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Soil mixture for the introduction of Pinus sibirica to the plantations in the village Poikovsky

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Relevance Fertile soils are virtually absent on the territory of our village, they were destroyed during the development of the territories. Considering soil fatigue from environmental positions, you can define that it was a consequence of the environmental crisis, coming as a result of disharmony in plant and soil environment. Hydrological regime of the soil changes, followed by overgrown of tall grasses and undesirable tree species. It is very important to preserve the fertile layer of soil during the construction of settlements and industrial facilities.

Before the start of oil production and construction of the village Poikovsky, there was was a mature cedar forest. Today we have isolated trees of Siberian pine in the places where there was no construction of houses, cottages, infrastructure or industrial projects. After oil extraction is finished, perhaps, most residents lwill eave in search of new work. What remains after us when hydrocarbon reserves run out in Nefteyugansk area? A desert? If we want to leave a mature forest, we need to think about gardening of settlements with local valuable species of trees now.

M.E. Tkachenko gives the data about Siberian cedar growing in the dry sands and rocky cliffs. Academician P.S. Pallas wrote that this kind of tree grows in swamps and high in the mountains. Professor B.V. Grozdov noted the growth of Siberian pine on soils of permafrost, where it forms adventitious roots. [6, 68].

However, seedlings poorly take root in disturbed soils, they have increased demands on the elements of the food compared to older plants, they require mineral nutrition and care. Introduction to the Siberian cedar to plantation culture in the settlements increases their productivity and longevity. Greening the village territory with seedlings of alpine stone pine would contribute to the restoration of the dead cedar forests on the territory of the Nefteyugansk district.

The study showed that in the village Poykovsky there are isolated examples of alpine stone pine adult plants, the surviving after the construction of houses and infrastructure. Soils are infertile or absent, there are lots of solid waste. The territory of the village Poikovsky has not enough plantations. There is no festival of forest plantation for all the residents. Residents are not willing to plant trees and

gardens around the newly built high-rise buildings. Young people are not interested in the landscaping of the village.

Analysis of random pine plantations in the district No. 3 showed that only 2 of 17 seedlings planted by villagers near the houses took roots. There is a contradiction between the desire of some of the villagers to plant Pinus sibirica near their homes, and a very low survival rate of seedlings of Pinus sibirica in conditions of disturbed soils.

Problem: reduced survival rate of seedlings with the introduction of stone pine to plantations to the territory of Poikovsky village. Siberian pine is beauty and pride of Ugra, our national heritage. Reduction of areas of natural cedar forests in Nefteyugansk district is raising concern. Fertile soils are virtually absent on the territory of our village, they were destroyed during the development of the territories. How to create a fertile layer, destroyed in the construction of settlements and industrial facilities, but necessary for seedlings of Pinus sibirica?

Object: seedlings of alpine stone pine.

Subject: soil mixtures, improving survival of stone pine seedlings in the introduction of Pinus sibirica to plantations of Poikovsky village.

Hypothesis: If we carry out experiments to determine the composition of the soil for optimal rooting of Siberian pine seedlings in the disturbed areas; it is possible to determine the composition of soil mixture for seedlings survival when introducing Siberian pine seedlings to plantations in the territory Poikovsky settlement.

Target is to determine the composition of soil mixture for best rooting of Siberian pine seedlings, when introducing to the plantations of the settlement Poikovsky

Objectives: To study existing methods of cultivation of stone pine seedlings; to choose the method of analysis of soil samples; to determine the composition of soil mixture for growing seedlings of Pinus sibirica on disturbed areas of Poikovsky village; to plant pine seedlings on various sites in the village Poikovsky with use of soil mixture composed and analyze their survival; to identify current and average periodic pine seedling growth, planted at various sites and natural grown Pinus sibirica of the same age on the test plots in the forest ecosystem; to determine the degree of prevalence of planted seedlings and regrowth naturally grown Pinus

sibirica with forest pathology monitoring techniques. To formulate conclusions and proposals for the introduction of Siberian pine for landscaping of Poikovsky village based on a systematic analysis of the results.

Methods: Analysis of literary sources, phytoindication, analysis of planting area study; analysis of soil samples, experiment, taxation, forest pathology monitoring, observation, measurement, comparison, statistical analysis, systematic analysis.

I. Literary sources analysis

History shows that our ancestors loved and respected cedar, treated it with care, carefully guarded fruiting cedar and planted young trees. Cedar air is healthful, pathogens do not survive in it, it relieves fatigue, gives vigor and energy. Long ago people who lived on the territory of the Khanty-Mansiysk Autonomous Okrug-Ugra, noticed the special properties of cedar, which played a special role: "The spruce forest is for work, the birch forest is for fun, cedar forest is to pray to God" [16.182]. It is proved that the air in the cedar forest is much cleaner than in any operating room, 2 times cleaner than in the pine forest and 3-4 times cleaner than in the spruce forest. It is recommended to plant cedar near places of rest, arbors, near the baths. Introduction to the Siberian cedar to plantation culture in the settlements increases their productivity and longevity [14.188]. .

Cedar tree grows for a long time; the first 10 years it grows by 1-5 cm per year. It is difficult to restore cedar forest because in the first 5-10 years the seedlings are very demanding to feeding elements and good care [19.115]. Introduction of the Siberian stone pine to plantations of the green areas and forests of I group improves their recreational capacity and water protection properties.

Being nut-bearing, Siberian cedar helps to increase the number and diversity of forest fauna [16.32].

Creating a culture of alpine stone pine planting is permitted only when using seedlings 4 or 6 year-old of biological age. To create a culture of Siberian cedar it is acceptable to use ordinary planting and biogroups, and planting sites. The second method corresponds to biology of the species, but reduces the possibility of mechanization of silviculture [28. 91].

Soil is the most conservative element of the northern ecosystem. The soils of the North for thousands years have repeatedly experienced climate variations, which are fixed or projected in the scenarios of global warming. It is likely that the soils of the North developed mechanisms of adaptation to climate variability by one or two degrees and atmosphere precipitation by 100-200 mm (average), which is forecasted in these scenarios. Of course, they will somehow respond to the warming with their dynamic properties: humidity, temperature, acidity, content of organic matter. In loamy and clay soils and grounds of the North, during warming, the nature and depth of the permafrost will change very quickly. [18. 218]. There are two types of forest humus: mild (neutral) humus and coarse (sour) humus. Mild humus is formed by the decomposition of loose litter under deciduous and coniferous - deciduous species. The soils are loose, with a neutral reaction. Coarse humus is formed in pure coniferous plantations with dense litter. Soils with a coarse humus are colder, prone to waterlogging, and acidic. Fertility of a soil depends on the volume of humus. Humus glues dense particles of inorganic species in clumps, creating conditions for air infiltration, water storage [4.98].

Soil fatigue is result of ecological imbalance in the system "soil-plant" due to unilateral effects on cultivated plants' soil environment. Considering soil fatigue from environmental positions, you can define that it was a consequence of the environmental crisis, coming as a result of disharmony in plant and soil environment. There is no soil fatigue climax communities, they can exist indefinitely on condition of constant environmental conditions. Soil fatigue is accompanied by the development of plant diseases and pests, primary infection

spread faster, improving the conditions of supply of insect pests, weed plants develop increasingly [22. 216].

Under the growth of the tree we understand the increase in its size, which is determined by the diameter, cross-sectional area, height and volume of the barrel. Current growth reflects a specific change in the taxation index for the period of time. Average growth reflects the change in the average index per year of life or for the overall lifetime of the tree [28.169].

Forest pathology monitoring is carried out for the protection of forests from pests and diseases, and is one of the most important measures for the preservation of environmental, aesthetic and economic functions of forests. It allows to assess condition of individual trees and forest stands, and plantations [15.109]. In conducting research it is necessary to assess the condition of the trees using valid scales tested in practice, the study recommended by Rosselkhoz. Survey results are summarized in "forest pathology inventory card". [28. 238].

There are the following pine forest pests, which are very common: Pine subcortical bug -Aradus cinnamomeus Panz; large pine weevil - Hylobius abietis L .; Small pine weevil- Pissodes notatus L .; wintering pine-shoot mouth- Evetria buoliana Schiff; Summer pine-shoot mouth - Evetria duplana Hb; pine silk moth- Dendrolimus pini L .; Siberian silk moth- Dendrolimus sibiricus Tschetw; pine sawfly Neodiprion sertifer Geoffr; woodworm or stenographer - Ipss exdentatus. [28. 218].

II. Characteristics of the research object

Pinus sibirica is a tree up to 40 meters, trunk diameter of up to 1.5 - 2 m. Young trees have a crown of sharp pyramid shape, adult trees have spreading, often misshapen crown. Branching is multicipital. The upper branches have a shape of chandelier, they are raised up. Bark on young trunks and branches is ash-silver, with brown transverse lenticels, later it becomes fissured, gray-brown. The needles are 5-12 cm long, soft, triangular in cross-section, dark green with a bluish tinge; it retains on the tree for 3-7 years. Male antheral cones are usually located in the middle part of the crown, female cones - on the upper ends of the burgeons of the tree for 2-3 near the apical bud. The root system of the stick-type with open lateral roots. [10. 129]. In the wild Siberian pine is propagated by seeds, distributed by nutcracker, chipmunk, squirrel, sable and other animals that feed on pine nuts; in cultivation - mainly seedlings and saplings, economically valuable forms are propagated by inoculation.

Siberian pine is a specie of extreme continental climate. In adulthood it requires light. It grows in a variety of soils, but prefers deep-drained loamy and loamy weakly podzolized soils. Poor toleration of air pollution with smoke, transplantation in adulthood [1. 51]. Relation of Pinus sibirica to light at different ages is different, seedlings tolerate strong shading.

Basic rules when planting - to observe the orientation of the seedlings in the space (the northern part of the crown to turn when planting on the north), the distance between the trees from 4 to 8 meters, between the trees and buildings - at least 3 meters. In th beginning it is growing slowly - at the age of 5 years old seedling reaches a height of 25-35 cm, at the age of 10 years - 0.8-1.5 meters. Starting from 15-20 years old, it grows quickly, gives annual growth of 15 to 35 cm. Fruiting begins at the age of 15-25 years with good care and proper placement. Watering: It requires a good water supply, tolerates a moderate excess moisture; in spring abundant watering and spraying is required for awakening. Feeding: It

requires fertile soils; young plants are fed in early spring with special fertilizer for conifers, with age does not need a feeding. Pinus sibirica prefers loamy and sandy, fairly moist but well-drained fertile soil.

Seedlings of cedar poorly take root in disturbed soils, they have increased demands on the elements of the food compared to older plants, they require mineral nutrition and care. Younger seedlings require moderate shading and additional moisture (rain, artificial humidification from the hose).

III. Characteristics of the methods used.

For soil mixtures and analysis of seedlings survival we used author's technique of growing seedlings of Siberian pine in disturbed soils in the conditions of the introduction to the plantations in the territory of Poikovsky settlement.

Soil mixtures shall be added to the seed-sot simultaneously at planting day (10 liters per 1 seedling). Coarse sand is introduced to improve the soil structure in clay soils, silt and clay - to sand soils. One third of soft humus is added to the mixture, it was produced by the decomposition of loose litter under deciduous and coniferous - deciduous species.

Methods for determining the composition of soil mixture:

1. Determination of soil texture (wet method).

Take a pinch of soil, moisten with water, knead well, roll into a ball, then into a "cord". No cord could be made - sand, beginnings of a cord - sandy loam , the cord is crushed when rolling - light loam, cord is solid, but crushes when twisted - medium loam, a cord with a continuous ring with fractures - heavy loam, cord is solid, whole ring - clay. Soils, which contain more than 50% physical clay are called clay soils in the podzolic soil zone. Loam soil will contain from 20 to 50% of physical clay.

2. Checking of cultivation parameters (artificial fertility) of soil according to V.K.Pestryakov. (Table 1, Annex I).

3. Determination of humus content in the soil. Analysis by calcination.

Soil sample of 0.5 to 1 kg is distributed by a thin layer on the paper and dried in a dry room for 2-3 days. After removal of ground roots, soil is crumbled in a porcelain mortar and sieved through a sieve with holes of 0.25 mm diameter. Remaining on the sieve sand particles are crumbled and in a mortar and mixed with crumbled soil.

10 g of air-dry soil ((m1) are put on a clean iron pan or crucible. **Af**ter that the sample of soil shall be calcined in a Russian stove on the hearth-warmed for 2 hours. After cooling, the residue of soil is weighed ((m2). Humus weight calculated as m3 = m1 - m2. Mass fraction of humus in soil in % is calculated according to the formula: $C = m_3 / m_2 \times 100\%$

For the measurement of pH of salt extract and content of P_20_5we used measuring kits for laboratory analysis of soil extracts Christmas+:

pH of the salt extraction is potentiometric, colorimetric (GOST 26483, GOST 26423); content of P_20_5, mg/100 g is photometric (GOST 26204).

Seedlings situation analysis technique.

We determine the average periodic growth of pine seedling planted at various sites and natural undergrowth grown of Pinus sibirica of the same age on the test plots in the forest ecosystem.

Average periodic growth of seedlings (Z_T) is determined with the use of mathematical statistics method by dividing the current periodic growth or general survivor growth on the appropriate number of years, according to the formula: $Z_T = \frac{T - Tn}{n}$

T is a survivor growth indicator

Tn is a survivor growth indicator n years ago

T - T_n is current periodic growth

n is the period of growth

It allows to determine the degree of damage of planted seedlings and regrowth of naturally grown Pinus sibirica with forest pathology monitoring techniques.

An analysis of the condition of the seedlings is carried out according to the procedure of N.N. Chernov. Scale of seedlings condition category gives the characteristics of the seedlings from greatly weakened to deadwood by their appearance with the use of surveillance techniques and descriptions (Table 5, Annex IV).

It ranked as the status of individual seedling, and all the studied plants of Pinus sibirica on a trial site are recorder in the "forest pathology inventory card" - all lesions of seedlings from pests, diseases, mechanical damage, the number of root weeds.

Analysis of survival is given as a percentage, the number of survivors and dead seedlings planted each year and for the entire study period.

The conclusion on confirmation of the hypothesis is based on a systematic analysis of the results, taking into account the dynamics by years of research. We

formulate conclusions and proposals for the introduction of Siberian pine for landscaping of Poikovsky settlement.

IV. Results and discussions.

The study showed that in the village Poykovsky there are isolated examples of stone pine adult plants, the surviving after the construction of houses and infrastructure. Study of the territory showed that soils are infertile or absent, there are lots of solid waste. Soil disturbance was judged using phytoindication: We observed the oppressed and damaged plants and areas of bare ground. Coil compaction (trampling, and the load of heavy equipment) had particularly strong impact on the index of soil disturbance. Soil reaction to specific types of anthropogenic pollution is poorly studied.

The poll showed that knowledge about the use of stone pine, its uniqueness are at an extremely low level. 86% of the villagers do not know much about the uniqueness of Siberian cedar. 56% visit a forest to collect wild plants and walks without thinking about what types of trees growing on the territory adjacent to the village, if stone pine (Siberian cedar) grows in other territories of Russia and the world. Observations have shown that 67% of tourists in the forest break twigs, trampling the grass.

Among the damaged undergrowth on test plots adjacent to the forest ecosystem School we noticed 10% (29 units) undergrowth of Siberian cedar. Analysis of natural stone pine plantations planted by residents in the district No. 3 showed that the survival rate of seedlings is very low in terms of disturbed soil (2 seedlings planted by the villagers of 17 survived).

In spring of 2013, 30 seedlings were planted in soils existing in the territory near the sports complex (Annex II). Measuring the amount of humus by calcination and use of measuring kits for analysis of soil extracts (Christmas + Lab) suggested an average degree of soil cultivation (Table 2, Annex II). Mechanical composition of soil is heavy loam and clay. Analysis of the survival rate of seedlings, with an average degree of soil cultivation showed a low survival rate -16 of 30 planted seedlings died in the first year. Survival rate is 46% (Table 3, Annex II).

In order to prove this hypothesis before planting of seedlings of Pinus sibirica, we used technique to determine soil texture (wet method). We made soil mixtures for planting: We used to add soft humus produced by the decomposition of loose litter under deciduous and coniferous-deciduous species, determined by cultivation parameters of soil (according to V.K. Pestryakov), analyzed the content of humus in the soil by calcination, as measured by the pH of the salt extraction and content of P_20_5. It resulted in friable soil, with near neutral reaction (pH = 6.8). The texture of soil is sandy loam and light and medium loamy, level of cultivation is high (Table 4, Annex III).

On several trial sites in 2013-2015 we planted 155 seedlings of stone pine (on the territory of school No. 4 in 2013 - 25, 2014 -30, 2015- 25). In 2015, 20

seedlings at the orphanage "Zabota" and 25 near the Temple of the Holy Trinity, within the "Forest of Memory" campaign to the Victory Day - 30 seedlings. (Annexes VI - VIII). Volume of added peat mixture is up to 10 liters per one seedling in one stage in the planting day. Current and periodic average growth took place, we studied diseases and pests among stuck and dead seedlings.

Analysis on the condition of the seedlings using method of N.N. Chernov showed that without soil mixtures more than half of the seedlings are characterized from strongly weakened to dead wood, while the seedlings planted with use of soil mixture do not have signs of weakening (Table 5, Annex IV). Analysis of survival showed a significant increase in the number of surviving seedlings at planting with soil mixture. Survival rate for 2013 - 92%, 2014 - 90%; 2015 - 94%. The average survival rate is 93.6%, which was by 47.6% higher than without the use of soil mixtures (Annex III, diagrams).

Average periodic growth of seedlings is determined by dividing the current periodic growth or general survivor growth on the appropriate number of years, according to the formula: $Z_T = \frac{T - Tn}{n}$. The indicator was 5.4 centimeters per year.

The study of the periodic average growth in naturally grown Pinus sibirica young trees of the same age that seedlings of studied test sites of school ecological path showed that it is less than 1.2 cm per year

Forest pathology monitoring revealed the following pests of Siberian pine, which are the most widespread: Pine bug -Aradus cinnamomeus Panz (12%); large pine weevil - Hylobius abietis L. (16%); double shoot - Evetria duplana Hb (9%); pine moth-Dendrolimus pini L. (9%). Susceptibility of planted seedlings to infection with diseases and parasites is 3-7% lower than of the young trees at the territory of the school ecological path (Table 6, Annex V).

Conclusion:

1. In this study, we analyzed 30 literature sources on growing conditions and cultivation techniques for stone pine, the study continues.

2. Adding of humus produced by the decomposition of loose litter under deciduous and coniferous - deciduous species improves survival rate of seedlings. Volume of added peat mixture is up to 10 liters per one seedling in one stage in the planting day. Best survival rate was provided by the cultivation of stone pine in sufficiently rich, fresh-drained loamy and sandy soils with a high degree of cultivation.

3. Secondary periodic seedling growth, planted with soil mixture was by 5-6% higher than the naturally growing young trees in the investigated sample plots of school ecological path.

4. Forest pathology monitoring revealed that exposure to infection with diseases for planted seedlings is 3-7% lower than for the young trees in the territory of the surveyed school ecological path.

5. Theoretical value: We received and proved effectiveness of the author's technique of growing seedlings of Siberian pine in disturbed soils in the conditions of the introduction to the plantations in the territory of Poikovsky settlement.

6. Practical value: 155 seedlings of Siberian pine on various sites in Poikovsky with soil mixture composed were planted and their survival was analyzed; Adding of soil mixtures at the time of planting does not require spring feeding that provides a survival rate 47.6% higher and facilitates the maintenance of seedlings and planting costs. This makes it possible not only to plant on the school grounds, but also on any disturbed soils of the settlements, attracting people to one time campaigns "Arbor

Festival" to guarantee the survival rate of seedlings. Using the obtained data, we developed and implemented a social project "Let us plant cedar garden together," cedar garden is being created in the school territory, we started of Siberian pine to the plantations in the Poikovsky settlement, that will contribute to the restoration of cedar area in Nefteyugansk district

Conclusions: During this study we have proved the hypothesis: The composition of soil mixture is determined to improve the survival rate of seedlings when introducing Siberian pine to plantations in disturbed soils in the settlement of Poikovsky.

Suggestions: To use the technique of growing stone pine seedlings in disturbed soils in conditions of introduction of stone pine to plantations the settlements of Nefteyugansk district and other areas of KhMAO-Ugra in conditions of disturbed soils.

II. Practical part

Based on these data, we was developed a comprehensive action plan for the conservation of the fertile layer of soil during the construction of settlements and industrial facilities in the village Poikovsky, on the introduction of Siberian pine (cedar) to the plantations on the territory of the village Poikovsky and environmental education of the population.

Terms of implementation: Practical and research work in the territory of the village Poikovsky and at the site of forest ecosystem - annualy in spring and autumn in the years 2014-2016. Environmental education - throughout the school year.

Participants: All events are organized by the members of the Youth environmental organization and school forestry "Raduga" with the guidance of teachers of the municipal educational budgetary institution School No. 4 of village Poikovsky and with the assistance of TO Nefteyugansk forestry and Sector of Urban Development and land use of administration of Poykovsky.

Plan of the activities in the 2015-16 academic year

No.	of the event	Responsible And participants	Terms of implementation	Checkoff
1	Development and justification of the social project "Our village is a cedar garden"	members of MEO and ShL "Raduga" Partners: TO Nefteyugansk forestry and Sector of Urban Development and land use of administration of Poykovsky.	2015-16 academic year	The project is designed, it is a part of district and regional competition of social projects
2.	Planting stone pine within the campaign "Forest of victory"	Members of MEO and ShL "Raduga"; Partners: TO Nefteyugansk forestry and Sector of Urban Development and land use of administration of Poykovsky.	May, 2016	It is planned to plant 50 seedlings

3	Planting stone pine within the campaign "Valley of the graduates"	Graduate of 9 and 11 grades and their families. Partners: TO Nefteyugansk forestry and Sector of Urban Development and land use of administration of Poykovsky.	May, 2016	It is planned to plant 50 seedlings
4	Planting of stone pine in the territory of secondary school No.4 within the project "Let's create a cedar garden"	Members of MEO and ShL "Raduga"; Partners: TO Nefteyugansk forestry and Sector of Urban Development and land use of administration of Poykovsky.	September, 2015 May, 2016	30 seedlings were planted; continuing creation of cedar garden on the territory of secondary school No. 4, investigating the state of planted trees. It is planned to plant 50 seedlings
5	"Ecovseobuch" for the residents of the village Poykovsky. Environmental education of residentes and students	members of MEO and ShL "Raduga" Responsible: Adelina Khusainova. Karina Yumadirova, Elena Miletskaya	2015-16 academic year	Production and distribution of illustrated leaflets, crossword puzzles, learning games
6	Campaign "Ecology for drivers"	members of MEO and ShL "Raduga" Responsible: Albina Munacheva Sofia Laktionova Anastasia Borisovskaya	May, 2016	200 drivers were given leaflets about the rare plants of Nefteyugansk district, produced by students
7	Installation of information boards	Members of ShL "Raduga" Nikolai Azarov, Alexei Zorin		Installation of 6 information boards
8	Festival "Days of trees planting»	Members of MEO "Raduga": Tatyana Martynova Albina Munacheva Sofia Laktionova	May, September	We carried out ecological festival for pupils of School No. 4 and their parents, 420 people participated in the event
9	Family holiday "Day of cedar"	Members of MEO "Raduga": Tatyana Martynova Anastasia Borisovskaya	September	We carried out ecological festival for pupils of School No. 4 and their parents, 180 people participated in the event
10	Materials in the press of ShL "Raduga"	Responsible: Anastasia Borisovskaya	Throughout the 2015-16	In each issue of the newspaper "Zeleny shum (Green Noise)"

			academic year	
11	Cleaning the school ecological trail forest of rubbish	members of MEO and ShL "Raduga" students of MOBU SOSh No. 4	Every year in spring and autumn	Campaign "The Little Prince" - cleaning of forest from rubbish each year in September and May. 210 people registered - campaign participants, cleaned the forest territory of 4 ha (recreation area) and banks 5 small freshwater forest ponds. 2 videos shot.
12	Mappets made from recycled materials at the theater "Ekokukly"	Members of ShL "Raduga" Anna Raspopina Madina Nabieva	During the year	6 performances based on author's scenario "Old cedar tales"; 3 performances "Save the forest"
13	Cartoon "The Country of Soil"	Leaders of school camp groups - members of MEO "Raduga" Polina Davydova Narmin Kasymova	June-August 2016	Work in school camp: Competition of scenarios, making muppets and decorations from recycled materials, cartoon filming, editing, voiceover. Publications on Youtube.
14	Collection of environmental fairy-tales "Old cedar tales"	Members of MEO "Raduga" Anastasia Borisovskaya	May, 2016	We carried out a contest of environmental tales and illustrations about the Siberian cedar, published a collection in printing office of MOBU "School No. 4"
15	Excursions to the school museum of nature "Soils of Nefteyugansk district", "Pinus sibirica"	Members of MEO "Raduga": Albina Munacheva Sofia Laktionova	During the year	We organized 14 excursions for students and parents.

Forecast: If we do not take measures to restore populations of Siberian pine (cedar) in the territory of the settlements in Nefteyugansk district, then, in the event of termination of the operation of this area as a settlement, subject to the preservation of oil wells and termination of production, replacement succession will take at least 100 years. Restoring of cedar forest in a given territory can not be guaranteed. If we do not have environmental education about the uniqueness of stone pine, the

vulnerability of northern soils, the difficulties of recovery in areas disturbed by settlements, roads, industrial facilities. If we do not explain the rules of conduct in the woods, lands "reclaimed" from forests, in the next 15-20 years, under the influence of anthropogenic succession there will be "man-made deserts." We need to develop measures to restore populations of cedar to preserve vulnerable to human activity northern soils, with the involvement of local authorities of Poikovsky village.

Prospects for further work: Together with the Sector of Urban Development and land use of administration of Poykovsky village we monitor the use of topsoil in areas planned for construction of apartment buildings. Together with forestry of Nefteyugansk area we select sections for the use of topsoil under logging and fire-sites. Study of soil composition at Poikovsky settlement is continuing. Ongoing study and description of the species composition of the stand at the studied area of the forest, the characteristics of plant life, determining the abundance of species, occurrence of stone pine in the studied community. According to a study, administration and the youth environmental organization of the school make practical proposals. The study results are analyzed together with the specialists of TO "Nefteyugansk forestry" for the development of measures for the conservation of fertile soils for planting pine seedlings in the territory of the Nefteyugansk district. We adjust the action plan.

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ANNEXES

Table 1.

Cultivation parameters (artificial fertility) of soil according to V.K.Pestryakov.

Indicator	Mechanical composition of the soil	Cultivation		
		Medium	Good	High
Content of humus, %	Sandy loam and sand	2.2	3.0	4.0
	Light and medium loam	2.8	3.6	4.5
	Loam and clay	3.2	4.8	5.5
pH of hydrochloric extract	Sandy loam and sand	5.8	6.8	6.8
	Light and medium loam	5.6	6.8	6.8

	Loam and clay	5.6	6.6	6.8
Content of P_20_5, mg/100 g of soil	Sandy loam and sand	18	25	50
	Light and medium loam	16	20	50
	Loam and clay	12	18	40

Determination of soil texture (wet method)

Calcination method analysis

II.

Table 2 Measurement of the amount of humus by calcination and use of measuring kits for analysis of soil extracts (according to V.K. Pestryakov)

Indicator	Mechanical composition of the soil	Cultivation
Content of humus, %	Loam and clay	3.2
pH of hydrochloric extract	Loam and clay	5.4
Content of P_20_5, mg/100 g of soil	Loam and clay	12

Table 3 Analysis of the survival of pine seedlings with an average degree of soil cultivation

Number of seedlings	Opa-city	humidity	Soil content	Result (survival rate)
9	Average	Natural (rainfall) and secondary hydration	Heavy loam	5 species

21	Average	using hose with main water	medium loam	9 species

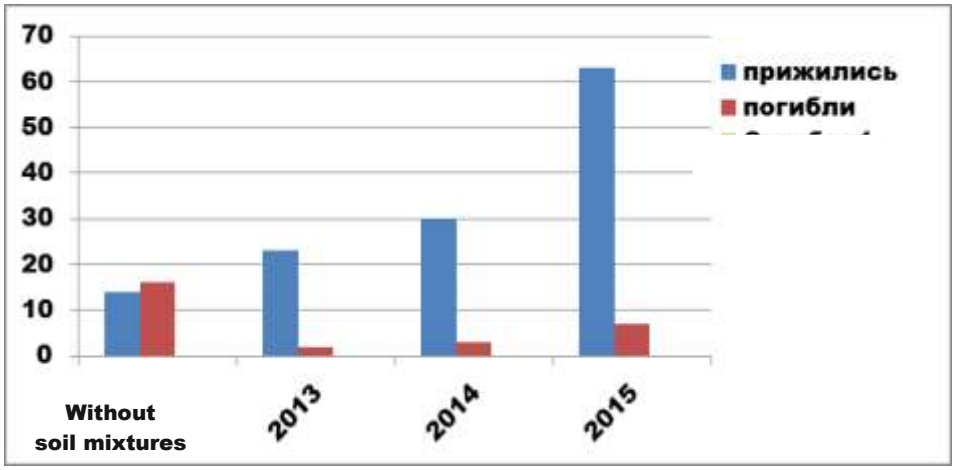
(May, 2013, planting of Pinus sibirica seedlings around the sports complex)

III.

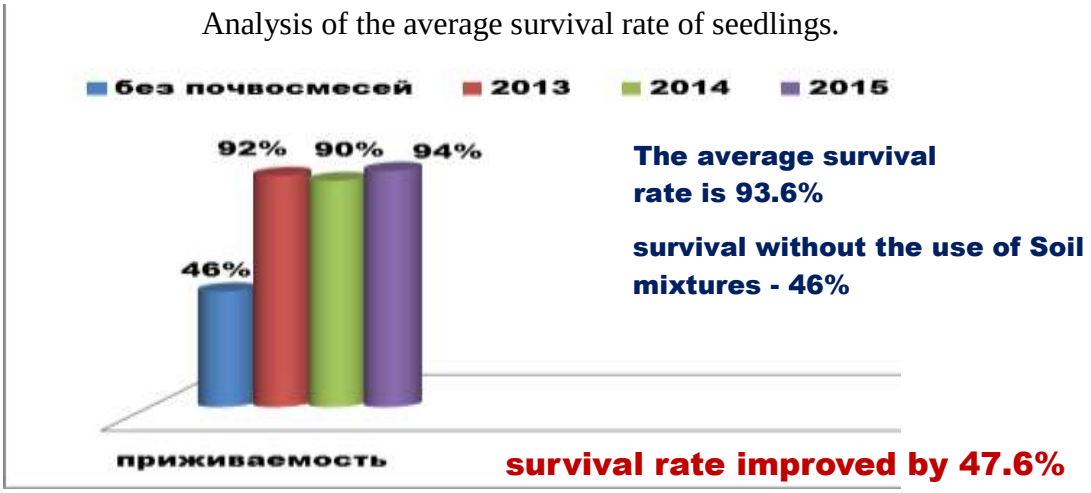
Table 4. We made soil mixtures for planting: we added soft humus produced by the decomposition of loose litter under deciduous and coniferous-deciduous species, determined parameters of cultivation of the soil (according to V.K. Pestryakov)

Indicator	Soil texture (wet method)	Cultivation
Content of humus, %	Loamy sand Light and medium loam	4.0 4.5
pH of hydrochloric extract	Loamy sand Light and medium loam	6.8 6.8
Content of $P_2 0_5$, (mg/100 g)	Loamy sand Light and medium loam	5.0 5.0

Number of dead and of established seedlings using soil mixtures by years of planting and without use of soil mixtures



Analysis of the average survival rate of seedlings.



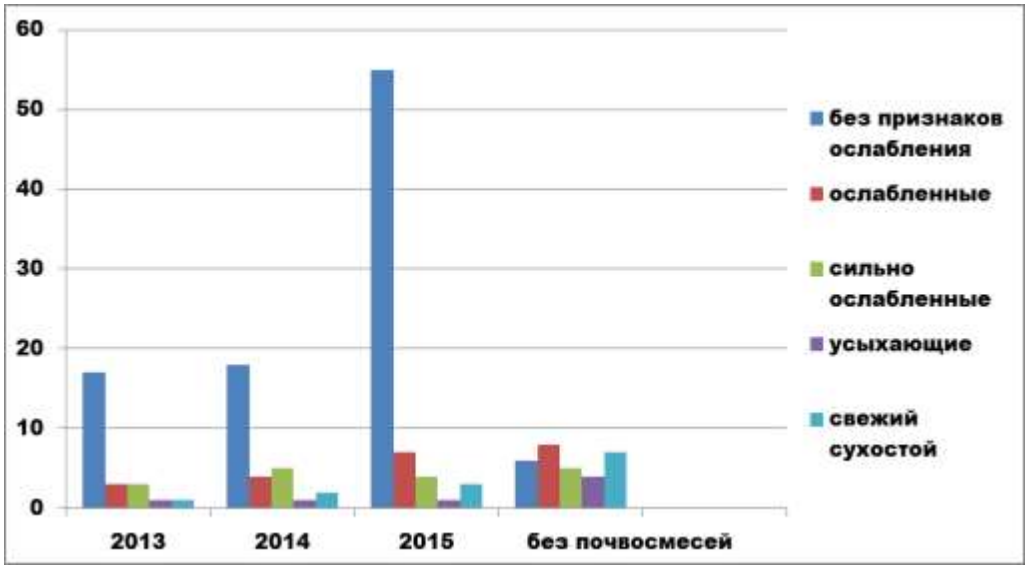
IV.

Table 5 Scale of category of Pinus sibirica seedling status by years of planting with use of soil mixture (method of N.N. Chernov)

Trees category	Years of research		
	2013	2014	2015
Number of examined planted seedlings	25	30	70
No signs of weakening (thick crown, green needles, normal growth of the current year for the breed, age and site conditions)	17	18	55
Weakened (crown is sparse, needles are light green, growth is reduced, but not more than half, some dried branches)	3	4	7
Very weakened (crown is delicate, light green needles, matte, weak growth, less than half of normal rate, drying branches up to 2/3 of the crown)	3	5	4
Dry out (crown is very open, needles are gray, yellow or yellow-green, growth is very weak or non-existent,	1	1	1

drying branches more than 2/3)			
New dead wood (pine needles are gray, yellow or red-brown, partially falling bark)	1	2	3

Analysis on the condition of the seedlings, planted in 2013-15 years with soil mixture, and without soil mixture using method of N.N.Chernov



V.

Table 6 Forest pathology monitoring revealed that exposure to infection with diseases for planted seedlings is 3-7 % lower than for the young trees in the territory of the surveyed school ecological path.

Types of pests / Study category	**Pine bug - Aradus cinnamon-meus Panz**	**Pine weevil - Hylobius abietis L.**	**Banded pine weevil - Pissodes notatus L.**	**Pine-shoot moth - Evetria buoliana Schiff**	**Double shoot - Evetria duplanaHb**	**Pine silk warm- Dendrolimus pini L.**	**Siberian silk warm- Dendrolimus sibiricus Tschetw**	**European pine sawfly - Neodiprion sertifer Geoffr**
Young trees of Pinus sibirica on the school ecological path	**19%**	**18%**	**9%**	**9%**	**12%**	**14%**	**12%**	**10%**
Seedlings of Pinus sibirica								

planted with the use of soil mixtures	**12%**	**16%**	**2%**	**6%**	**9%**	**9%**	**55%**	**4%**

Aradus cinnamon

Pine weevil

Siberian silk warm

Top drying

VI

Seedlings of Pinus sibirica planted in the territory of MOBU SOSh No. 4:
in 2013 - 25, 2014 -30, 2015- 25

Planting seedlings of Pinus sibirica in creating od cedar garden in the territory of MOBU School No. 4 in 2013-2015

Siberian pine garden in the territory of MOBU School No. 4 in a village Poykovsky. February, 2016

VII

In 2015, 25 seedlings of Pinus sibirica planted near Holy Trinity Cathedral

Planted within the "Forest of Memory" campaign to the Day of Victory - 30 seedlings of Pinus sibirica.

In 2015, 20 seedlings of Pinus sibirica planted near the orphanage "Zabota."