Appendix 5 – Results of the soil laboratory analysis

This appendix presents the results of the laboratory analysis of the soils that were sampled in Dedoplistskaro municipality during spring of 2016. The differences in soil characteristics between Site 1 and 2 are described in section 3.5.2 in the report. Findings from the remaining sites are described below.

TABLE A5.1

Site 1

Current usage: Arable
Crop: Winter barley
Plot size: 10 ha
Management practice: No burns of crop residues (at least last 3 years);
Crop residues incorporation to soil after harvest: Yes
Use of synthetic fertilizer: No (at least last 3 years)

Parameter	Result of Analysis
pH (in water extract)	8.22
Calcium carbonate (%)	0.75
Organic matter (%)	3.84
Loss of organic matter at 150°C (%)	0.27
Loss of organic matter at 250°C (%)	2.28
Nitrogen (N) % (total)	0.11
Phosphorous (P2O5) % (total)	0.07
Potassium (K2O) % (total)	0.62
Exchangeable Calcium (Ca) mg.eq./100 g	45.17
Exchangeable Magnesium (Mg) mg.eq./100 g	6.57
Exchangeable Sodium (Na) mg.eq./100 g	0.38
Bulk density g/cm3	0.96
Hygroscopic water (%)	6.38

Particle size distribution* (%)	fraction (mm)						
	1-0.25	0.25-0.05	0.05-0.01	0.01-0.005	0.005-0.001	<0.001	<0.01
	0	2	20	8	17	53	78

** based on physical clay fraction content (<0.01 mm) soil texture is medium clay (physical clay content 75–85 %)*

TABLE A5.2

Site 2

Current usage: Arable
Crop: Winter wheat
Plot size: 15 ha
Management practice: annual burn of crops residues (at least last 3 years);
Crop residues incorporation to soil after harvest: No
Use of synthetic fertilizer: Yes (at least last 3 years)

Parameter	Result of Analysis
pH (in water extract)	7.87
Calcium carbonate (%)	0.00
Organic matter (%)	3.13
Loss of organic matter at 150°C (%)	0.18
Loss of organic matter at 250°C (%)	2.28
Nitrogen (N) % (total)	0.11
Phosphorous (P2O5) % (total)	0.08
Potassium (K2O) % (total)	0.64
Exchangeable Calcium (Ca) mg.eq./100 g	47.01
Exchangeable Magnesium (Mg) mg.eq./100 g	8.15
Exchangeable Sodium (Na) mg.eq./100 g	0.37
Bulk density g/cm3	1.09
Hygroscopic water (%)	6.38

Particle size distribution* (%)	fraction (mm)						
	1-0.25	0.25-0.05	0.05-0.01	0.01-0.005	0.005-0.001	<0.001	<0.01
	0	3	17	10	17	53	80

** based on physical clay fraction content (<0.01 mm) soil texture is medium clay (physical clay content 75–85 %)*

TABLE A5.3

Site 3

Current usage: Windbreak

Current status: burned in 2015;

Parameter	Result of Analysis
pH (in water extract)	8.19
Calcium carbonate (%)	0.38
Organic matter (%)	4.70
Loss of organic matter at 150°C (%)	0.14
Loss of organic matter at 250°C (%)	3.42
Nitrogen (N) % (total)	0.09
Phosphorous (P2O5) % (total)	0.09
Potassium (K2O) % (total)	0.65
Exchangeable Calcium (Ca) mg.eq./100 g	51.45
Exchangeable Magnesium (Mg) mg.eq./100 g	6.43
Exchangeable Sodium (Na) mg.eq./100 g	0.35
Bulk density g/cm3	0.91
Hygroscopic water (%)	6.61

Particle size distribution* (%)	fraction (mm)						
	1-0.25	0.25-0.05	0.05-0.01	0.01-0.005	0.005-0.001	<0.001	<0.01
	0	7	18	9	17	49	75

** based on physical clay fraction content (<0.01 mm) soil texture is medium clay (physical clay content 75–85 %)*

TABLE A5.4

Site 4

Current usage: Arable
Crop: Winter barley
Plot size: 6 ha
Management practice: No burns of crop residues (at least last 2 years);
Crop residues incorporation to soil after harvest: No
Use of synthetic fertilizer: No (at least last 2 years)

Parameter	Result of Analysis
pH (in water extract)	7.95
Calcium carbonate (%)	0.76
Organic matter (%)	3.49
Loss of organic matter at 150°C (%)	0.00
Loss of organic matter at 250°C (%)	2.83
Nitrogen (N) % (total)	0.10
Phosphorous (P2O5) % (total)	0.07
Potassium (K2O) % (total)	0.40
Exchangeable Calcium (Ca) mg.eq./100 g	45.66
Exchangeable Magnesium (Mg) mg.eq./100 g	5.98
Exchangeable Sodium (Na) mg.eq./100 g	0.47
Bulk density g/cm3	0.81
Hygroscopic water (%)	7.07

Particle size distribution* (%)	fraction (mm)						
	1-0.25	0.25-0.05	0.05-0.01	0.01-0.005	0.005-0.001	<0.001	<0.01
	0	2	17	9	19	53	81

** based on physical clay fraction content (<0.01 mm) soil texture is medium clay (physical clay content 75–85 %)*

TABLE A5.5

Site 5

Current usage: Windbreak

Current status: unburned

Parameter	Result of Analysis
pH (in water extract)	8.18
Calcium carbonate (%)	1.89
Organic matter (%)	4.80
Loss of organic matter at 150°C (%)	0.09
Loss of organic matter at 250°C (%)	3.81
Nitrogen (N) % (total)	0.09
Phosphorous (P2O5) % (total)	0.08
Potassium (K2O) % (total)	0.37
Exchangeable Calcium (Ca) mg.eq./100 g	67.36
Exchangeable Magnesium (Mg) mg.eq./100 g	5.63
Exchangeable Sodium (Na) mg.eq./100 g	0.37
Bulk density g/cm3	0.82
Hygroscopic water (%)	6.84

Particle size distribution* (%)	fraction (mm)						
	1-0.25	0.25-0.05	0.05-0.01	0.01-0.005	0.005-0.001	<0.001	<0.01
	0	3	15	9	21	52	82

** based on physical clay fraction content (<0.01 mm) soil texture is medium clay (physical clay content 75–85 %)*

TABLE A5.6

Site 6

Current usage: Arable
Crop: No winter cereals were sown during sampling
Plot size: 50 ha
Management practice: No burns of crop residues (at least last 5 years), burned accidentally in 2015;
Crop residues incorporation to soil after harvest: Yes
Use of synthetic fertilizer: Yes (at least last 5 years)

Parameter	Result of Analysis
pH (in water extract)	8.43
Calcium carbonate (%)	1.89
Organic matter (%)	3.25
Loss of organic matter at 150°C (%)	0.25
Loss of organic matter at 250°C (%)	2.45
Nitrogen (N) % (total)	0.14
Phosphorous (P2O5) % (total)	0.08
Potassium (K2O) % (total)	0.34
Exchangeable Calcium (Ca) mg.eq./100 g	52.62
Exchangeable Magnesium (Mg) mg.eq./100 g	4.28
Exchangeable Sodium (Na) mg.eq./100 g	0.37
Bulk density g/cm3	0.95
Hygroscopic water (%)	5.93

Particle size distribution* (%)	fraction (mm)						
	1-0.25	0.25-0.05	0.05-0.01	0.01-0.005	0.005-0.001	<0.001	<0.01
	0	5	20	10	20	45	75

** based on physical clay fraction content (<0.01 mm) soil texture is medium clay (physical clay content 75–85 %)*

TABLE A5.7

Site 7

Current usage: Arable
Crop: Winter wheat
Plot size: 100 ha
Management practice: No burns of crop residues (at least last 2 years), burned accidentally in 2015;
Crop residues incorporation to soil after harvest: Yes
Use of synthetic fertilizer: Yes (at least last 2 years)

Parameter	Result of Analysis						
pH (in water extract)	8.19						
Calcium carbonate (%)	3.75						
Organic matter (%)	2.66						
Loss of organic matter at 150°C (%)	0.00						
Loss of organic matter at 250°C (%)	2.39						
Nitrogen (N) % (total)	0.11						
Phosphorous (P2O5) % (total)	0.07						
Potassium (K2O) % (total)	0.50						
Exchangeable Calcium (Ca) mg.eq./100 g	51.94						
Exchangeable Magnesium (Mg) mg.eq./100 g	4.09						
Exchangeable Sodium (Na) mg.eq./100 g	0.41						
Bulk density g/cm3	0.99						
Hygroscopic water (%)	6.16						
Particle size distribution* (%)	fraction (mm)						
	1-0.25	0.25-0.05	0.05-0.01	0.01-0.005	0.005-0.001	<0.001	<0.01
	0	5	17	9	22	47	78

** based on physical clay fraction content (<0.01 mm) soil texture is medium clay (physical clay content 75–85 %)*

TABLE A5.8

Site 8

Current usage: Arable
Crop: Winter wheat
Plot size: 52 ha
Management practice: No burns of crop residues (at least last 5 years), burned accidentally in 2015;
Crop residues incorporation to soil after harvest: Yes
Use of synthetic fertilizer: Yes (at least last 5 years)

Parameter	Result of Analysis
pH (in water extract)	8.04
Calcium carbonate (%)	0.38
Organic matter (%)	3.27
Loss of organic matter at 150°C (%)	0.26
Loss of organic matter at 250°C (%)	2.37
Nitrogen (N) % (total)	0.11
Phosphorous (P2O5) % (total)	0.14
Potassium (K2O) % (total)	0.46
Exchangeable Calcium (Ca) mg.eq./100 g	45.25
Exchangeable Magnesium (Mg) mg.eq./100 g	8.37
Exchangeable Sodium (Na) mg.eq./100 g	0.38
Bulk density g/cm3	0.99
Hygroscopic water (%)	6.61

Particle size distribution* (%)	fraction (mm)						
	1-0.25	0.25-0.05	0.05-0.01	0.01-0.005	0.005-0.001	<0.001	<0.01
	0	1	17	11	16	55	82

** based on physical clay fraction content (<0.01 mm) soil texture is medium clay (physical clay content 75–85 %)*

TABLE A5.9

Site 9

Current usage: Arable
Crop: Winter barley
Plot size: 13 ha
Management practice: No burns of crop residues (at least last 5 years), burned accidentally in 2015;
Crop residues incorporation to soil after harvest: Yes
Use of synthetic fertilizer: Yes (at least last 5 years)

Parameter	Result of Analysis
pH (in water extract)	8.12
Calcium carbonate (%)	6.38
Organic matter (%)	3.01
Loss of organic matter at 150°C (%)	0.26
Loss of organic matter at 250°C (%)	2.45
Nitrogen (N) % (total)	0.08
Phosphorous (P2O5) % (total)	0.14
Potassium (K2O) % (total)	0.60
Exchangeable Calcium (Ca) mg.eq./100 g	50.65
Exchangeable Magnesium (Mg) mg.eq./100 g	4.26
Exchangeable Sodium (Na) mg.eq./100 g	0.34
Bulk density g/cm3	0.97
Hygroscopic water (%)	6.16

Particle size distribution* (%)	fraction (mm)						
	1-0.25	0.25-0.05	0.05-0.01	0.01-0.005	0.005-0.001	<0.001	<0.01
	0	1	17	12	21	49	82

** based on physical clay fraction content (<0.01 mm) soil texture is medium clay (physical clay content 75–85 %)*

A5.1 Comparative analysis of soil characteristics amongst site 3–9

Unlike Site 1 and 2, Site 3 and Site 5 represents the windbreak areas and therefore cannot be compared to these. Site 3 was totally burned in 2015 and Site 5 was remained unaffected. Organic matter content on Site 3 is slightly lower (by 0.1%), than on Site 5, which might be result of the fire, but such small differences can be caused by non-homogeneity of soil too. Site 3 and Site 5 more differs by their bulk density, where Site 3 has higher value, which might be caused by burning of fresh organic matter and plant residues.

Site 4 is an arable land unaffected by fire, which shows higher organic matter content compared to other arable lands (Site 2, Site 6, Site 7, Site 8, Site 9) except Site 1, and has lower bulk density than any other arable land.

Site 6, Site 7, Site 8 and Site 9 have similar management practice with no burns and incorporation of residues after harvest, but all of them were accidentally burned in 2015. They show a lower organic matter content compared to Site 1, which can be influenced by fire, but also by other factors. Bulk density of the soils from these sites are very similar and vary between 0.95-0.99 g/cm^3 and fall in the same range as for Site 1 (0.96 g/cm^3).