7 Anthropogenic Soils of Canada

An Anthropogenic Spodosol in Canada

The Homesville soil in New Brunswick, Canada is in a crop rotation with potatoes. Originally, the vegetation consisted of mix hardwood and softwood trees and the soil classified as a Spodosol (see image below). After the trees were cleared and the soil was plowed, the spodic B-horizon was incorporated with the A horizon – thus changing the classification from a Spodosol to an Inceptisol. This human activity and resulting change in classification according to Soil Taxonomy is common through the Maritime Provinces and New England.

N A R R A T I V E P E D O N D E S C R I P T I O N

Pedon: Holmesville — NSSL Pedon Number: 87P0589
Soil Survey Number S87-FN-260-001 — Print Date: 08/20/02
Location: Canada
20 mi S into field 11 m from E edge of powerline, 5 km N of Grand Falls New Brunswick Canada.
Latitude: 47-06-04-N — Longitude: 067-43-46-W
Physiography: Hillside or mountainside in glaciated uplands
Geomorphic Position: backslope sideslope
Slope: 6% convex southeast facing — Elevation: 200 m MSL
Precipitation: 110 cm - Udic Moisture Regime.
Water Table Depth: — Permeability: Moderate
Air Temperature: Ann: 3.9 Summ: 17 Win: -11
Drainage: Moderately well drained — Land Use: Cropland
Stoniness: Class 1 Erosion or Deposition: Severe — Runoff: Moderate
Particle Size Control Section: 25 to 100 cm
Parent Material: glacial till from sedimentary material
Classification: Fine-loamy, mixed, frigid Typic Dystrochrept
Vegetation: CLOVER TIMOTH
Diagnostic Horizons: 0 to 21 cm Ochric, 21 to 30 cm Cambic
Described By: H. Rees, R. Rourke, C. Wang, J. Kimble, T. Cook — Sample Date: 06/87
Location Cont: About 20 m S into field from village Rd., .6 km W of intersection with Rd. from Grand Falls. Cultivated crops red clover, timothy, alsike clover, in crop rotation with potatoes.

Ap1 -- 0 to 10 cm; dark yellowish brown (10YR 4/4) crushed moist silt loam; strong very fine and fine granular structure; very friable, slightly sticky, slightly plastic; many very fine and few fine roots throughout; strongly acid (pH=5.0); 2 percent pebbles sedimentary rocks, 10 percent cobbles sedimentary rocks; abrupt wavy boundary. 2-5% gravel. 87P3099

Ap2 -- 10 to 21 cm; dark yellowish brown (10YR 4/4) crushed moist silt loam; weak fine and medium subangular blocky structure parting to moderate very fine and fine granular; , friable, slightly sticky, slightly plastic; common very fine and few fine roots throughout; few very fine discontinuous tubular pores; strongly acid (pH=5.0); 10 percent pebbles sedimentary rocks, 2 percent cobbles sedimentary rocks, 10 percent stones sedimentary rocks; abrupt wavy boundary. 5-10% gravel. 87P3100

Bw -- 21 to 30 cm; 80% yellowish brown (10YR 5/6) crushed and 20% dark yellowish brown (10YR 4/6) exterior moist gravelly loam; weak fine and medium subangular blocky structure; , friable, nonsticky, slightly plastic; few very fine roots throughout; few very fine discontinuous tubular pores; very few distinct clay films between sand grains; very strongly acid (pH=4.7); 25 percent pebbles sedimentary rocks, 5 percent cobbles sedimentary rocks, 1 percent stones sedimentary rocks; clear wavy boundary. 87P3101

BC -- 30 to 38 cm; light olive brown (2.5Y 5/4) crushed moist gravelly sandy loam; weak fine and medium angular blocky structure; , friable, nonsticky, nonplastic; few very fine roots throughout; many very fine and fine discontinuous tubular pores; very few distinct clay films between sand grains; very strongly acid (pH=4.5); 25 percent pebbles sedimentary rocks, 5 percent cobbles sedimentary rocks, 10 percent stones sedimentary rocks; clear wavy boundary. 87P3102

2C1 -- 38 to 67 cm; olive brown (2.5Y 4/4) crushed moist sandy loam; massive; , friable, nonsticky, nonplastic; many fine interstitial pores; very strongly acid (pH=4.5); 10 percent pebbles sedimentary rocks, 1 percent stones sedimentary rocks; gradual wavy boundary. 87P3103

3C2 -- 67 to 87 cm; olive brown (2.5Y 4/4) crushed moist gravelly loam; weak medium and coarse angular blocky structure; firm, slightly sticky, slightly plastic; many very fine and fine interstitial pores; many continuous faint clay films on sand and gravel and very few continuous faint clay films in root channels and/or pores; very strongly acid (pH=4.5); 15 percent pebbles sedimentary rocks, 5 percent cobbles sedimentary rocks, 1 percent stones sedimentary rocks. Also on clay skins all sand grains are thinly coated. 87P3104

The soil profile could very well have looked like the following had plowing not occurred. Imagine what the impact would be of plowing on a Spodosol with thin morphology. Please note that most of the Spodosols in New Brunswick Province do not have thick albic horizons as presented in this image.

*** P R I M A R Y C H A R A C T E R I Z A T I O N D A T A ***

S87FN-260-001 (CANADA)

PRINT DATE 08/20/02

SAMPLED AS : HOLMESVILLE ; COARSE-LOAMY, MIXED, FRIGID TYPIC DYSTROCHREPT
REVISED TO : ;

SSL - PROJECT 87P 129, (CP87FN194) NEW BRUNSWICK ISCOM-TOUR
- PEDON 87P 589, SAMPLES 87P 3099- 3104
- GENERAL METHODS 1B1A, 2A1, 2B

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
NATIONAL SOIL SURVEY CENTER
SOIL SURVEY LABORATORY
LINCOLN, NEBRASKA 68508-3866

-1-- -2-- -3-- -4-- -5-- -6-- -7-- -8-- -9-- -10- -11- -12- -13- -14- -15- -16- -17- -18- -19- -20-

SAMPLE NO.	DEPTH (CM)	HORIZON	TOTAL CLAY LT .002	TOTAL SILT .002 -.05	TOTAL SAND .05 -2	CLAY FINE LT .0002	CLAY CO3 LT .002	SILT FINE .002 -.02	SILT COARSE .02 -.05	SAND VF .05 -.10	SAND F .10 -.25	SAND M .25 -.50	SAND C .5 -1	SAND VC 1 -2	COARSE FRACTIONS(MM) WEIGHT 2 -5	5 -20	20 -75	>2MM .1- 75	WT PCT OF WHOLE SOIL
			<- - - - - - - - - - - - PCT OF <2MM (3A1) - - - - - - - - - - - - - ->												<- PCT OF <75MM(3B1)->				
87P3099S	0- 10	AP1	9.5	44.7	45.8	0.7		27.9	16.8	11.5	12.2	9.1	7.3	5.7	11	19	5	57	44
87P3100S	10- 21	AP2	11.2	43.0	45.8	--		28.1	14.9	10.5	11.0	8.3	7.9	8.1	9	22	6	59	48
87P3101S	21- 30	BW	7.6	41.5	50.9	--		25.9	15.6	12.1	13.4	9.2	8.3	7.9	11	20	9	63	45
87P3102S	30- 38	BC	6.9	32.5	60.6	--		21.6	10.9	15.1	17.8	10.8	7.7	9.2	7	14	8	61	43
87P3103S	38- 67	2C1	6.6	22.6	70.8	0.5		14.5	8.1	16.7	26.2	14.3	7.8	5.8	7	18	7	69	42
87P3104S	67- 87	3C2	11.5	35.1	53.4	2.2		22.0	13.1	16.2	16.2	9.2	6.7	5.1	8	20	14	64	47

DEPTH (CM)	ORGN C 6A1c PCT	TOTAL N 6B3a <2MM	EXTR P 6S3 PPM	TOTAL S 6R3a	EXTRACTABLE FE 6C2b	AL 6G7a	MN 6D2a	CEC 8D1	15 BAR 8D1	ATTERBERG LIMITS LL 4F1	PI 4F	BULK DENSITY FIELD MOIST 4A3a	1/3 BAR 4A1d	OVEN DRY 4A1h	COLE WHOLE SOIL 4D1	WATER CONTENT FIELD MOIST 4B4	1/10 BAR 4B1c	1/3 BAR 4B1c	15 BAR 4B2b	WRD WHOLE SOIL 4C1
	PCT	<2MM	PPM	<- PERCENT	OF <2MM -->					PCT <0.4MM		<- - G/CC - - ->			CM/CM	<- - -PCT OF <2MM - ->				CM/CM
0- 10	2.00	0.171		1.4	0.5	TR	1.26	0.91											7.5	
10- 21	1.80	0.152		1.4	0.5	0.1	1.03	0.81				1.32	1.38	0.011		28.7	25.7	7.1	0.17	
21- 30	0.95	0.078		0.9	0.4	TR	0.84	1.04				1.39	1.41	0.004			21.5	5.0	0.14	
30- 38	0.37			0.8	0.2	TR	0.54	0.70				1.74	1.74	--			15.1	3.2	0.14	
38- 67	0.14			0.8	0.1	0.1	0.44	0.92				1.65	1.65	--			12.8	3.2	0.09	
67- 87	0.15			1.2	0.1	0.1	0.36	0.52				1.59	1.60	0.001			17.7	4.5	0.13	

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USDA-NRCS-NSSC-SOIL SURVEY LABORATORY ; PEDON 87P 589, SAMPLE 87P 3099- 3104

	-1--	-2--	-3--	-4--	-5--	-6--	-7--	-8--	-9--	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-	-18-	-19-	-20-
	(- NH4OAC EXTRACTABLE BASES -)					ACID- ITY	EXTR AL	(- - - -CEC - - -) SUM	NH4- OAC	BASES + AL	AL SAT	-BASE SAT- SUM	NH4 OAC	CO3 AS CACO3 <2MM	RES. OHMS /CM		COND. MMHOS /CM	(- - - -PH - - -) NAF	CACL2 .01M	H2O
DEPTH (CM)	CA 5B5a 6N2e	MG 5B5a 6O2d	NA 5B5a 6P2b	K 5B5a 6Q2b	SUM BASES	6H5a	6G9b	CATS 5A3a	5A8b	5A3b	5G1	5C3	5C1	6E1g	8E1		8I	8C1d	8C1f 1:2	8C1f 1:1
	<- - - - - - - - - - -MEQ /					100 G - - - - - - - - - - - ->					<- - - - -PCT - - - ->									
0- 10	5.6	0.6	0.1	0.1	6.4	12.3		18.7	12.0			34	53					10.5	5.3	5.7
10- 21	4.0	0.4	--	0.1	4.5	23.7	0.5	28.2	11.5	5.0	10	16	39					10.7	5.1	5.5
21- 30	0.8	0.2	TR	TR	1.0	9.9	0.8	10.9	6.4	1.8	44	9	16					10.9	4.9	5.5
30- 38	0.4	0.1	0.1	TR	0.6	4.9	0.4	5.5	3.7	1.0	40	11	16					10.6	4.9	5.5
38- 67	0.4	0.1	--	TR	0.5	3.4	0.4	3.9	2.9	0.9	44	13	17					9.9	4.7	5.3
67- 87	1.5	0.3	0.1	TR	1.9	3.4	0.4	5.3	4.1	2.3	17	36	46					9.3	4.6	5.2

	(- -NA PYROPHOSPHATE EXTRACTABLE- -)					(- -)
	C	FE	AL	FE+AL	FE+AL	AL+C	INDEX OF
DEPTH (CM)	6A4a	6C8a	6G10	(- -DIVIDED BY- -) DI-CI FE+AL	PCT CLAY	PCT CLAY	ACCUM
	<- PCT OF <2MM ->						
0- 10		0.5	0.4	0.5	0.1		

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SAMPLE NUMBER	FRACTION	-1- X-RAY 7A2i peak size	-2- X-RAY	-3- X-RAY	-4- X-RAY	-5- X-RAY	-6- THERMAL DTA	-7- THERMAL TGA	-8- THERMAL 7A6	-9- THERMAL 7A4b	-10- ELEMENTAL SiO2	-11- ELEMENTAL AL2O3	-12- ELEMENTAL Fe2O3	-13- ELEMENTAL MgO	-14- ELEMENTAL CaO	-15- ELEMENTAL K2O	-16- ELEMENTAL Na2O	-17- CLAY MINERALOGY (<.002mm) 7C3 Percent	-18- RETN	-19- PRETA 7D2	-20- INTER TION
87P3099	TCLY	KK 2	VR 2	CL 2	MI 2								8.0					1.7			
87P3101	TCLY	KK 2	VR 1	CL 1	MI 1								6.0					2.7			

FRACTION INTERPRETATION:

TCLY Total Clay, <0.002mm

MINERAL INTERPRETATION:

KK kaolinite VR vermiculite CL chlorite MI mica

RELATIVE PEAK SIZE: 5 Very Large 4 Large 3 Medium 2 Small 1 Very Small 6 No Peaks

INTERPRETATION (BY HORIZON):

PEDON MINERALOGY
BASED ON SAND/SILT:
BASED ON CLAY:
FAMILY MINERALOGY:
COMMENTS:

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		-1--	-2--	-3--	-4--	-5--	-6--	-7--	-8--	-9--	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-	-18-	-19-	-20-
		ACID OPT DEN	OXALATE FE	EXTRACTION SI	AL	PHOSPHOUS RET	CIT-ACID	KCL MN	TOTAL C	(- -WATER 0.06 BAR	1- BAR	CONTENT- - 2- BAR	15 BAR	)(- - - - WATER DISPERSIBLE - - - -) <- - PIPETTE - - >< - HYDROMETER - > CLAY	SILT	SAND	CLAY	SILT	SAND	MIN SOIL CONT	AGGRT STABL <5mm
SAMPLE NO.	HZ NO	8J	6C9a	6V2	6G12	6S4	6S5	6D3	6A2d	4B1c	4B1a	4B1a	4B2b	<- - - 3A1c	- - ->	<- - - SML	- - ->	8F1	4G1		
			<- P C T o f < 2 m m ->				<- P P M ->		< - - - - - - - - - - - - P E R C E N T o f < 2 m m - - - - - - - - >											<20mm>	< PCT>
87P3099	1	0.19	0.72	0.06	0.49	56			2.00				8.6								41
87P3100	2	0.18	0.73	0.07	0.53	58			1.88	28.7			9.1								38
87P3101	3	0.11	0.29	0.11	0.57	60			1.01				7.9								58
87P3102	4	0.05	0.14	0.06	0.29	36			0.40				4.8								23
87P3103	5	0.03	0.12	0.02	0.13	31			0.15				6.1								18
87P3104	6	0.03	0.18	0.01	0.07	18			0.13				6.0								12