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Investigation of organic matter status as an important indicator of anthropogenic impact for the estimation of *Terric Histosol* quality

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Experiments were conducted at the Radviliškis Experimental Station on *Terric Histosol* with a non-removed and removed peat layer. The following item were investigated: unused peat bog, unfertilised perennial grasses, $P_{60}K_{120}$ and $N_{120}P_{60}K_{120}$ fertilised perennial grasses, red clover (*Trifolium pratense* L.) and timothy (*Phleum pratense* L.) mixture and crop rotation field (potatoes, winter rye, red clover). Detailed studies of organic matter status in *Terric Histosol* were carried out in 1998–2001. Organic matter (OM) composition was found to be different in peat bogs with a removed and with a non-removed peat layer. Averaged data from four experimental years suggest that the *Terric Histosol* with a non-removed peat layer contained more organic carbon (337.2–346.1 g kg^{-1}), compared with the *Terric Histosol* with a removed peat layer (321.5–332.3 g kg^{-1}). Organic carbon (C_{org}) content compared with that in an unused peat bog tended to decline mostly in the crop rotation field. Averaged data indicate that the content of C_{org} was by 1.9% lower than in the peat bog with a non-removed peat layer and in the peat bog with a removed peat layer by 2.6% lower than in an unused peat bog. Higher contents of organic matter extracted in sodium hydroxide solutions, as well as a higher content of humic acids, were identified in the peat soil with a non-removed layer. Lower contents of humic acids were identified in the crop rotation field compared with the soil under grasses and unused peaty soil. A relationship (r = 0.679–0.771) was found between the SOM and soluble OM contents in the soil and the activity of enzymes (urease, invertase). This relationship is described by linear regression equations. In order to conserve and accumulate organic matter in drained peat bogs, field crops should not be grown in a crop rotation; instead, it is most expedient to cultivate perennial grasses or to leave natural meadow and utilise them not intensively.

Key words: *Terric Histosol*, meadow, crop rotation, NPK, organic matter, soil quality, anthropogenic impact

INTRODUCTION

The problem of evaluation of the reserves and balance of carbon in various components of ecosystems and in the biosphere as a whole is primarily related to the growing concern of scientists about the possibility of global warming of the climate of the Earth (Rojkov et al., 2002). Ecosystems of wetlands and peat bogs are one of the larger organic carbon reserves. Organic carbon is the main component of soil organic matter. Soil organic matter (SOM) is considered as one of the main indicators of soil fertility, cultivation level as well soil resistance to the negative anthropogenic and natural factors. The chief main human activities determining changes in the ecosystems of peaty soils, their chemical properties, including organic matter characteristics, are drainage, peat layer removal, utilisation of such soils for agricultural production, tillage, and fertilisation. There are numerous findings on the dynamics of SOM status in mineral soils, however, there are not enough data on the status of organic matter in peat bog soils, i.e. in sensitive and rapidly changing ecosystems (Aro et al., 2004; Glatzel et al., 2003; Garnier-Sillam et al., 1999; Janušienė, Šleinys, 2003; Ivleva, Shimko, 2002, Maryganova et al, 2004). There is little experimental evidence to be used for the assessment of peat bog ecosystems, especially for the determination of the effects of different management of peat bogs in Lithuania, although bog soils cover an area of

578 thousand hectares, i.e. 6–7% of the total territory (Janušienė, Šleinys, 2003). Peat bog soils account for 2/3 of bog soils. The Radviliškis bog corresponds to boggy soils prevalent in the country (Bilevičius, Puodžiukynas, 1969; Mikutėnas, 1996). The botanical composition, physical and agrochemical properties of drained and cultivated peat bogs make it possible to grow various agricultural crops under relatively favourable conditions (Maþvila, 1998). The intensity of organic matter decomposition is greatly affected by the factors of anthropogenic activity: degree of draining, soil tillage and fertilisation (Brunienė, Puodžiukynas, 1992; Szajdak et al., 2002). The changes occur most rapidly in well-drained, intensively tilled soil. The more peat soil is turned and loosened, the better breakdown by microorganisms is achieved (Jankevičienė et al., 1995). Owing to intensive mineralization, the peat layer can decrease by up to 5 cm per year. As a result, apart from agronomic objectives to use peat bogs for agricultural production, there is another relevant goal to protect this soil from decomposition. Perennial grasses are believed to be able to reduce OM decomposition, since they partly restore OM by leaving a great root content and stubble. Some researchers recommend establishing long-term grasslands, which, if properly managed, could produce a high herbage yield (Барсуков, 1998; Szabo et al., 1999; De Visser et al., 2001), however, OM transformation depends on the composition of individual swards and their management. Bog soils are conserved organic matter whose quality depends on the plants from which peat was formed (Bambalov, Belen'kaja, 1998).

In order to develop predictive models that work over time-scales, we need a better understanding of feedback mechanisms among hydrology, community composition, and organic matter accumulation in peatlands (Bauer, 2004). Soil organic matter is considered to be one of the main indicators of soil fertility, cultivation level and soil resistance to the negative anthropogenous and natural factors, it serves in providing soil with nutrients, adds to their conservation, determines the soil potential properties. Humic substances in the soil are traditionally defined according to their solubility (Александрова, 1980; Orlov, 1990). Various solutions are used for organic matter extraction in peat soils: from "mild" extraction by water or 5% sodium carbonate solution after decalcination to alkalis (0.02 mol L^{-1} NaOH by heating at 80 ^{0}C) (Ефимов, Василькова, 1970; Пономарева, Николаева, 1961). Among the extraction methods, solution of 0.1 mol L^{-1} NaOH occupies an intermediate position; the extraction is done at room temperature. At standard extraction, the ratio of peat to solution is 1:100, extraction time is 20 hours. The extractant conventionally used for extraction of humic substances from soil samples is NaOH solution, which is also the most efficient one. The fractional and group composition of organic matter in peat soils of long-term agricultural experiments at the Polesie, Minsk, Ivantsevich, and Sarny experimental stations was studied. It was shown that the group composition of organic matter in reclaimed peat soils mainly depended on the geobotanic nature of peat and varied slightly during agricultural use. The fractional composition of humic acids changed considerably. Soils were enriched with a biochemically stable fraction extracted with sodium pyrophosphate and were depleted of a biochemically less stable fraction additionally extracted with alkali (Bambalov, Belen'kaya, 1997).

The aim of this work was to estimate the status of organic matter in peat bog soils both with the removed and non-removed peat layer by growing annual and perennial plants in a crop rotation, as well as to identify the means allowing maximal conservation and maintenance of soil quality parameters in an ecologically sensitive ecosystem.

MATERIALS AND METHODS

Experimental site and conditions. Field experiments were conducted at the Radviliðkis Experimental Station in 1995 in a peat bog with the removed and non-removed peat layer *(Terric Histosol)* lying 120 m above the sea level (55°45´N, 23°30´E) (Эрингис, 1964). The Radviliðkis peat bog, whose eastern edge borders the Radviliškis town (Fig.1), covers an area of 1203 ha. The Radviliškis bog formed at the source of the Beržė river.

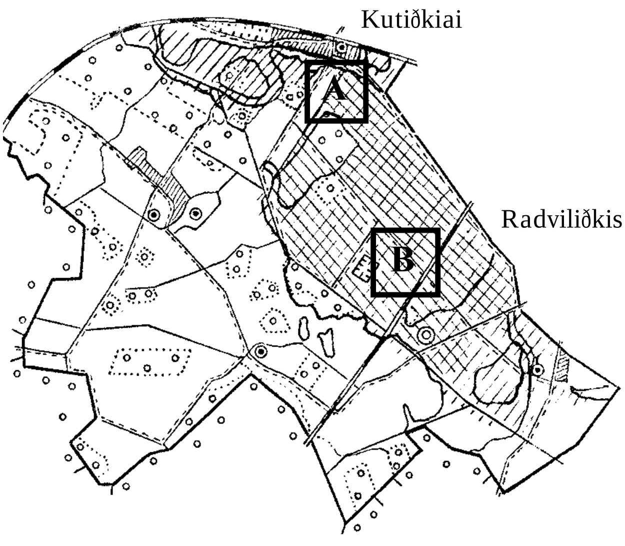

Fig. 1. A – non-removed peat bog; B – removed peat bog; ° ° ° – forest

The drainage of the bog was started in 1905 after digging a bank channel which was deepened several times in the course of time. The Radviliðkis Experimental Station was set up at the edge of the peat bog in 1936. Peat digging for fuel was begun in 1938. The peat was dug especially intensively in 1954–1966 when 85% of peat was removed. The peat bog was drained by a closed drainage. The thickness of the peat layer was on average 1.95 m, the thickest peat layer being 3.4 m, and in the treatment with removed peat layer 0.3–0.4 m. Sand lies under peat. Currently the peat is not dug for fuel. After removal of the peat layer the peat bog was drained by a closed drainage and sown over with perennial grasses. The peat in the peat bog with the non-removed layer was well decomposed (40%) and in that with the removed layer medium decomposed (27–30%). Prior to the trial, there was grassland on both parts of the peat bog (with both the removed and non-removed peat layer). The experimental sites were ploughed and rototilled. At the trial establishment, the peat bog with both the removed and non-removed peat layer had the pH_{KCl} value of 5.5–5.6 and 6.2–6.5, mobile P_2O_5 89–140 and 79–138 mg kg^{-1}, and K_2O 90–120 and 101–112 mg kg^{-1} soil, respectively (Petraitytė et al., 2003).

The following items were investigated: unused peat bog (before the trial establishment the peat bog had been tilled, then was left unsown, and grassland formed naturally later) (treatment 1); unfertilised perennial grasses (timothy, meadow fescue and upright brome) (treatment 2); crop rotation field (potatoes, winter rye, red clover) (treatment 3); red clover (*Trifolium pratense* L.) and timothy (*Phleum pratense* L.) mixture (treatment 4); $P_{60}K_{120}$ and $N_{120}P_{60}K_{120}$ applied grasses (treatment 5). Treatment 1 was tilled but was left unsown, and grassland formed naturally later. Detailed studies of organic matter in a peat bog were conducted during 1998–2001. Every year, for treatments 3 and 4 $P_{60}K_{120}$ (non-removed peat bog) and $N_{120}P_{60}K_{120}$ (removed peat bog) were applied.

Chemical analysis. For chemical analyses we used soil samples taken at a depth of 0–20 cm in the autumns of 1998– 2001. The soil samples were air-dried, ground, and sieved using a 0.25 mm sieve. Chemical analyses were carried out at the LIA Analytical Laboratory. Organic carbon was determined by the dichromatic Tyurin method, and organic matter content by the loss on ignition method (LOI). For determination of mobile humic substances, the extraction procedure was provided using 0.1 mol L^{-1} NaOH solution. A mixture of 0.6 g of soil and 60 mL 0.1 mol L^{-1} NaOH solution was periodically shaken at ambient temperature. 20 h later to suspension 10 mL Na_2SO_4 (saturated) was added and the soil was separated by centrifugation at 3850 rpm. In order to precipitate humic acids to 20 mL of solution, 1.0 mol L^{-1} of sulphuric acid was added up to pH 1.3–1.5 and warmed at a temperature of 68–70 °C. The precipitated humic acids were filtered and washed several times with 0.01 mol L^{-1} H_2SO_4 solution. Then the humic acids were re-dissolved using 0.1 mol L^{-1} NaOH solution. Solution of humic acids was evaporated in Erlenmeyer flasks. The wet combustion method of Tyurin measures organic carbon content according to the modified Tyurin dichromate approach using wet combustion (Никитин, 1999). 5 mL of chromous mixture was added for oxidation procedure, combusted by the so-called 'wet chemistry method' for 0.5 h at 160 °C. Some solutions of each fraction were evaporated, oxidized and organic carbon content was determined.

The resultant data were analysed by analysis of variance (ANOVA for EXCEL (vers. 3.42) and modified STAT_ENG for EXCEL (vers. 1.55) (Tarakanovas, 2002).

RESULTS AND DISCUSSION

The rational use of peat soils is aimed to achieve an effective productivity of agricultural crops grown in

Table 1. **Organic carbon content (g kg^{-1}) in differently used *Terric Histosol* with the non-removed peat layer. Radviliškis, 1998–2001**

Treatment	1998	1999	2000	2001	Average 1998–2001	% from check
*Unused **	330.1	353.7	356.9	343.8	346.1 ± 6.0	100
Unfertilised grasses	332.1	354.7	352.1	337.8	344.2 ± 5.5	100.2
Crop rotation field	331.3	349.7	336.6	331.4	337.2 ± 4.3	98.1
Red clover and timothy mixture	331.4	348.7	351.1	347.3	344.6 ± 4.5	101.4
NPK fertilised grasses	328.3	348.8	354.4	353.0	346.1 ± 6.1	100.7

*– natural meadow.

Table 2. **Organic carbon content (g kg^{-1}) in differently used *Terric Histosol* with removed peat layer. Radviliškis, 1998–2001**

Treatment	1998	1999	2000	2001	Average 1998–2001	% from check
*Unused **	320.7	320.5	343.8	335.9	330.2 ± 5.8	100
Unfertilised grasses	323.0	323.8	337.8	312.4	324.2 ± 5.2	98.2
Crop rotation field	320.7	309.0	331.4	324.9	321.5 ± 4.7	97.4
Red clover and timothy mixture	322.7	319.9	347.3	324.9	328.7 ± 6.3	99.5
NPK fertilised grasses	313.9	318.4	353.0	344.0	332.3 ± 9.6	100.6

*– natural meadow.

Table 3. **OM content (C g kg^{-1}) extracted with sodium hydroxyde solution in differently used *Terric Histosol* with the non-removed peat layer Radviliškis, 1998–2001**

Treatment	1998	1999	2000	2001	Average 1998–2001	% from check
Unused *	77.2	89.7	92.4	97.9	89.3 ± 4.4	100
Unfertilised grasses	81.5	89.4	95.2	101.6	91.9 ± 4.3	102.9
Crop rotation field	79.6	91.6	94.2	102.5	92.0 ± 4.7	103.0
Red clover and timothy mixture	80.9	92.9	97.0	102.5	93.3 ± 4.6	104.4
NPK fertilised grasses	81.4	91.6	90.6	104.7	92.1 ± 4.8	103.1

*– natural meadow.

Table 4. **OM content (C g kg^{-1}) extracted with sodium hydoxyde solution in differently used *Terric Histosol* with the removed peat layer. Radviliškis, 1998–2001**

Treatment	1998	1999	2000	2001	Average 1998–2001	% from check
Unused *	68.0	53.7	44.3	49.6	53.9 ± 5.1	100
Unfertilised grasses	67.4	49.0	38.0	42.3	49.2 ± 6.5	91.3
Crop rotation field	65.2	52.9	35.7	45.9	49.9 ± 6.2	92.5
Red clover and timothy mixture	66.5	54.2	41.2	45.9	52.0 ± 5.5	96.5
NPK fertilised grasses	62.2	51.8	43.0	53.3	52.6 ± 3.9	97.6

*– natural meadow.

Table 5. **Humic acids (C g kg^{-1}) determined in sodium hydroxide solution in differently used *Terric Histosol* with the non-removed peat layer. Radviliškis, 1998–2001**

Treatment	1998	1999	2000	2001	Average 1998–2001	% from check
Unused *	41.5	44.5	48.0	54.4	47.1 ± 2.8	100
Unfertilised grasses	44.3	48.7	49.0	53.5	48.9 ± 1.9	103.8
Crop rotation field	43.1	46.9	49.9	53.5	48.4 ± 2.2	102.8
Red clover and timothy mixture	43.0	48.2	53.5	53.5	49.6 ± 2.5	105.3
NPK fertilised grasses	42.7	47.8	46.2	56.5	48.3 ± 2.9	102.5

*– natural meadow.

Table 6. **Humic acids (C g kg^{-1}) determined in sodium hydroxide solution in differently used *Terric Histosol* the removed peat layer Radviliškis, 1998–2001**

Treatment	1998	1999	2000	2001	Average 1998–2001	% from check
Unused *	33.4	28.3	23.5	28.9	28.5 ± 2.0	100
Unfertilised grasses	34.6	25.7	19.9	24.4	26.2 ± 3.1	91.9
Crop rotation field	31.5	27.4	18.8	22.5	25.1 ± 2.8	88.1
Red clover and timothy mixture	33.5	27.8	22.4	26.2	27.5 ± 2.3	96.5
NPK fertilised grasses	29.9	31.3	23.3	30.8	28.8 ± 1.9	101.1

*– natural meadow.

such soils, and maximal organic matter conservation is impossible without the knowledge of OM transformation processes occurring in the soil. Data provided in Tables 1 and 2 suggest that the peat bog with the non-removed peat layer contained more organic carbon (337.2–346.1 g kg^{-1}) compared with the peat bog with the removed peat layer (321.5–332.3 g kg^{-1}). Organic carbon content compared with that in an unused peat bog tended to decrease mostly in the crop rotation field. In the peat bog with the non-removed peat layer, according to the averaged data of four years, it was by 1.9% and in the peat bog with the removed peat layer by 2.6% lower than in a natural meadow. A balanced mineral fertilisation of grasses maintained organic carbon content or tended to increase it (0.7% in a peat bog with non-removed layer, 0.6% in the peat bog with the removed peat layer) due to a larger amount of plant residues left, since the highest plant yield was obtained in this treatment (Petraitytė et al., 2003). During the experimental period, the pH of the peat bog varied insignificantly; in the peat bog with the non-removed peat layer the average pH_{KCl} was 5.6 and in the peat bog with the removed peat layer 6.3. The differences in soil acidity influenced organic matter composition. Higher peat bog acidity increased OM mobility, i.e. in the peat bog with the non-removed peat layer (with a lower pH) a higher content of soluble organic matter was identified compared with the peat bog with the removed peat layer (a higher pH value). It has been found that high mobility is specific of organic matter composition, especially in the peat bog with the non-removed peat layer, which was influenced by soil acidity. Compared with a natural meadow, all agricultural practices tested increased the content of OM dissolved in sodium hydroxide from 2.9 to 4.4% and in the peat bog with the removed peat layer from 3.4 to 8.7% (Tables 3 and 4).

Humic acids extracted with sodium hydroxide concentrations decreased during the four-year period on average to 25.1 g kg^{-1} compared to unused *Terric Histosol* (28.5 g kg^{-1}) (Tables 5 and 6). A decrease in humic acid content was observed in *Terric Histosol* with the removed layer in the crop rotation ecosystem. The same trend was noticed for soluble organic matter; its content was higher in the peat bog with the non-removed peat layer, and the agricultural use of the peat bog increased the content of humic acids extracted by sodium hydroxide solution, compared to the unused peat bog (meadow), and in the peat bog with the removed peat layer the content of humic acids did not increase: an especially notable reduction in humic acid content occurred in the crop rotation field (11.9%) compared to the unused peat bog (meadow).

In peat soils, organic matter content is generally as high as 80–95%, and by this feature they significantly differ from mineral soils (Ефимов, Василькова, 1970). The authors suggest that soil productivity largely depends on organic matter transformation processes. SOM humification degree is understood as a share of humic acids in the total amount of organic carbon (Orlov, 1990). It is desirable that this figure is as high as possible, so that humification processes exceed mineralization processes.

Changes in soil organic matter (SOM) quantity during land use may be difficult to detect in a short term. Figure 2 shows that in the peat bog with the non-removed peat layer determination of total SOM content by the LOI method did not reveal any differences between the treatments, however, in the peat bog with the removed peat layer changes in SOM were slightly higher. Removal or non-removal of peat layer had a greater effect on SOM content compared with the effect of peat bog management (natural meadow, field crop rotation or grassland). We can see that the indicator of total SOM was insufficiently sensitive to characterise OM changes during the four-year period. Soluble organic matter varied more than the total SOM content or organic carbon content. Data provided in Tables 1–8 suggest that determination of organic matter fractions can serve as a sensitive indicator of peat bog status and can be used for determination of an early degradation stage of a peat bog, therefore to assess short-term anthropogenic effects it is necessary to test soluble organic matter. Thus, soluble organic matter that sensitively respond to anthrophogenous effect and provide much information on organic matter decomposition, and formation of humic substances in soil should be determined in 0.1 mol L^{-1} sodium pyrophosphate and 0.1 mol L^{-1} sodium hydroxide solutions.

Figure 3 shows that organic matter humification degree in the peat bog with the non-removed peat layer was by >1/3 lower compared

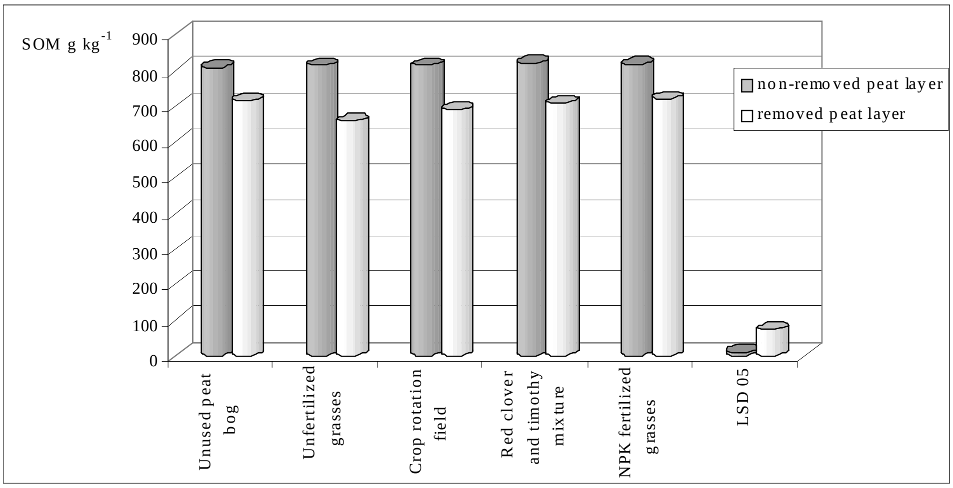

Fig 2. SOM content (LOI method) in differently used *Terric Histosol*

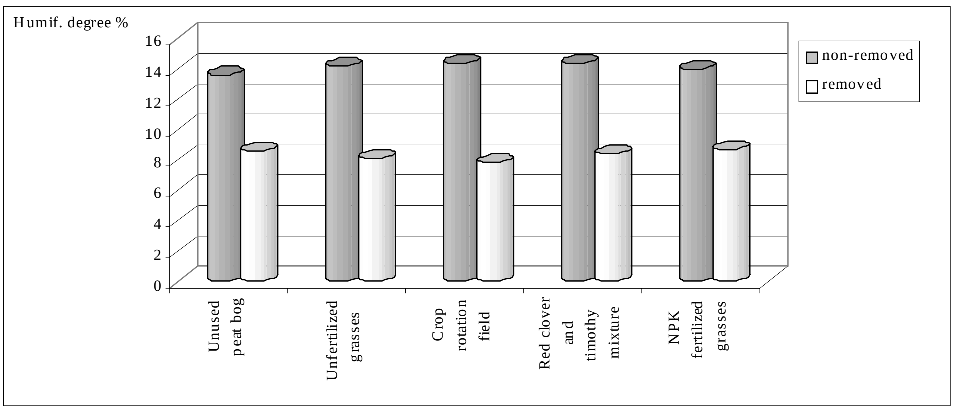

Fig. 3. Humification degree of HA of sodium hydroxide solution in differently used *Terric Histosol*

with the peat bog with the removed peat layer. Assessment according to humification degree showed that the most favourable conditions for the preservation of OM in *Terric Histosol* with the removed peat layer, already strongly affected anthropogenically, were identified in the soil where the peat layer was the removed and plants were allowed to grow naturally or when this area was occupied by NPK–fertilised grasses or their mixture with legumes. However, this kind of peat bog management does not restore soil organic matter and only inhibits its further breakdown. Unfertilised grasses or field crop rotation reduce organic matter humification processes and promote mineralisation.

The activity of enzymes taking part in biochemical OM transformation processes in *Terric Histosol* was closely related with OM indices (Table 7). The relationships were described using linear regression equations (Table 8). A balance usually settles between organic matter mineralization and humification

Table 7. **Correlation (r) between SOM indices and enzymatic activity in peat bog soil, 2000**

	Invertase	Urease
SOM [a)]	0.679*l	n.s.
HA of sodium hydroxide solution	0.771**l	0.696*l
OM dissolved in sodium hydroxide solution	0.771**l	0.697*l
Urease	0.761*l	

r – correlation coefficient; * = P < 0.05 level of probability; ** = P < 0.001 level of probability; n.s. – non-significant; [a)] – determined by the LOI method.

Table 8. **Linear regression analysis of various chemical and enzymatic activity indices (n = 20)**

Indices		Linear regression equation
X	*Y*	*Y = A +BX*
Urease	OM soluble in sodium hydroxide solution	Y = 4.3 + 48.2X
Urease	HA of sodium hydroxide solution	Y = 2.66 + 25.2X
Invertase	HA of sodium hydroxide solution	Y = –50.2 + 0.41X
Invertase	OM soluble in sodium hydroxide solution	Y = –96.8 + 0.79
Urease	invertase	Y = 140.2 + 50.4X

in natural ecosystems, while in disturbed ecosystems mineralization and peat degradation processes start to prevail. This can lead to a complete degradation of peat bogs, which is conditioned by many reasons, one of which is incorrect management. It was stated that the global area of peatlands in the world has been reduced significantly (estimated to be at least 10 to 20%) in the last 200 years through climate change and human activities, particularly by drainage for agriculture and forestry (http://www.mirewiseuse.com/statement.html). Human pressures on peatlands are both direct through drainage, land conversion, excavation, and indirect, as a result of air pollution, water contamination, contraction through water removal, and infrastructure development. The range and importance of the diverse functions, services and resources provided by peatlands are changing dramatically with an increase in human demand for the use of these ecosystems and their natural resources. Peat-forming ecosystems are important sinks for atmospheric carbon, nevertheless generally underestimated in global climatic change studies. This work aims at the quantification of the Middle Lithuanian peat ecosystem to store carbon. The quantification of carbon stored in peat layers is related to technological means and agricultural crops characteristics. The effects of agricultural means in a peat bog on soluble organic matter generally are poorly known, although it represents the most mobile part of organic matter in peat. Our research and data provided in this paper partly fill in this niche. An estimation of the current state of Middle Lithuania's peat soil whose one of the major soil quality indicators are total SOM and soluble organic matter content, are presented. Using these and similar experimental data one can predict changes in peat and choose adequate conservation measures.

CONCLUSIONS

1. Organic matter composition of *Terric Histosol* with a removed and the non-removed peat layer was different: peat soil of the peat bog with the non-removed peat layer contained more humic acids and soluble organic matter compared with the peat bog with the removed peat layer. Similarly, the peat soil of the peat bog with the non-removed peat layer was found to contain more organic carbon than that of the peat bog with the removed peat layer.

2. In the crop rotation field in the *Terric Histosol*, the content of organic carbon tended to decline both with the non-removed (from 346.12 to 337.2 g kg^{-1}) and the removed (from 330.2 to 321.5 g kg^{-1}) peat layer. A significant reduction in the content of mobile humic acids and humification degree occurred in the crop rotation field compared with unused *Terric Histosol* (natural meadow).

3. The most efficient way to conserve and accumulate organic matter in drained *Terric Histosol* is to grow perennial grasses or just leave natural meadows and use them non-intensively. In order to conserve organic matter on ecologically disturbed *Terric Histosol* with a removed peat layer, long-lived sown grasses should be grown, which should be moderately fertilised, and unused meadow can be not fertilised at all.

4. For the assessment of OM changes in peat soil it is necessary to study not only the total contents of SOM or organic carbon but also of soluble organic matter, which can be considered as sensitive indicators of the anthropogenic impact and early negative changes leading to degradation or complete destruction.

5. There exists a relationship (r = 0.679–0.771) between OM content in the soil and the activity of enzymes. This relationship can be described by linear regression equations.

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ORGANINĖS MEDŽIAGOS BŪKLĖS KAIP SVARBAUS ANTROPOGENINĖS VEIKLOS INDIKATORIAUS IŠTYRIMAS ŽEMAPELKIŲ DIRVOŽEMIO (*TERRIC HISTOSOL*) KOKYBEI ĮVERTINTI

S a n t r a u k a

Bandymai įrengti 1995 m. Radviliškio bandymų stotyje žemapelkėje su nukastu ir nenukastu durpių sluoksniu. Buvo tiriama: nenaudojama žemapelkė (pieva), netręšiamos daugiametės varpinės žolės, $P_{60}K_{120}$ ir $N_{120}P_{60}K_{120}$ tręšiamos varpinės žolės, raudonųjų dobilų (*Trifolium pratense* L.) ir pašarinių motiejukų (*Phleum pratense* L.) mišinys bei sėjomainos laukas (bulvės, žieminiai rugiai, raudonieji dobilai). Išsamūs organinės medžiagos (OM) būklės tyrimai žemapelkėje buvo atlikti 1998–2001 m. OM sudėtis buvo skirtinga nukastoje ir nenukastoje žemapelkėje. Remiantis vidutiniais 4 metų duomenimis, nenukastoje žemapelkėje buvo daugiau organinės anglies (337,2–346,1 g kg^{-1}), palyginus su nukasta žemapelke (321,5–332,3 g kg^{-1}). Organinės anglies kiekis (C_{org}) sėjomainos lauke turėjo tendenciją mažėti, palyginus su nenaudojama žemapelke (natūrali pieva). Vidutiniškai per 4 metus C_{org} kiekis turėjo mažėjimo tendenciją nuo 346,12 iki 337,2 g kg^{-1} nenukastoje bei nuo 330,2 iki 321,5 g kg^{-1} nukastoje žemapelkėje, palyginus su nenaudojama (natūrali pieva). Didesni kiekiai OM ekstrahuotos natrio hidroksido tirpalu, kaip ir huminių rūgščių kiekis, buvo nenukastoje žemapelkėje. Sėjomainos lauke buvo mažesni huminių rūgščių kiekiai, negu auginant daugiametes žoles ar laikant natūralią pievą. Nustatyta priklausomybė (r = 0,679–0,771) tarp suminio OM kiekio, tirpios jo dalies ir fermentų (ureazės, invertazės) aktyvumo. Ši priklausomybė išreikšta linijinės regresijos lygtimis. Siekiant išsaugoti ir kaupti organinę medžiagą nusausintoje žemapelkėje, nerekomenduojama auginti lauko augalus sėjomainoje, vietoj to geriau auginti daugiametes žoles ar palikti natūralias pievas ir jas neintensyviai naudoti.

Raktažodžiai: žemapelkė, pieva, sėjomaina, NPK, organinė medžiaga, dirvožemio kokybė, antropogeninė veikla