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Assessment of Physico-chemical Properties in Some Soils of District Baramulla under Different Land Use Systems

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ABSTRACT

The experiment was carried out at, Faculty of Agriculture, Wadura-Sopore, SKUAST-K during 2017-2018, to study "Soil Physico-chemical properties in some soils of district Baramulla under different Land use systems". The land use systems studied included apple, paddy, maize, vegetables, forest and pasture. Composite soil samples were collected randomly for each land use system at a depth (0-20 cm) and were analyzed for soil texture, pH, EC, CEC, organic carbon and calcium carbonate. The soils were found to possess medium to moderately fine texture.

Introduction

Land use is characterized by the arrangements, activities and inputs people undertake in a certain land cover type to produce, change or maintain it (Abad *et al.,* 2014). Land use systems significantly affected the clay, the silt and the sand fractions and affect the distribution and supply of soil nutrients by directly altering soil properties like exchangeable basic and acidic cations (Stutter *et al.,* 2004). Land use and soil management practices influence the soil nutrients and related soil processes, such as erosion, oxidation, mineralization, and leaching, etc (Celik, 2005; Liu *et al.,* 2010). As a result, it can modify the processes of transport and re-distribution of nutrients. The supply of nutrients to the plants in an appropriate quantity at the correct time is essential for sustainable yield. Soil organic matter, crop residues and manure plays a vital role in supplying nutrients to plants. The nutrient dynamics forms the basis for fertilizer application to get regular and optimum yield without losing the soil health. An appropriate land use system plays an important role in improving soil quality through the addition of leaf litter, binding of soil through root system, checking runoff, soil and nutrient losses, etc. A systematic characterization of soil is of prime importance for evolving suitable agronomic practices and predicting their ability in relation to the different land use systems. Therefore, the present study entitled "Assessment of physico-chemical properties in some soils of district Baramulla under different Land use systems" has been carried out.

Materials and Methods

The present investigation entitled, **"**Assessment of physico-chemical properties in some soils of district Baramulla under different Land use systems**"**, was carried out at, Faculty of Agriculture, Wadura - Sopore, SKUAST-K during 2017-18 (Fig. 1). The details of the techniques followed and materials used during the course of this investigation are presented as;

For investigating the "Assessment of soil physico-chemical properties in some soils of District Baramulla under different Land use systems", composite surface soil samples (0-20 cm) were collected from the following locations in district Baramulla. The exact locations of these sites are presented in Table 1.

No. of land use systems used: 05
Horticulture: Fruits- apple
Agriculture (Irrigated - paddy)
Agri-horti (Maize & Vegetables)
Forestry
Pasture

Design of survey

No. of locations per land use system: 03
No. of sites per location: 03
No. of replications per site: 02
Design: Stratified Random Sampling

Preparation of soil samples

The soil samples were air dried in shade, ground with wooden mallet and passed through a 2 mm plastic sieve. For organic carbon determination, the soil was passed through 0.2 mm sieve. After mixing thoroughly, the processed soil samples were stored in polythene bags for laboratory studies.

Physico-chemical characteristics of soil

Mechanical analysis (Particle size distribution)

The mechanical analysis of the soil samples was done by following the International Pipette method as described by Piper (1966).

Soil reaction (pH): Soil pH was determined in 1:2.5 soil: water suspension with digital glass electrode pH meter (Jackson, 1973).

Electrical conductivity (EC): Electrical conductivity of the suspension liquid of 1: 2.5 soil: water suspension was determined with the help of Solu bridge conductivity meter at 25^{o}C (Jackson, 1967).

Cation Exchange Capacity (CEC): Cation exchange capacity of soil was determined according to the procedure outlined by Rhoades (1982).

Calcium Carbonate ($CaCO_3$): Calcium carbonate was determined by the method given by Puri (1930).

Organic Carbon (OC): Organic carbon was determined by Walkley and Black's rapid titration method.

Results and Discussion

Physico-chemical properties of soil

Particle size distribution (Soil texture)

Particle size distribution of the soil is a governing factor for assessing nutrient supplying power, aeration and drainage of soils. The data presented in Table 2, with regard to particle size distribution indicated varied mechanical make up in district Baramulla. The course sand fraction in surface soils varied from 0.17 to 3.60, 1.20 to 10.56, 1.30 to 2.88, 1.10 to 3.20, 1.20 to 6.30 and 0.16 to 8.10 per cent with the mean values of 2.48, 4.26, 2.01, 2.18, 3.06 and 2.78 per cent in apple, paddy, maize, vegetables, forest and pasture respectively.

The fine sand fraction varied from 15.00 to 44.45, 16.62 to 32.21, 17.10 to 19.90, 16.10 to 37.31, 20.68 to 54.50 and 22.00 to 51.89 per cent with the mean values of 25.67, 24.48, 18.17, 23.84, 34.60 and 36.69 per cent in apple, paddy, maize, vegetables, forest and pasture respectively.

The silt content varied from 20.10 to 49.50, 28.89 to 47.80, 43.56 to 56.11, 45.10 to 50.20, 22.10 to 53.60 and 20.10 to 50.02 per cent with the mean values of 41.19, 37.34, 49.16, 48.20, 39.24 and 39.61 per cent in apple, paddy, maize, vegetables, forest and pasture respectively.

The clay fraction varied from 10.20 to 35.20, 22.00 to 39.65, 21.14 to 35.60, 10.50 to 36.50, 8.00 to 33.54 and 9.00 to 34.54 per cent with the mean values of 29. 99, 33.05, 29.90, 26.01, 21.66 and 20.56 per cent in apple, paddy, maize, vegetables, forest and pasture respectively.

The soils were found to possess medium to moderately fine texture with translocation of clay and its deposition in the lower layers. Similar observations were earlier reported by Najar *et al.*, (2009), Ramzan *et al.*, (2014) and Bashir *et al.*, (2016).

Soil reaction (pH)

The pH value (Table 3) in the surface soils of the selected locations under different land uses ranged from 6.02 to 6.62 with a mean of 6.35 in apple, 6.11 to 6.40 with a mean of 6.27 in paddy, 6.30 to 7.30 with a mean of 6.85 in maize, 6.00 to 6.60 with a mean of 6.25 in vegetable and 5.70 to 6.60 with a mean of 6.23 in forest and 5.80 to 6.60 with a mean of 6.26 in pasture soils respectively. The low pH observed in soils might be attributed to relatively higher rainfall which increases the leaching of salts and higher content of organic matter which brings down pH by releasing organic acids. The results are in agreement with the experimental findings of Bhat (2009), Najar *et al.*, (2009), Pal *et al.*, (2013), Sharma *et al.*, (2013), Ramzan *et al.*, (2014) and Bashir *et al.*, (2016).

Electrical conductivity

The electrical conductivity of the soil samples ranged from 0.05 to 0.20 dSm^{-1} with a mean 0.12 dSm^{-1} (apple), 0.15 to 0.34 dSm^{-1} with a mean of 0.22 dSm^{-1} (paddy), 0.27 to 0.78 dSm^{-1} with a mean of 0.61 dSm^{-1} (maize), 0.40 to 0.46 dSm^{-1} with a mean of 0.42 dSm^{-1} (vegetables), 0.07 to 0.25 dSm^{-1} with a mean 0.18 dSm^{-1} (forest) and 0.11 to 0.41 dSm^{-1} with a mean of 0.25 dSm^{-1} (pasture) respectively in the surface soils of selected sites under selected locations (Table 3). Electrical conductivity showing decreasing trend may be due to leaching of soluble salts. These results are in conformity with Thangasamy *et al.*, (2004), Rao *et al.*, (2008), Dhale and Prasad (2009), Najar *et al.*, (2009), Sharma *et al.*, (2013) and Bashir *et al.*, (2016).

Cation exchange capacity

The data in Table 3 revealed that cation exchange capacity under selected land uses varied from 13.50 to 17.75 $Cmol_c\ kg^{-1}$ with a mean of 15.19 $Cmol_c\ kg^{-1}$ (apple), 11.10 to 13.96 $Cmol_c\ kg^{-1}$ with a mean of 12.51 $Cmol_c\ kg^{-1}$ (paddy), 12.20 to 16.45 $Cmol_c\ kg^{-1}$ with a mean of 14.49 $Cmol_c\ kg^{-1}$ (maize), 10.55 to 14.00 $Cmol_c\ kg^{-1}$ with a mean of 12.17 $Cmol_c\ kg^{-1}$ (vegetables), 10.51 to 12.78 $Cmol_c\ kg^{-1}$ with a mean of 11.75 $Cmol_c\ kg^{-1}$ (forest) and 11.56 to 17.65 $Cmol_c\ kg^{-1}$ with a mean of 15.37 $Cmol_c\ kg^{-1}$ (pasture) respectively in the studied area with significant differences among the locations. The differences in the cation exchange capacity can be ascribed to the differences in the organic matter content and clay when the higher values of the cation exchange capacity can be assigned to the higher amount of organic matter in the surface soils. These findings corroborate with the results of Wani *et al.,* (2010), Pal *et al.,* (2013), Sharma *et al.,* (2013), Ramzan *et al.,* (2014) and Bashir *et al.,* (2016).

Table.1 Location of the soil

Land use system	Sample Code	Location	Altitude (mtrs)	Latitidue	Longtitude
APPLE	L_1S_1	Goripora	1550	$34^0$21’31.478”N	$74^0$25’48.726”E
	L_1S_2	Janwara	1547	$34^0$20’29.254”N	$74^0$29’28.219”E
	L_1S_3	Seelo	1560	$34^0$19’47.669”N	$74^0$25’37.704”E
	L_2S_1	Tapper	1552	$34^0$11’55.447”N	$74^0$30’45.808”E
	L_2S_2	Nehalpora	1637	$34^0$08’50.521”N	$74^0$31’20.547”E
	L_2S_3	Hanjiwera	1548	$34^0$08’31.288”N	$74^0$35’05.287”E
	L_3S_1	singpora	1561	$34^0$08’37.766”N	$74^0$35’48.865”E
	L_3S_2	Singpora	1554	$34^0$08’54.181”N	$74^0$36’34.616”E
	L_3S_3	Singpora	1549	$34^0$09’03.540”N	$74^0$37’15.145”E
PADDY	L_1S_1	Uri	1420	34^0 04’27.256”N	$74^0$03’28.426”E
	L_1S_2	Chehal	1551	$34^0$09’ 5.171”N	74^0 12’31.831”E
	L_1S_3	Sheeri	1565	$34^0$10’54.356”N	$74^0$18’16.813E
	L_2S_1	Mirgund	1827	$34^0$04’40.435”N	$74^0$29’19.605”E
	L_2S_2	Kunzar	1739	$34^0$05’05.513”N	$74^0$30’36.068”E
	L_2S_3	Wussan	1665	$34^0$05’17.318”N	$74^0$32’07.592”E
	L_3S_1	Dawlatpora	1565	$34^0$12’52.429”N	$74^0$28’03.354”E
	L_3S_2	Saloosa	1567	$34^0$11’53.833”N	$74^0$27’36.881”E
	L_3S_3	Wagoora	1627	$34^0$10’00.274”N	$74^0$25’40.386”E
MAIZE	L_1S_1	Gantmulla	1590	34^O 10’34.59” N	74^0 16’11.971”E
	L_1S_2	Gantmulla	1545	$34^0$10’17.212”N	$74^0$14’45.361” E
	L_1S_3	Gantmulla	1630	34^0 10’25.408”N	$74^0$14’ 54.160”E
	L_2S_1	Checki	1558	34^0 07’11.341”N	$74^0$40’33.824”E
	L_2S_2	Kawoosa	1572	$34^0$06’34.438” N	74^0 38’47.212”E
	L_2S_3	Kakarpora	1551	$34^0$08’15.985”N	74^0 39’28.820”E
	L_3S_1	Minichakh	1768	$34^0$11’10.939” N	$74^0$21’51.429”E
	L_3S_2	Chandoosa	1956	$34^0$09’09.299”N	$74^0$22’30.827”E
	L_3S_3	muqam	1644	$34^0$13’29.700”N	74^o24’34.00”E

Contd..

VEGETABLES	**L_1S_1**	**Watrigam**	**1607**	**34^{0}19'18.866"N**	**74^{0}22'25.327"E**
	L_1S_2	Dangiwacha	1577	34^{0}32'03.134'N	74^0.36'91.648"E
	L_1S_3	Bahrampura	1594	34^{0}19'38.454"N	74^{0}23'38.426'E
	L_2S_1	Mamoosa	1609	34^{0}06'41.226"N	74^{0}32'17.254"E
	L_2S_2	Narbal	1561	34^{0}07'11.485"N	74^{0}40'33.469"E
	L_2S_3	Pattan	1641	34^{0}08'50.032"N	74^{0}31'20.504"E
	L_3S_1	jamia masjid	1557	34^{0}08'53.025"N	74^{0}36'34.226"E
	L_3S_2	Nowpora jageer	1620	34^0 13' 1.900" N	74^0 13' 29.70" E
	L_3S_3	Singpora	1553	34^{0}09'03.395"N	74^{0}37'14.439"E
FOREST	L_1S_1	Ferozpora	2219	34^{0}03'50.500"N	74^{0}24'59.130"E
	L_1S_2	Yaru	1567	34^{0}22'54.291"N	74^{0}19'42.815"E
	L_1S_3	Gulmarg	2630	34^{0}03'37.728"N	74^{0}23'13.414"E
	L_2S_1	Gulmarg	2540	34^{0}02'31.451"N	74^{0}23'51.385"E
	L_2S_2	Shranz	2007	34^{0}05'38.629"N	74^{0}22'43.750"E
	L_2S_3	Rajpora	2017	34^{0}08'20.544"N	74^{0}21'45.522"E
	L_3S_1	Nowshehra	1582	34^{0}09'16.110"N	74^{0}13'27.53"E
	L_3S_2	Gantmulla	1583	34^{0}10'31.845"N	74^{0}15'20.326"E
	L_3S_3	Mohra	1441	34^{0}08'41.555"N	74^{0}09'14.284"E
PASTURE	L_1S_1	Botingo	1553	34^{0}21'50.373"N	74^{0}29'47.826"E
	L_1S_2	Duroo	1552	34^{0}21'02.074"N	74^{0}27'55.216"E
	L_1S_3	Brath	1569	34^{0}20'07.265"N	74^{0}26'13.402"E
	L_2S_1	uri	1360	34^{0}04'24.069"N	74^{0}04'00.894"E
	L_2S_2	Boniyar	1477	34^{0}08'24.197"N	74^{0}10'13.572"E
	L_2S_3	Pichlan	1571	34^{0}09'51.892'N	74^{0}14'09.263" E
	L_3S_1	shontpathri	2270	34^{0}05'13.224"N	74^{0}23'30.463"E
	L_3S_2	Gulmarg	2609	34^{0}03'24.517"N	74^{0}23'13.408"E
	L_3S_3	Gulmarg	2614	34^{0}03'34.306"N	74^{0}23'12.887"E

Table.2 Particle size distribution of soils of District Baramulla under different Land use systems

	Soil separates (˜%)					
Land use System	**Coarse sand**	**Fine sand**	**Total sand**	**Silt**	**Clay**	**Textural class**
APPLE						
L_1S_1	0.22	43.32	43.54	21.62	34.76	Clay loam
L_1S_2	0.17	44.45	44.62	20.10	34.68	Clay loam
L_1S_3	2.68	37.31	39.99	49.50	10.20	Silt loam
L_2S_1	3.18	18.21	21.39	47.66	30.55	Silt clay loam
L_2S_2	3.00	25.24	28.24	47.20	23.80	Silt loam
L_2S_3	2.85	19.25	22.10	46.21	31.62	Silt clay loam
L_3S_1	3.20	16.10	19.30	45.30	34.90	Silt clay loam
L_3S_2	3.40	15.20	18.60	46.10	35.20	Silt clay loam
L_3S_3	3.60	15.00	18.60	47.00	34.20	Silt clay loam
Mean	2.48	25.67	28.49	41.19	29.99	-
PADDY						
L_1S_1	3.24	16.62	19.86	46.33	33.20	Silt clay loam
L_1S_2	3.12	26.53	29.65	30.56	39.65	Clay loam
L_1S_3	2.20	24.20	26.40	47.80	24.85	Silt loam
L_2S_1	5.80	26.20	32.00	32.10	35.30	Clay loam
L_2S_2	10.56	24.48	35.04	42.92	22.00	Loam
L_2S_3	1.20	18.02	19.22	45.50	35.10	Silt clay loam
L_3S_1	3.62	26.23	29.85	31.56	37.65	clay loam
L_3S_2	3.76	25.85	21.61	30.42	38.42	Clay loam
L_3S_3	4.87	32.21	37.08	28.89	33.11	Clay loam
Mean	4.26	24.48	27.86	37.34	33.05	-

Contd..

Land use System	Coarse sand	Fine sand	Total sand	Silt	Clay	Textural class
MAIZE						
L_1S_1	2.20	18.01	20.21	56.11	21.14	Silt loam
L_1S_2	1.95	18.77	20.72	54.23	22.88	Silt loam
L_1S_3	2.68	18.48	21.16	55.60	23.22	Silt loam
L_2S_1	1.30	18.10	19.40	45.40	34.40	Silt clay loam
L_2S_2	2.88	17.64	20.52	44.22	35.00	Silt clay loam
L_2S_3	1.62	18.23	19.85	43.56	35.25	Silt clay loam
L_3S_1	1.32	17.10	18.42	46.10	35.40	Silt clay loam
L_3S_2	2.30	19.90	22.20	52.10	26.20	Silt loam
L_3S_3	1.80	17.30	19.10	45.10	35.60	Silt clay loam
Mean	2.01	18.17	20.18	49.16	29.90	-
VEGETABLES						
L_1S_1	1.92	26.91	28.82	49.20	20.98	Silt loam
L_1S_2	2.01	25.41	27.42	50.20	22.10	Silt loam
L_1S_3	2.00	26.80	28.80	48.60	21.60	Silt loam
L_2S_1	1.68	29.71	31.39	49.50	19.02	Silt loam
L_2S_2	1.56	19.20	20.76	45.10	33.30	Silt Clay loam
L_2S_3	2.68	37.31	39.99	49.50	10.50	Silt loam
L_3S_1	3.45	16.80	20.25	49.10	36.50	Silt clay loam
L_3S_2	1.10	16.30	17.40	47.30	35.20	Silt clay loam
L_3S_3	3.20	16.10	19.30	45.30	34.90	Silt clay loam
Mean	2.18	23.84	26.01	48.20	26.01	-

Contd..

Land use System	Coarse sand	Fine sand	Total sand	Silt	Clay	Textural class
FOREST						
L_1S_1	1.20	42.20	43.40	22.10	33.54	Sandy clay loam
L_1S_2	2.60	24.20	26.80	45.80	21.43	Silt loam
L_1S_3	3.50	54.50	58.00	32.00	8.00	Sandy loam
L_2S_1	2.65	52.35	55.00	36.00	9.00	Sandy loam
L_2S_2	6.30	30.50	36.80	34.10	28.30	Clay loam
L_2S_3	5.23	31.44	36.67	33.14	29.44	Clay loam
L_3S_1	2.00	27.22	29.22	48.32	20.46	Silt loam
L_3S_2	1.58	20.68	22.26	53.60	23.98	Silt loam
L_3S_3	2.50	28.32	30.82	48.12	20.78	Silt loam
Mean	3.06	34.60	37.66	39.24	21.66	-
PASTURE						
L_1S_1	7.30	29.50	36.80	35.10	27.10	Clay loam
L_1S_2	0.16	45.20	45.36	20.10	34.54	Sandy clay loam
L_1S_3	2.00	22.00	24.00	45.20	30.80	Clay loam
L_2S_1	2.20	27.62	29.82	50.02	18.20	Silt loam
L_2S_2	1.80	26.38	28.18	47.52	22.88	Silt Loam
L_2S_3	2.50	24.61	27.11	48.54	23.56	Silt loam
L_3S_1	8.10	27.50	35.60	36.10	27.30	Clay loam
L_3S_2	2.84	51.16	54.00	36.00	10.00	Sandy loam
L_3S_3	3.11	51.89	55.00	37.00	9.00	Sandy loam
Mean	2.78	36.69	39.47	39.61	20.56	-

Table.3 Physico-chemical characteristics in soils of District Baramulla under different land use systems

Land use system	pH **(1:2.5)**	EC **(dSm^{-1})**	OC **(%)**	CEC **($Cmol_ckg^{-1}$)**	$CaCO_3$ **(%)**
APPLE					
L_1S_1	6.36	0.15	3.01	17.75	0.12
L_1S_2	6.24	0.18	2.40	16.11	0.18
L_1S_3	6.62	0.14	1.90	14.00	0.23
L_2S_1	6.55	0.10	2.10	15.55	0.19
L_2S_2	6.43	0.20	1.97	14.12	0.21
L_2S_3	6.02	0.09	1.50	13.45	0.28
L_3S_1	6.41	0.05	2.80	17.33	0.15
L_3S_2	6.28	0.08	1.88	13.50	0.25
L_3S_3	6.25	0.10	2.00	14.88	0.20
Mean	6.35	0.12	2.17	15.19	0.20
95% C.I	6.21-6.49	0.08 0.16	1.8-2.54	13.95-16.42	0.16-0.23
PADDY					
L_1S_1	6.40	0.15	2.72	13.64	0.10
L_1S_2	6.36	0.34	1.25	12.12	0.18
L_1S_3	6.25	0.21	2.01	12.75	0.15
L_2S_1	6.22	0.20	2.81	13.96	0.10
L_2S_2	6.11	0.18	1.08	11.54	0.25
L_2S_3	6.31	0.28	1.70	11.99	0.20
L_3S_1	6.28	0.20	1.05	11.10	0.28
L_3S_2	6.31	0.21	1.50	12.33	0.16
L_3S_3	6.21	0.25	2.20	13.22	0.15
Mean	6.27	0.22	1.81	12.52	0.17
95% C.I	6.20-6.34	0.18-0.27	1.30-2.33	11.78-13.25	0.13- 0.22

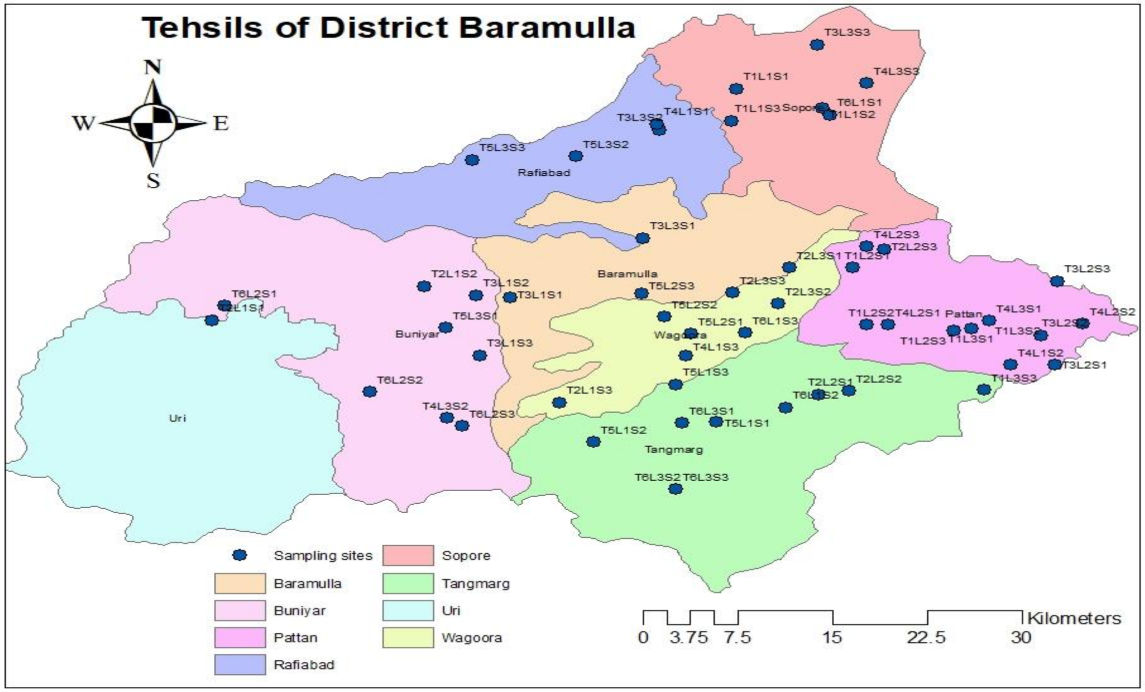
Contd..

Land use system	pH **(1:2.5)**	EC **(dSm^{-1})**	**OC (%)**	CEC **($Cmol_c kg^{-1}$)**	$CaCO_3$ **(%)**
MAIZE					
L_1S_1	7.20	0.27	1.25	12.62	0.46
L_1S_2	6.90	0.75	3.08	15.14	0.22
L_1S_3	7.00	0.61	3.40	15.76	0.21
L_2S_1	6.70	0.52	1.08	12.20	0.65
L_2S_2	6.50	0.65	4.60	16.45	0.18
L_2S_3	6.80	0.71	2.05	13.11	0.43
L_3S_1	6.30	0.55	2.06	14.33	0.41
L_3S_2	7.30	0.78	4.01	16.31	0.20
L_3S_3	7.00	0.65	2.70	14.50	0.33
Mean	6.85	0.61	2.69	14.49	0.34
95% C.I	6.60-7.10	0.49-0.72	1.77-3.61	13.28-15.70	0.22-0.46
VEGETABLES					
L_1S_1	6.00	0.46	2.80	12.22	0.26
L_1S_2	6.20	0.43	3.81	13.11	0.22
L_1S_3	6.50	0.41	2.15	10.67	0.35
L_2S_1	6.10	0.40	3.05	12.72	0.25
L_2S_2	6.30	0.42	2.01	10.55	0.38
L_2S_3	6.60	0.41	2.68	12.21	0.28
L_3S_1	6.30	0.45	2.56	11.23	0.30
L_3S_2	6.00	0.42	3.20	12.85	0.24
L_3S_3	6.30	0.40	4.52	14.00	0.20
Mean	6.25	0.42	2.98	12.17	0.28
95% C.I	6.09-6.41	0.40-0.44	2.36-3.58	11.28-13.06	0.23-0.32

Contd..

Land use system	pH **(1:2.5)**	EC **(dSm^{-1})**	OC **(%)**	CEC **($Cmol_c kg^{-1}$)**	$CaCO_3$ **(%)**
FOREST					
L_1S_1	6.20	0.25	3.65	12.64	0.20
L_1S_2	6.60	0.17	2.28	11.88	0.23
L_1S_3	6.10	0.20	1.09	10.51	0.41
L_2S_1	6.30	0.20	1.87	10.56	0.36
L_2S_2	5.70	0.25	3.01	12.50	0.20
L_2S_3	5.90	0.12	2.00	11.28	0.31
L_3S_1	6.60	0.07	4.05	12.78	0.11
L_3S_2	6.50	0.16	2.01	11.41	0.26
L_3S_3	6.20	0.20	2.50	12.21	0.21
Mean	6.23	0.18	2.50	11.75	0.25
95% C.I	6.00-6.47	0.13-0.22	1.78-3.21	11.09-12.41	0.18-0.32
PASTURE					
L_1S_1	6.30	0.27	4.50	17.65	0.15
L_1S_2	6.50	0.32	2.80	16.10	0.23
L_1S_3	6.20	0.41	1.50	12.83	0.28
L_2S_1	6.10	0.40	2.91	16.88	0.19
L_2S_2	6.60	0.12	1.84	14.23	0.27
L_2S_3	6.20	0.11	1.29	11.56	0.31
L_3S_1	5.80	0.30	2.90	16.20	0.20
L_3S_2	6.20	0.20	3.05	17.25	0.17
L_3S_3	6.40	0.15	2.20	15.61	0.25
Mean	6.26	0.25	2.55	15.37	0.23
95% C.I	6.07-6.43	0.16-0.34	1.80-3.30	13.77-16.96	0.18-0.27

Fig.1


Tehsils of District Baramulla
N
S
E
W
Sampling sites
Baramulla
Buniyar
Pattan
Rafiabad
Sopore
Tangmarg
Uri
Wagoora
0 3.75 7.5 15 22.5 30
Kilometers

Calcium carbonate

The calcium carbonate content in surface soils under different land use systems varied from 0.12 to 0.28 % with a mean of 0.20 % (apple), 0.10 to 0.28 % with a mean of 0.17% (paddy), 0.18 to 0.65 % with a mean of 0.34 % (maize), 0.20 to 0.38 % with a mean of 0.28 % (vegetables), 0.11 to 0.41 % with a mean of 0.25 % (forest) and 0.15 to 0.31 % with a mean of 0.23 % (pasture) (Table 3). The low content of calcium carbonate can be attributed to the leaching down of calcium carbonate to the lower surfaces. These results are in conformity with the experimental findings of Kirmani (2004), Ramzan *et al.,* (2014) and Bashir *et al.*, (2016).

Organic carbon

The soils under study varied in the organic carbon content ranging between 1.50 to 3.01 per cent with a mean of 2.17 per cent (apple), 1.05 to 2.81 per cent with a mean of 1.81 per cent (paddy), 1.08 to 4.60 per cent with a mean of 2.69 per cent (maize), 2.01 to 4.52 per cent with a mean of 2.98 per cent (vegetables), 1.09 to 4.05 per cent with a mean of 2.50 per cent (forest) and 1.29 to 4.50 per cent with a mean of 2.55 per cent (pasture) under different locations (Table 3). The higher content of organic carbon may be due to incorporation of crop residues. The results are in conformity with the findings of (Palvu *et al.*, 2007), Najar *et al.*, (2009), Wani *et al.*, (2010), Pal *et al.*, (2013), Ramzan *et al.*, (2014) and Bashir *et al.*, (2016).

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