kg Soil	Copper Mg/Kg Soil
0-22	0.66	13.06	3.00	1.12
22-55	0.12	2.08	1.38	0.28
55-80	0.12	4.02	1.08	0.28
80-110	0.08	3.08	1.12	0.24
110-155	0.12	2.90	2.00	0.26

Table 3: Morphological And Physiochemical Characteristic Of Profile 3

Horizon	Depth (cm)	Color	Texture	Structure	Consistence		Re-action	Boundary
		Moist			Moist	Wet		
Ap	0-28	5/6 10YR	loamy sand	1w sbk	mfr	wss, wsp	es	cs
AC	28-75	5/6 10YR	loamy sand	1w sbk	mfr	wss,wsp	ev	cs
C1	75-120	5/6 10YR	sandy loam	m	mfr	wss,wsp	es	gs
C2	120-160	4/6 10YR	sandy loam	m	mfr	wss,wsp	eo	-

Horizon	Depth (cm)	pH (1:2)	EC (ds/m)	Calcium carbonate (%)	Texture			
					Sand (%)	Silt (%)	Clay (%)	Soil type
Ap	0-28	9.0	0.067	1.07	73.50	13.40	13.10	sandy loam
AC	28-75	8.8	0.056	1.60	72.40	16.60	11.00	sandy loam
C1	75-120	8.7	0.094	1.75	76.90	15.30	7.90	loamy sand
C2	120-160	8.9	0.084	0.75	69.50	24.78	5.72	loamy sand

Depth (cm)	Organic carbon (%)	Available nitrogen kg/ha	Available phosphorus kg/ha	Available potassium kg/ha	Saturation (%)
0-28	0.170	175.61	13.44	266	28.6
28-75	0.240	37.632	163.5	238	27.6
75-120	0.277	200.70	64.96	212	28.8
120-160	0.292	188.16	33.60	294	28.6

Depth (cm)	Zinc mg/kg soil	Iron mg/kg soil	Manganese mg/kg soil	Copper mg/kg soil
0-28	0.90	1.80	5.96	0.82
28-75	0.24	0.76	1.06	0.54
75-120	0.12	1.58	1.40	0.32
120-160	0.08	1.76	0.70	0.24

Table 4: Morphological And Physiochemical Characteristic Of Profile 4

Horizon	Depth (cm)	Color	Texture	Structure	Consistence		Re-action	Boundary
		Moist			Moist	Wet		
Ap	0-22	3/4 10YR	silt loam	2m sbk	mfr	ws, wp	ev	ds
B1	22-48	4/4 10YR	silt loam	3m sbk	mfr	ws, wp	ev	ds
B21	48-85	4/6 10YR	silt loam	3m sbk	mfr	ws, wp	ev	cs
B22	85-115	5/3 10YR	silt loam	3m sbk	mfr	ws, wp	ev	cs
Bc	115-155	5/4 10YR	silt loam	2m sbk	mfr	ws, wp	es	-

Horizon	Depth (cm)	pH (1:2)	EC (dS/m)	Calcium carbonate (%)	Texture			
					Sand (%)	Silt (%)	Clay (%)	Soil type
AP	0-22	7.5	0.121	3.07	49.40	26.00	24.60	silt loam
B1	22-48	8.7	0.044	2.50	51.80	25.50	23.20	silt loam
B21	48-85	8.6	0.038	2.25	51.00	28.00	21.00	silt loam
B22	85-115	8.7	0.086	2.00	50.30	27.30	22.40	silt loam
BC	115-155	8.7	0.041	1.95	55.30	25.10	19.60	silt loam

Depth (cm)	Organic carbon (%)	Available nitrogen kg/ha	Available phosphorus kg/ha	Available potassium Kg/ha	Saturation (%)
0-22	0.370	457.856	123.20	372.4	32.0
22-48	0.352	363.776	11.20	291.2	30.2
48-85	0.337	94.060	62.72	319.2	31.4
85-115	0.225	163.072	91.84	238.0	31.2
115-155	0.202	106.620	82.88	347.2	32.8

Depth (cm)	Zinc mg/kg soil	Iron mg/kg soil	Manganese mg/kg soil	Copper mg/kg soil
0-22	0.20	2.48	2.18	0.76
22-48	0.30	4.80	2.78	0.38
48-85	0.24	1.32	0.70	1.80
85-115	0.14	1.74	0.96	0.70
115-155	0.12	1.90	1.06	0.50

Table 5: Morphological And Physiochemical Characteristic Of Profile 5

Horizon	Depth (cm)	Color	Texture	Structure	Consistence		Re-action	Boundary
		Moist			Moist	Wet		
Ap	0-20	4/2 10YR	silt loam	2m sbk	mfr	wss, wp	es	gs
AB	20-55	4/2 10YR	silt loam	3m sbk	mfr	wss, wp	Ev	gs
B1	55-85	4/4 10YR	silt loam	3m sbk	mfr	wss, wp	ev	ds
B21	85-120	5/4 10YR	sandy loam	2m sbk	mfr	wss, wsp	es	gs
B22	120-155	5/6 10YR	sandy loam	2m sbk	mfr	wss, wsp	eo	-

Horizon	Depth (cm)	pH (1:2)	EC (dS/m)	Calcium carbonate (%)	Texture			
					Sand (%)	Silt (%)	Clay (%)	Soil type
AP	0-20	8.5	0.113	2.0	51.50	29.20	19.30	silt loam
B1	20-55	8.2	0.085	2.50	42.90	35.00	22.10	silt loam
B2	55-85	8.4	0.085	2.40	57.00	33.40	33.60	silt loam
BC1	85-120	8.4	0.063	2.12	69.30	16.20	14.50	sandy loam
BC2	120-155	8.8	0.098	1.80	61.90	23.40	14.70	sandy loam

Depth (cm)	Organic carbon (%)	Available nitrogen kg/ha	Available phosphorus kg/ha	Available potassium kg/ha	Saturation (%)
0-20	0.232	407.680	80.64	453.8	31.6
20-55	0.320	388.864	76.16	372.4	33.0
55-85	0.277	351.230	145.6	266.0	32.6
85-120	0.165	87.808	123.2	212.8	31.8
120-155	0.210	30.800	114.2	184.6	33.8

Depth (cm)	Zinc mg/kg soil	Iron mg/kg soil	Manganese mg/kg soil	Copper mg/kg soil
0-20	2.18	5.88	1.18	1.20
20-55	0.20	2.40	0.96	0.84
55-85	0.12	1.62	1.20	0.60
85-120	0.10	1.42	1.70	0.38
120-155	0.10	1.62	1.58	0.34

Soil Classification And Soil Map

Soil Of The Experimental Farm Of School Of Agriculture, Lovely Professional University Classified Up To Family As Per Soil Taxonomy. And A Soil Map Was Prepared Per Cent Area Of Each Unit At Map Has Been Worked Out.

Pedon 1, 2 And 3 Classified In To

Order: Entisols
Sub Order: Orthenths
Great Group: Ustorthents
Sub Group**:** Typic Ustorthents
Coarse Loamy Mixed The Hyperthermic Family Of Typic Ustorthents

Pedon 4 And 5 Classified In To

Order**:** Inceptisols
Sub Order: Ustepts
Great Group**:** Haplustepts
Sub Group**:** Typic Haplustepts
Fine Loamy Mixed Hypertrophic, Family Of Typichaplustepts

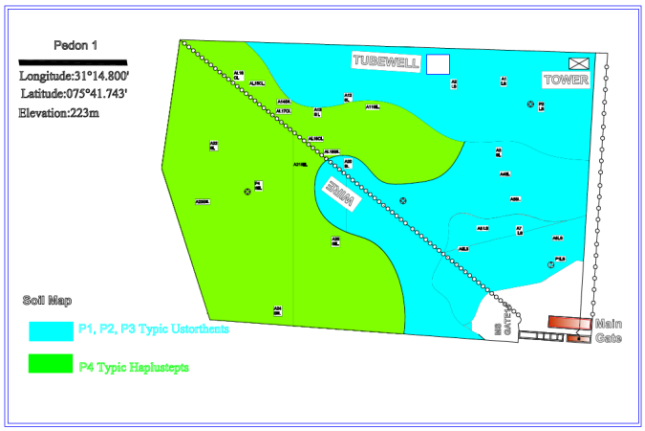

Fig. 1 Soil Map Of Experimental Farm Of School Of Agriculture

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