ленные объекты доступны для умеренного посещения.

К преимуществам Артинского района относится то, что туризм может удачно (не требуя больших затрат на производство туристского продукта) сочетаться с другими видами природопользования: сельским хозяйством, рыболовством. Развитие туризма содействует сохранению природных комплексов, организации национальных парков.

Кроме того, организация на данной территории памятника природы «Сабар» будет обеспечивать взаимодействие и дальнейшее развитие различных видов туризма в Артинском районе:

1) этнографического туризма. Артинский район уникален и в этом плане. На его территории проживают марийцы, сохранившие исконную культуру, поклоняющиеся лесным духам и идолам. Энтузиасты уже сейчас собирают этнографический материал для музея, расположенного в Доме культуры;

2) исторического туризма. В п. Арти до сих пор действует единственный в мире завод по производству кос методом ковки. На территории завода сохранились корпуса, построенные еще во времена Демидовых;

3) научно-познавательного туризма. В п. Арти находится магнитометеорологическая обсерватория – первое на Урале научное учреждение (сегодня филиал Института геофизики УрО РАН), значение исследований которой общепризнано во всем мире.

Итак, исходя из вышеприведенных данных можно сделать вывод, что создание ООПТ на данной территории своевременно и актуально.

Уже сейчас прошло несколько экспедиций, состоящих из представителей дальнего зарубежья, которые посетили Артинский завод, марийские и татарские поселения, уникальные памятники природы.

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APPLICATIONS OF UNCONVENTIONAL FERTILIZERS ON FOREST SCTOTS PINE NURSERIES IN THE URALS
(ОПЫТ ПРИМЕНЕНИЯ НЕТРАДИЦИОННЫХ УДОБРЕНИЙ ПРИ ВЫРАЩИВАНИИ СЕЯНЦЕВ СОСНЫ ОБЫКНОВЕННОЙ (PINUS SYLVESTRIS L.) НА УРАЛЕ)

The article presents information on the possibility of using non-traditional fertilizers, which are prepared on the basis of production wastes. Currently, they are accessible, affordable and at the same time highly effective means of increasing the fertility of forest soils. The changes in the parameters of planting material when making these mixtures.

Представлена информация о возможности использования нетрадиционных удобрений, которые приготовлены на основе отходов производств. В настоящее время они являются доступными, недорогими и высокоэффективными средствами повышения плодородия лесных почв. Проанализированы изменения параметров посадочного материала при внесении данных смесей.

About 600–800 seedlings and saplings for planting are grown in forest nurseries of Russia annually. It is the main method of regeneration. Most of the nurseries are located in the zone of low soil fertility and used for a long time. This has a negative impact on the quantity and quality of planting material (Rodin et al., 1989).

The use of conventional mineral and organic fertilizers in forestry is limited due to their high cost. As a cheap and at the same time highly effective means of increasing of forest soil fertility can be applied fertilizers, based on various waste products (Romanov et al., 1983).

Some types of waste, such as sewage sludge, have a high content of soluble organic compounds and elements, which influence the growth and development of plants.

The purpose of this study is to investigate applications of 6 types of unconventional fertilizers on forest Scots pine (Pinus sylvestris L.).

Some unconventional fertilizer mixtures were applied such as a mixture of peat and an active sludge; surplus active sludge treated with lime milk; surplus active sludge after mechanical dewatering; ashes of "Solikamskbumprom" enterprise; the mixture of sewage sludge and excess active sludge; a mixture of sewage sludge, active sludge and ash of "Solikamskbumprom" enterprise. These mixtures were provided by Perm National Research Polytechnic University.

The investigations were in two forest nurseries: the Ural training experimental forestry USFEU (UUOL) and the State Institution "Sukholozhsky forestry" (Metodicheskie …, 1964; Sokolov, 1967; Szczerba, 1967; Peresypkin et al, 1989). Fertilizers were applied between rows on sample plots (1x1 m) (1 m^2). At the same time parts of sample plots were fixed where fertilizers were not used.

Each mixture was applied at doses of 500 and 1000 kg per ha to annual and biennial Scots pine seedlings.

In the State Institution "Sukholozhsky forestry" forest nursery the fertilizers were applied by root method with preliminary and subsequent soil scarification. It was on July 10, 2013 at temperature 23–24 °C in cloudy weather. At the Ural training experimental forestry the fertilizers were used on July 11, 2013 at temperature 25–26 °C in sunny weather. Each sample plot is located at a distance of 50 cm to 2 m from each other. Also a map for the plots was made.

After the end of the growing season 30 seedlings in each sample plots were dug. In the laboratory the basic parameters were identified: the height of the seedling, the diameter of the neck of the root, the root length, the number of yellow and green needles (Novoseltseva, Smirnov, 1983).

The measurements were processed by methods of variation statistics. Table presents data of all criteria.

Notes: "+" – a positive impact on one or the other option of seedlings and is higher than in the control plot; "-" – lower than in the control plot.

Table shows the effectiveness of the use of certain mixtures.

At the forest nursery UUOL USFEU, when we applied a mixture of sewage sludge and active sludge (at 1,000 kg/ha) for biennial

Effect of uncoventional types and doses of fertilizers on the state of Scots pine seedlings

Type of fertilizer	Dose kg per ha	Average Diameter	The average height	The average length of the root system	The average length of the needles	Part of yellow needles
1	*2*	*3*	*4*	*5*	*6*	*7*
Forest nursery UUOL USFEU						
Biennial seedlings						
1. A mixture of peat and active sludge	500 1000	- -	- -	- +	+ -	+ +
2. Excessively activated sludge treated with lime milk	500 1000	- -	- -	- +	+ +	+ +
3. Excess activated sludge after mechanical dewatering	500 1000	- -	- -	- +	+ -	+ +
4. Ash of «Solikamskbumprom» enterprise	500 1000	+ -	- -	+ -	+ -	+ +
5. The mixture of sewage sludge and active sludge	500 1000	- +	- +	+ -	+ -	+ +
6. The mixture of sewage sludge, activated sludge and ash of «Solikamskbumprom» enterprise	500 1000	+ -	- -	+ +	+ -	- +

End table

1	*2*	*3*	*4*	*5*	*6*	*7*
Annual seedlings						
1. A mixture of peat and active sludge	500 1000	+ +	+ -	+ -	- +	- -
2. Excessively activated sludge treated with lime milk	500 1000	+ +	+ -	- -	+ -	- -
3. Excess active sludge after mechanical dewatering	500 1000	+ -	+ +	- +	+ +	- -
4. Ash of «Solikamskbumprom» enterprise	500 1000	+ +	+ +	- -	- +	- -
5. The mixture of sewage sludge and active sludge	500 1000	+ +	+ +	- -	- +	+ -
6. The mixture of sewage sludge, activated sludge and ash of «Solikamskbumprom» enterprise	500 1000	+ +	+ +	- -	+ +	+ -
Forest nursery of State Institution «Sukholozhsky forestry»						
Biennial seedlings						
1. A mixture of peat and active sludge	500 1000	- -	+ +	- +	- -	- -
2. Excessively activated sludge treated with lime milk	500 1000	-	- -	- +	- -	- -
3. Excess active sludge after mechanical dewatering	500 1000	- -	- -	- +	- -	- -
4. Ash of «Solikamskbumprom» enterprise	500 1000	- -	+ +	- -	- -	- -
5. The mixture of sewage sludge and active sludge	500 1000	- +	- +	+ +	+ -	- -
6. The mixture of sewage sludge, active sludge and ash of «Solikamskbumprom» enterprise	500 1000	+ -	+ +	+ +	- +	- +
Annual seedlings						
1. A mixture of peat and active sludge	500 1000	- +	+ +	-	+ +	+ -
2. Excessively active sludge treated with lime milk	500 1000	- -	+	-	+ +	+ -
3. Excess activated sludge after mechanical dewatering	500 1000	- -	+ -	-	+ +	+ +
4. Ash of «Solikamskbumprom» enterprise	500 1000	+ +	+ +	-	+ +	+ +
5. The mixture of sewage sludge and active sludge	500 1000	+ +	+ +	-	+ +	- -
6. The mixture of sewage sludge, active sludge and ash of «Solikamskbumprom» enterprise	500 1000	+ +	+ +	-	- +	- +

seedlings, there is a positive effect on the height of the aerial part. Adding other types and doses of unconventional fertilizers at biennial Scots pine seedlings cultivation resulted in a statistically significant decrease in the indices of average height compared to the control.

In the State Institution "Sukholozhsky forest" forest nursery only a mixture of sewage sludge and active sludge (at 1,000 kg per ha) and the mixture of sewage sludge, active sludge and ash of "Solikamskbumprom" (in at 500 kg per ha) influenced on the average diameter of biennial seedlings

positively. At the annual seedlings at both doses had a positive impact of Ash "Solikamskbumprom" enterprise, a mixture of sewage sludge and activae sludge and the mixture of sewage sludge, active sludge and ash of "Solikamskbumprom" enterprise. In other cases, the average diameter of considerably lower than in the control sample plot.

All mixtures had a positive effect on the average diameter of annual seedlings in nursery UUOL USFEU, except a mixture of active sludge after mechanical dewatering (at 1,000 kg per ha). The mixture of ash "Solikamskbumprom» enterprise (at a dose of 500 kg per ha), a mixture of sewage sludge and active sludge (at 1,000 kg per ha) and the mixture of sewage sludge, activ sludge and ash of "Solikamskbumprom» enterprise (at a dose of 500 kg / ha). have positive results on biennial seedlings. Other substances had no significant effect.

It should be noted that the average length of the root system in the nursery the State Institution "Sukholozhsky forestry" of annual seedlings none mixture had a positive impact, all the indicators are below control. But all mixtures affected the average length of the needles positively

When we applied the unconventional fertilizers in nursery UUOL USFEU, there is an increasing of part of yellow needles of biennial seedlings, we can observe a decreasing for all variants of the experiment.

In the "Sukholozhsky forest" nursery, on biennial seedlings part of yellow needles is smaller in all test areas, except for the site when applying mixture of sewage sludge, activate sludge and ash of "Solikamskbumprom" enterprise (at 1,000 kg per ha).

Conclusions

1. Unconventional fertilizers can be effectively used for growing Scots pine seedlings.

2. The effectiveness of unconventional fertilizers applying in the State Institution "Sukholozhsky forestry" nursery was higher than that in the nursery UUOL USFEU.

3. The differences in the effect of fertilizers on the unconvential indicators of Scots pine annual and biennial seedlings of cultivation cause the need for further research in order to select the best types and doses of fertilizers.

4. To determine the optimal types and doses of unconventional fertilizers it is necessary to study soil provision by nutrients.

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