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I. V. Sokolovskiy, A. A. Domasevich
Belarusian State Technological University

CHANGE ACIDITY SIFTED PEAT

The results of the reaction medium to neutralize the separated research in peat milling workpiece in "Dokshitsyraygaz". Peat is taken is characterized as a pine-sphagnum (Sphagnum magellansky – 35%, Sphagnum angustifolium – 25%, Scots pine – 25%, vaginal cotton grass – 15%), the degree of decomposition – 18%, ash content – 4.7%, pHKCl – 3.2, 50–60% relative humidity. To change the environment of the reaction as a calcareous material used dolomite flour and chalk. Doze of material is designed to skim 1 m^3 peat milling blank, which at a relative humidity of 50–60% and the addition of a natural weight of about 250 kg.

Studies have shown that the introduction of dolomite chalk and substrate in the reaction medium varies according to the dosage and duration of action of inter-substrate material with lime. The reaction medium in peat substrate is installed after 7-day interaction with chalk and a 10-day interaction with dolomite flour.

Key words: white peat, milling workpiece, peat substrate, acidity, neutralization, dolomite flour, chalk.

Introduction. Swamps in the Republic of Belarus occupy about 2.5 million hectares, 14.1% of the country area, with the reserves of peat-raw of 30.4 billion of m^3. Highmoors are most prevalent in the northern part of Belarus (Vitebsk and Minsk regions), they occupy 15.8% of the area of all moors and are located mainly on watersheds in closed drainless lowlands, in the same place there are the greatest reserves of peat deposits. Peat formation thickness is up to 2–4 m, occasionally up to 9–10 m [1]. According to the data of L. P. Smoliak, V. A. Ipatiev, the undrained highmoors of Belarus are characterized by the decomposition degree of 5–30%, by the ash content of 1.7–5.8% [2, 3].

The peat-forming plants characteristic of highmoors are: from tree species – pine; from undershrub – Labrador tea, marsh myrtle, heather, andromeda, blueberry, cranberry, black crowberry; from grass – cotton-grass, sheikhceria, beak rush; from mosses – Magellanic sphagnum, sphagnum angustifoliate, sphagnum-fuskum, etc. Sphagnous, cotton-grass, pine-cotton-grass, pine-sphagnous, sheikhceria-sphagnous and other kinds of peatare formedat highmoors. In a peat deposit it is very often that the valley peat, transitional, spreads under thehigh-moor peat,and that is connected withthe peculiarities of the moors water supply at different formation stages.

Favorable growth conditions for woody and herbaceous plants are determined by many factors, including the medium reaction. It was found out with the help of scientific researches and practical experience that high acidity and alkalinity make negative impact on growth of underground and above-ground part of plants.

Medium reaction determines solubility of many compounds and first of all those of phosphorus, and also availability of plants nutrients, their soil and plant mobility throughout all vegetation period.

Progressive technologies in a hothouse enterprise are based on particular qualities of the applied substrate and on the nutrition pattern optimization. Cultivation of seedlings of wood species in the covered ground is carried out mainly on the substrate of highmoor peat. The specified substrate possesses bactericidal properties which blocks the development of fungal microflora, it has high absorption and water-retaining ability (moisture capacity is 600–1,200% on mass or 56–84% on volume basis).

Peat is rather poor in nutrients and first of all in mobile phosphorus. Though there is some nitrogen, but it is difficult toassimilate for plants. High-moor peat contains 0.56–2.00% of nitrogen, 0.03–0.26% of phosphorus, 0.01–0.10% of potassium [2, 3].

Negative property of highmoors peat is high acidity. Analyzing the given index using references, and the data of soil and forest-topological researches of forests soils of Belarus, it is possible to note a wide variation in pH quantity indexes. According to the data of L. P. Smoliak, highmoors peat acidity of Belarus is at pH_{KCl} 3.2–4.2 level, and according to the data of V. A. Ipatiev – on pH_{H_2O} 2.6–4.2 level [2, 3]. The data received by N. I. Piavchenko testify that highmoors peat acidity of northern regions of the European territoryis pH_{KCl} 2.8–3.7 [4].

The given data point out to a significant variation of highmoors peat acidity, and that requires determination of indexes on optimization of peat medium reaction of each marsh body, including taking into account the thickness of a peat deposit. On the territory of Belarus many peat deposits are characterized as highmoorresidually lowland where the properties and characteristics of peat change with the depth.

Main part. High-moor peat substrate is now widely used for cultivation of planting stock in forestry of Belarus. Woody and shrubby kinds of

plants being grown are demanding in different degree to the reaction of substrate medium and to its changes. Therefore, in the given material there are researches results on neutralization or optimization of the medium reaction in the separated high-moor peat of milling preparation from field 5A of the peat deposit "Zhuravlevskoe" in RPU "Dokshitsy raigaz" (Vitebsk region, Dokshitsky district, village Krulevshchizna).

Peat on the developed field 5A at sampling for research and experiment was defined as pine-sphagnum, decomposing degree – 18%, ash content – 4.7%, actual acidity pH_{KCl} – 3.2, relative humidity – 50–60%.

Dolomitic powder was used as calcareous material with mass fraction of chemical chalk and magnesium carbonate in terms of $CaCO_3$ not less than 85% and chalk was used with mass fraction of calcium carbonates in terms of $CaCO_3$ not less than 85%.

10 dolomite deposits (Slavgorod district, Hotimsk district, etc.) are located on the territory of Belarus. They are closer to the surface in Orsha and Vitebsk regions.

Major manufacturer of dolomitic powder in Belarus is Open Society "Dolomite" in Vitebsk region (settlement Ruba). In the produced dolomitic powder from the deposit "Gralevo" there are 30.0% of CaO, 20.5% of MgO, 50–52% of $CaCO_3$, 43–45% of $MgCO_3$, there are impurities of Fe, Al, Si, Mn [5].

Chalk is a semiconsolidated, fine-grained type of carbonate rocks, white or yellowish in color, consisting mainly of calcium carbonate of natural origin or made artificially. Chemical composition of chalk from different deposits varies within the following limits: 47–55% of CaO, 0.1–1.9% of MgO, 0.2–6.0% of SiO_2, 0.2–4.0% of Al_2O_3, 0.02–0.70% of Fe_2O_3, 40–43% of CO_2 [6].

Researches were carried out in laboratory conditions at temperature of 17–20°C, 2 liter polyethylene containers were used for the experiment. The experiment was carried out 3 times on each variant. The application dose of dolomitic powderand chalk was calculated on 1 m^3 of separated high-moor peat (fraction of 0–7 mm) of milling preparation. At relative humidity of 50–60% and natural addition the specified volume of peat has mass of about 250 kg. This calculation is given for the purpose that in various recommendations the dose of calcareous materialis calculated as based on the volume or mass of peat.

Results of the realized researches on neutralization of the high-moor separated peat are given in Tables 1 and 2.

Introduction of dolomitic powder to peat substrate was carried out according to six variants of experiment (from 1 to 6 kg/m^3). In a day after experimentthere is the medium reaction change in the substrate, at that the bigger was the application rate of calcareous material, the faster was the substrate acidity decrease. However further content of peat substrate with the introduced dolomitic powder at temperature of 17–20°C leads to gradual decrease of actual acidity. With the application dose increase of dolomitic powderthe actual acidity in dynamics decreases more intensively and gets the constant value for 9–10 days. Further determination of actual acidity showed that its value had not changed.

Table 1

Actual acidity (pH_{KCl}) of high-moor peat at neutralization implementation taking into account the application rates of dolomitic powder and interaction duration

Norm of dolomitic powder, kg/m^3	Registration time, days							
	1	3	5	6	9	10	17	19
1	3.3	3.4	3.4	–	3.4	3.5	3.5	3.6
2	4.0	4.0	4.0	–	4.0	4.1	4.1	4.1
3	4.4	4.4	4.4	–	4.5	4.6	4.6	4.6
4	4.6	4.7	4.8	5.1	5.2	5.2	5.2	5.2
5	5.1	5.5	5.6	5.7	5.7	5.7	5.7	5.7
6	5.2	5.7	5.7	5.8	5.8	5.9	5.9	5.8

Table 2

Actual acidity (pH_{KCl}) of high-moor peat at neutralization implementation taking into account the application rates of chalk and interaction duration

Norm of chalk, kg/m^3	Registration time, days					
	1	3	5	7	9	14
2	4.1	4.1	4.2	4.3	4.4	4.4
4	4.4	4.5	4.7	4.9	4.7	4.7
6	5.1	5.2	5.3	5.4	5.1	5.4
8	5.3	5.8	6.1	6.8	6.7	6.6

The received data show that application of different doses of dolomitic powder will permit to change acidity of the separated high-moor peat with pH_{KCl} 3.2 to pH_{KCl} 3.5–5.9 depending on the dose and interaction duration.

While conducting experiments on neutralization of the peat substrate by chalk four variants with 3 times repetition were implemented with the application rate from 2 to 8 kg/m^3. Chalk usage also led to gradual change of actual acidity of the peat substrate with pHKCl 3.2 to pH_{KCl} 4.3–6.8 and to medium reaction establishment on the 6–7 day.

V. Nollendorf points out in his researches that magnesium carbonate dissolves readily and quickly in water in comparison with calcium carbonate. Therefore, acidity of the substrate made on the ba-

sis of high-moor peat, in the beginning is controlled by magnesium carbonate, calcium carbonate reacts more slowly and begins to influence the substrate acidity only after a while. It happens after gradual dissolution of carbonic gas in water and after formation of calcium bicarbonate which unlike the calcium carbonate dissolves in water readily. That is why it is not recommended to apply increased doses of calcareous materials to the substrate as problems begin later when solubility of calcium carbonate in water increases after dissolution of CO_2 in it. With the help of calcium bicarbonates ($Ca(HCO_3)_2$) there is formation in the substrate of poorly soluble in water ferric hydroxide $Fe(OH)_2$, and the plants being grown lose normal green color, chlorosis appears [7].

The conducted researches give grounds to draw a conclusion that for the medium optimization a more accurate on time acidity definition of the peat substrateis necessary, and also medium reaction dynamics at application to the substrate of mineral fertilizers.

Conclusion. With application of dolomitic powder and chalk the medium reaction in the substrate changes depending on the dose and interaction duration of the substrate with calcareous material.

Medium reaction in the peat substrate establishes after a 10-day interaction with dolomitic powder and a 7-day interaction with chalk.

Gradual medium reaction at peat neutralization is connected with unequal solubility of magnesium and calciumcarbonates. Magnesium carbonate dissolves readily and quickly in comparison with calcium carbonate. Calcium carbonate reacts more slowly and begins to influence the substrate acidity only after a while.

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Information about the authors

Sokolovskiy Ivan Vasil'yevich − PhD (Agriculture), Assistant Professor, Assistant Professor, the Department of Forest Plantations and Soil Science. Belarusian State Technological University (13a, Sverdlova str., 220006, Minsk, Republic of Belarus). E-mail: sivsoc@mail.ru

Domasevich Aleksandr Aleksandrovich − PhD (Agriculture), Assistant Professor, the Department of Forest Plantations and Soil Science. Belarusian State Technological University (13a, Sverdlova str., 220006, Minsk, Republic of Belarus). E-mail: damasevich@rambler.ru

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