Excursion Guide for Valuable Timber of Conifer and Broadleaf Trees Production.

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General Information about Training and Experimental Forest of Saint-Petersburg State Forest Technical University:

- Year of establishment: 1805
- Geomorphology: the area is situated on Ladoga-Ilmen lake-glacial lowland (the bottom of lake glacial basin). The height above sea level varies from 20 up to 70 meters.

Study Area: Lisino, Leningrad Region, Russia

Climate

The climate of the study area is characterized as moderate, which is influenced by cold air masses coming from the Arctic, and the warmer air mass from the Atlantic. The regional climate is strongly influence by the proximity of the Baltic Sea and Ladoga Lake

According to the weather station Luban maximum temperature of Lisino is 33 ° C in July and minimum -40 ° C in January. Average annual rainfall is approximately 590mm. additionally the average wind speed is 3.3 m/s and average relative humidity 80%. The climatic conditions is favorable for growth and development of trees and shrubs. The length of the growing period is approximately 150-160 days.

Hydrology

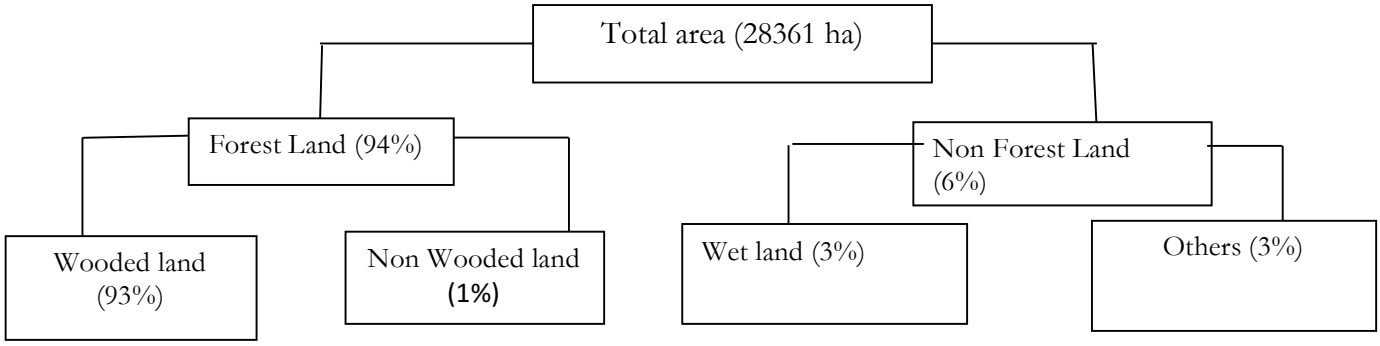
The largest river Lustovka crosses the forest from NW to SE. There are three streams in the forest area: Laguza, Heart and Kastenka. In addition, two channels: Kuznetsovsky and Kozhinsky pass through the forest.

Soils

The study area is located 30 to 70m above sea level. The topography is flat and undulating. Small flat hills formed by glacial debris are scattered throughout the forest. Formation of Podzol in marsh is the main soil in Lisino. Other predominant soil types are moor-humus podzolization (20%), podzolic moder-mor humus (18%), marsh soil type (57%), torf-podzolic (2%) and alluvial soils (3%).The soil is slightly acidic, poor with well-developed podzolic humus horizons.

Land use distribution

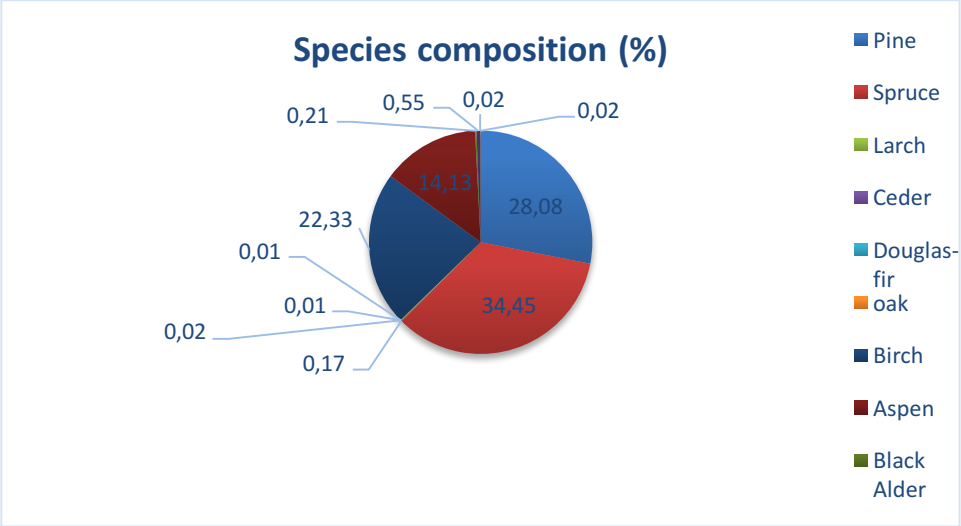
Total area of Lisino divided into 2 categories: forest land and non-forest land



In figure other lands include: landscaped meadows, ravines, peat harvesting, and road communications (air and cable power lines, phone lines), gas pipelines. Likewise, non-wooded land includes: forest plantation, nurseries, dead wood etc.

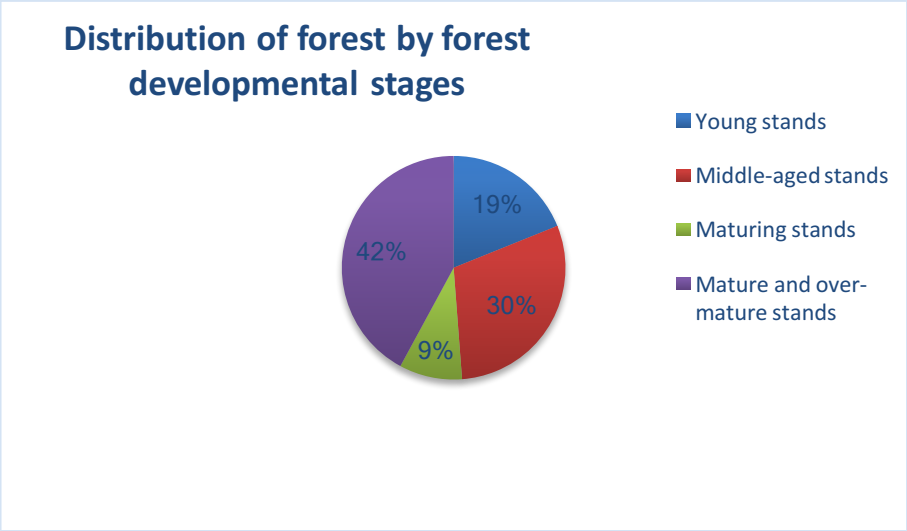
The distribution of forest area by dominant species

Lisino forest is dominated by coniferous species which occupy 63% of the forested area while deciduous species cover 37%.



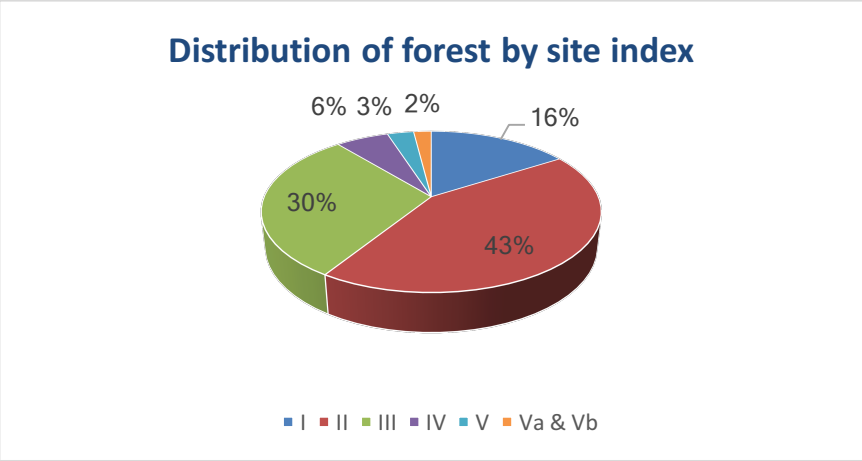
The distribution of forest area by forest developmental stages

Lisino forest is dominated by mature and over mature stands (42%), and has high proportion of middle-aged stands (30%).



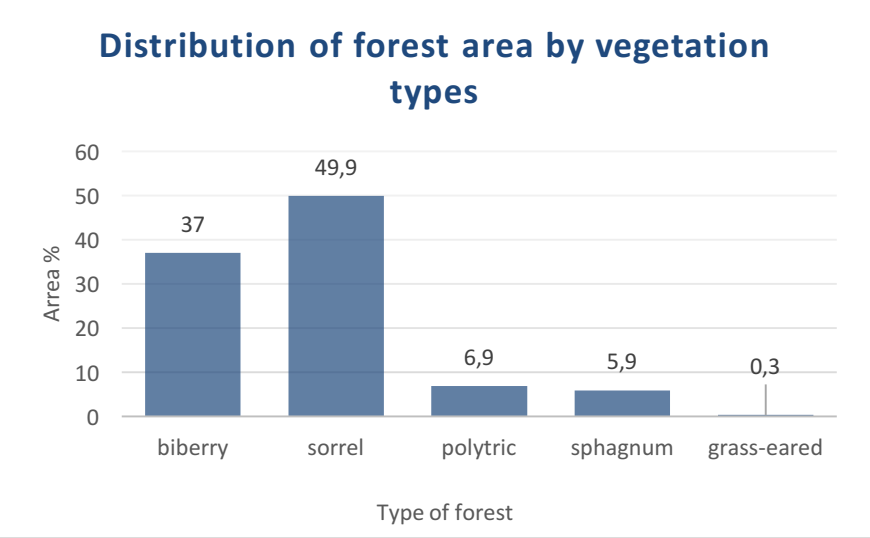
The distribution of forest area by site index (growth class)

Site index is another important factor in forests. Forest land in Lisino is also divided According to site index. There are 6 site index classes in Lision (Fig 7). I class is the best site while Va and Vb are poor sites. In this study data were collected from I,II and III sites.

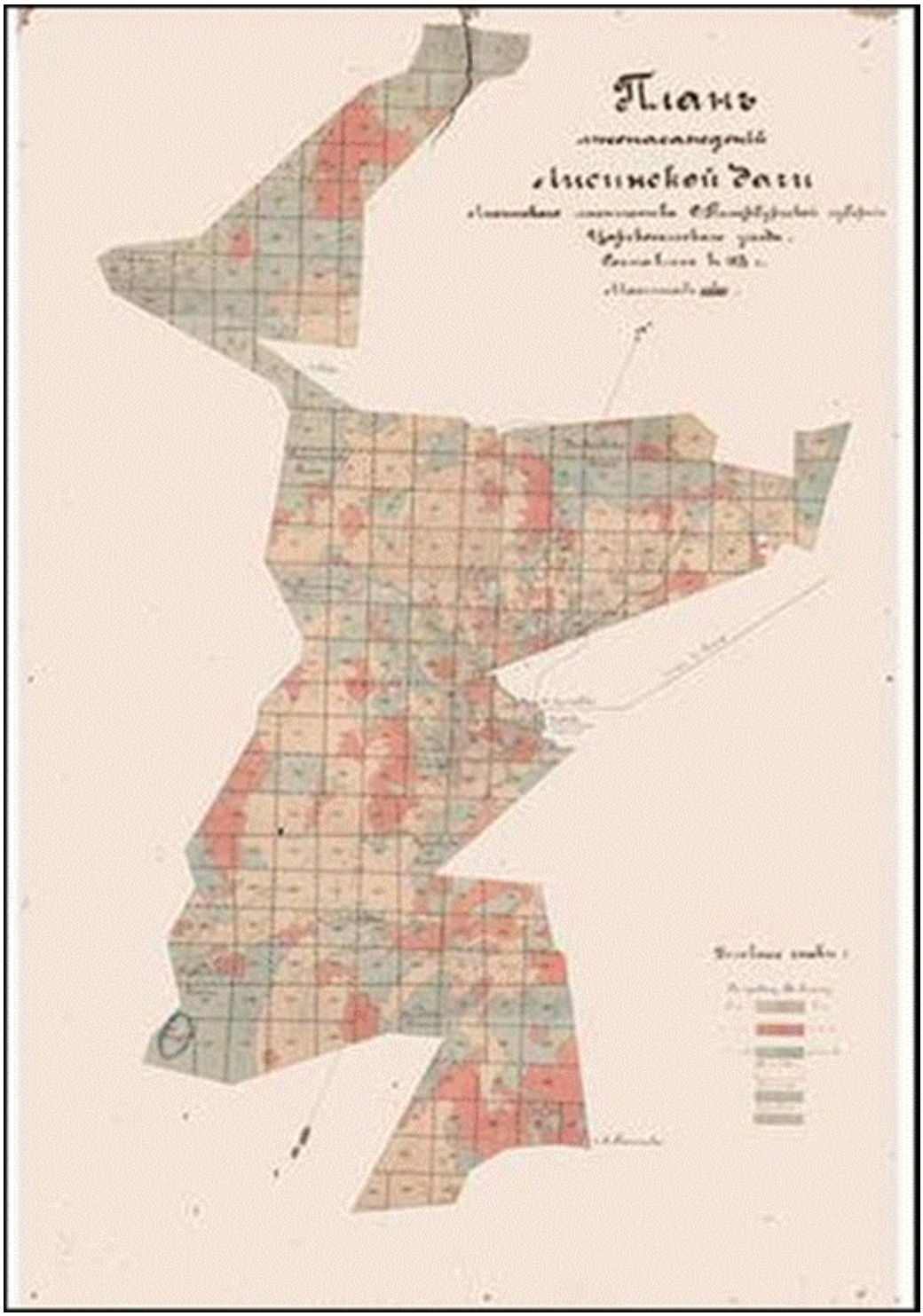


The distribution of forest area by vegetation types and forest conditions

The forest lands in Lisino are dominated by Sorrel and Bilberry floor vegetation. Other forest floor vegetation are Polytrichium mosses, Sphagnum mosses and Grass-eared vegetation.



Forest management plan for Lisino training and experimental forest - 1841



Demonstration plot № 1

Location: Block № 1 Compartment № 60

Compartment description

Size of the compartment: 5.6 ha
Dominating species: Scots pine
Age: 60 years, estimated at the year 2005

Plot description

Date of plot establishment: 2017
Size of the plot: 0.20 ha

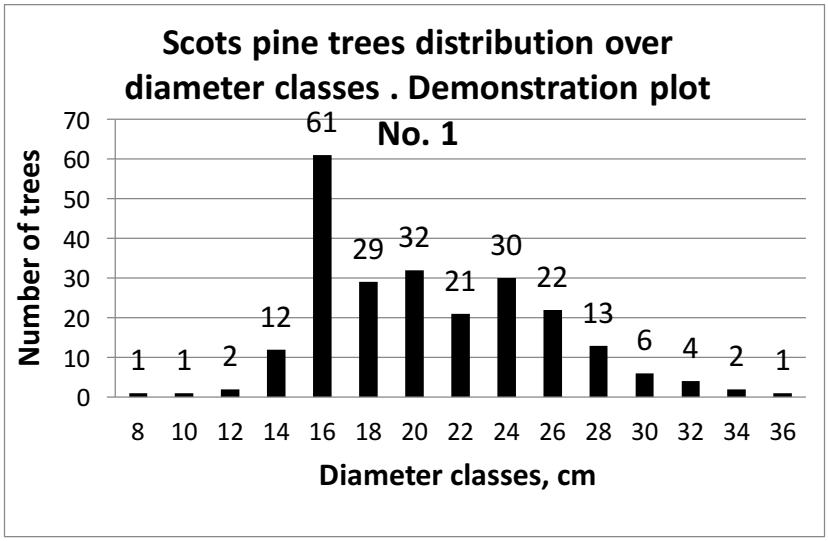
Tree stand description

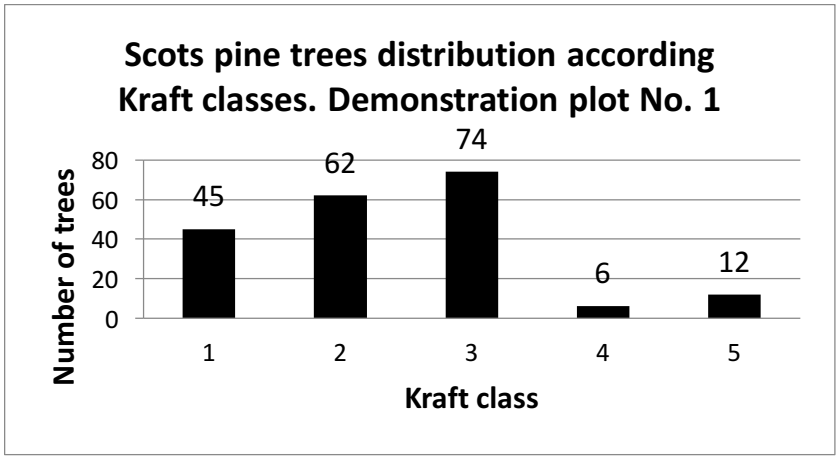
Tree stand description		Tree stand description per layers						
Dominating species	Growth class	№ of Layer	Composition and age per stand elements	Mean height, m	Density	Basal area, m^2/ha	Wood stock, m^3/ha	
Age class	Forest type						GST	Dead wood
Scots pine	I-a	I	10 SP	25,0	0,97	36,89	459,5	8,48
III	Sorrel							

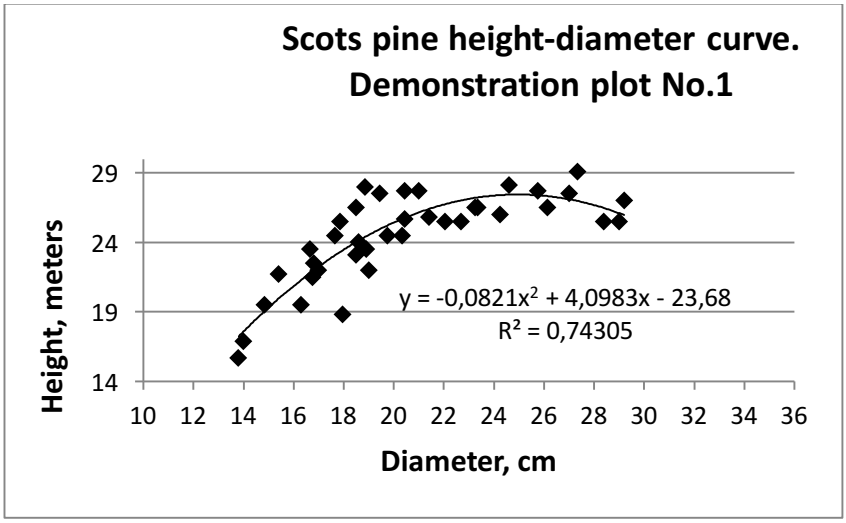
Tree stand elements description

Layer	Species	Age, years	Mean		Merchantability class	Basal area, m^2/ha	Wood stock, $м^3$/ha		Number of trees per hectare
			H, m	DBH cm			GST	Dead wood	
1	Scots pine	65	25,0	21,7	1	36,89	459,5	8,48	930

Forestry operations: thinning at the year 1977
Objective: A demonstration of possibilities of growing valuable timber of Scots pine trees by the application of an intensive approach.







Crop trees characteristics on demonstration plot and per hectare.

Main species: Scots pine
Age: 65 years
Number of trees: Total – 199
Crop trees on plot – 28
Crop trees per hectare – 140
Mean diameter: Total – 21.7 cm
Crop trees – 26.9 cm
Basal area: Total per hectare – 36.89 m^2/ha
Crop trees per hectare – 8.08 m^2/ha
Crop tress on plot – 1.62 m^2
Growing stock: Total per hectare – 459.5 m^3/ha
Crop trees per hectare – 104 m^3/ha
Crop trees on plot – 20.8 m^3

Demonstration plot № 2

Location: Block № 194 Compartment № 29

Compartment description

Size of the compartment: 3.3 ha
Dominating species: Scots pine
Age: 65 years, estimated at the year 2005

Plot description

Date of plot establishment: 2017
Size of the plot: 0.20 ha

Tree stand description

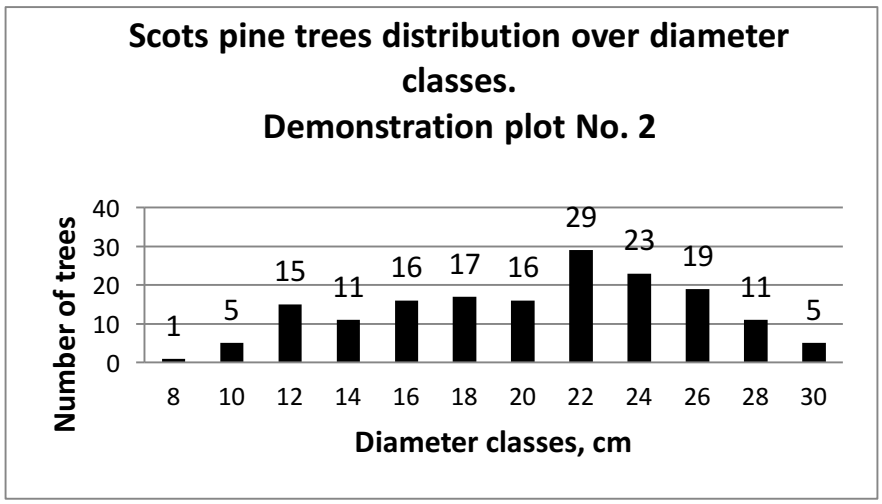
Tree stand description		Tree stand description per layers						
Dominating species	Growth class	№ of Layer	Composition and age per stand elements	Mean height, m	Density	Basal area, m^2/ha	Wood stock, m^3/ha	
Age class	Forest type						GST	Dead wood
Scots pine	I-a	1	10 SP	27,5	0,7	27,64	397,7	72,8
III	Sorrel	2	$6,2NS_I$ $2,4NS_{II}$ 1,4BR	15,5	0,28	8.6	72,8	-

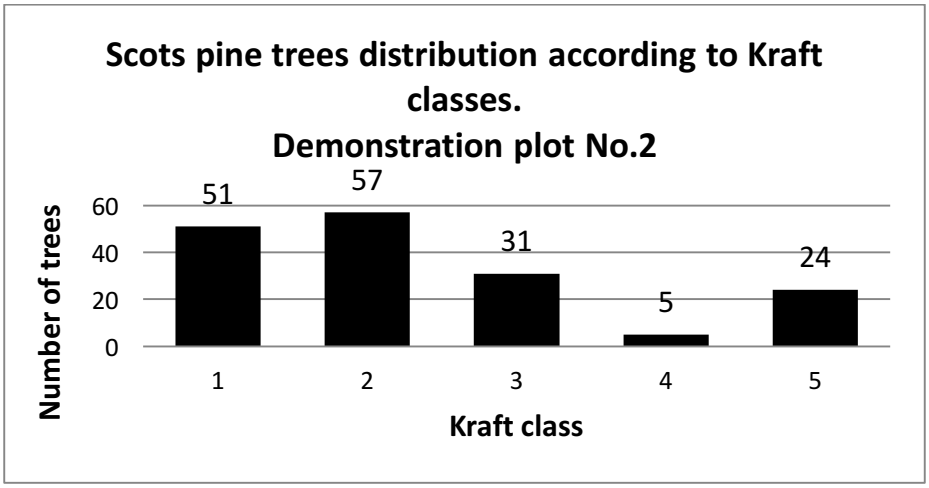
Tree stand elements description

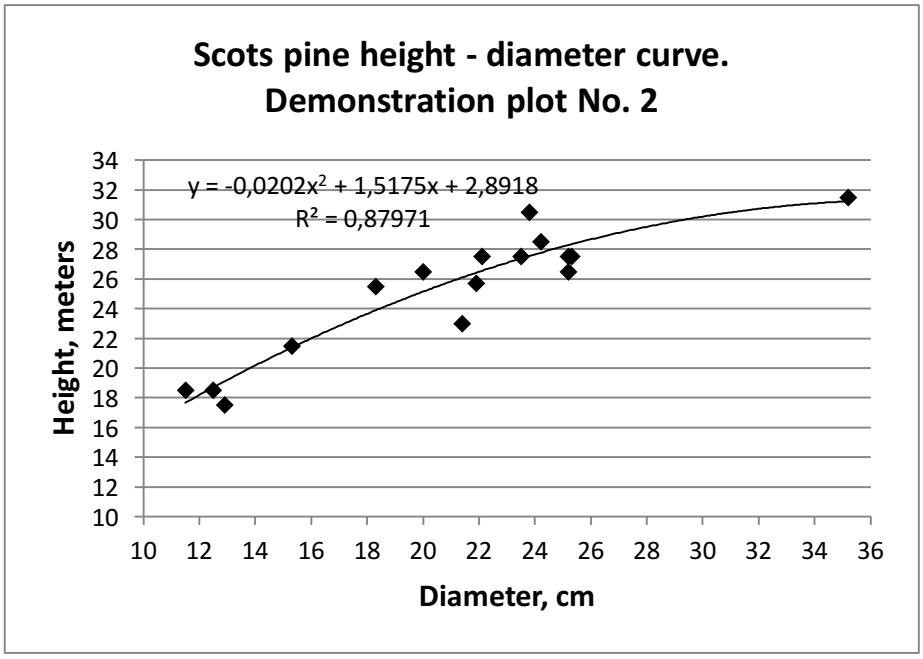
Layer	Species	Age, years	Mean		Merchantability class	Basal area, m^2/ha	Wood stock, $м^3$/ha		Number of trees per hectare
			H, m	DBH cm			GST	Dead wood	
1	Scots pine	55	27,5	22	1	27,64	397,7	20,5	725
2	Norway spruce	55	12,5	10,8	1	2,66	17,3		290
2	Norway spruce	110	16,0	15,6	1	5,01	45,0		260
2	Birch	50	18,5	12,9	4	0,92	10,4		75

Forestry operations: cleaning at the year 1955

Objective: A demonstration of possibilities of growing valuable timber of Scots pine trees by the application of an intensive approach.







Crop trees characteristics on demonstration plot and per hectare.

Main species: Scots pine
Age: 55 years
Number of trees: Total – 168
Crop trees on plot – 28
Crop trees per hectare – 140
Mean diameter: Total – 22.0 cm
Crop trees – 26.3 cm
Basal area: Total per hectare – 36.24 m^2/ha
Crop trees per hectare – 7.72 m^2/ha
Crop tress on plot – 1.54 m^2
Growing stock: Total per hectare – 470.5 m^3/ha
Crop trees per hectare – 114.2 m^3/ha
Crop trees on plot – 22.8 m^3

Demonstration plot № 3

Location: Block № 79 Compartment № 28

Compartment description

Size of the compartment: 3.7 ha

Dominating species: Norway spruce

Age: 25 years, estimated at the year 2005

Plot description

Date of plot establishment: 2017

Size of the plot: 0.20 ha

Tree stand description

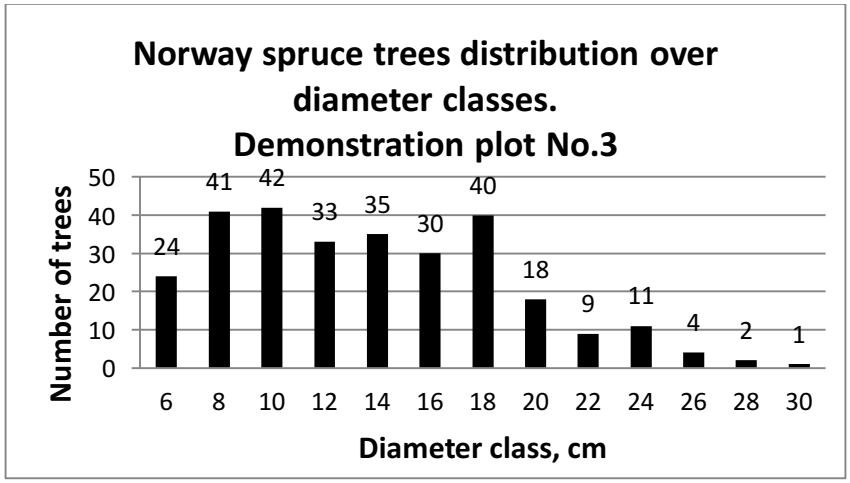
Tree stand description		Tree stand description per layers						
Dominating species	Growth class	№ of Layer	Composition and age per stand elements	Mean height, m	Density	Basal area, m^2/ha	Wood stock, m^3/ha	
Age class	Forest type						GST	Dead wood
Norway spruce	II	1	9,5NS0,3AS 0,2BR	17,9	0,8	26,72	303,1	2,4
III	Sorrel	2	8,6WL1,4AL	12,1	0,1	2,05	14,54	9,0

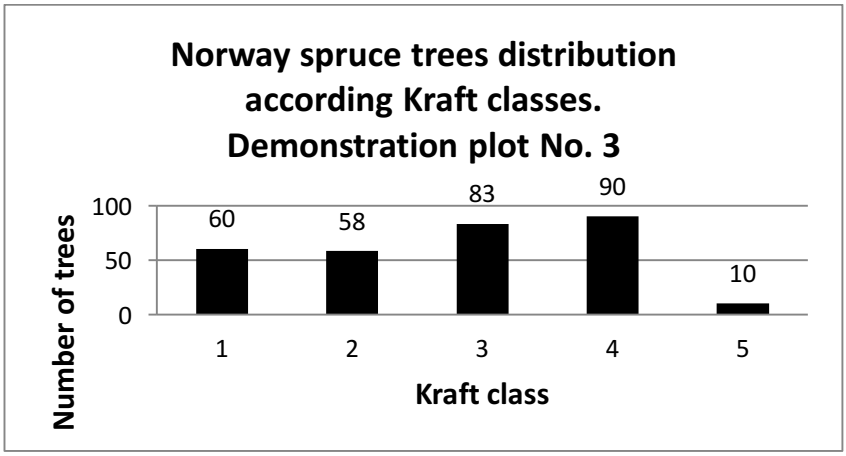
Tree stand elements description

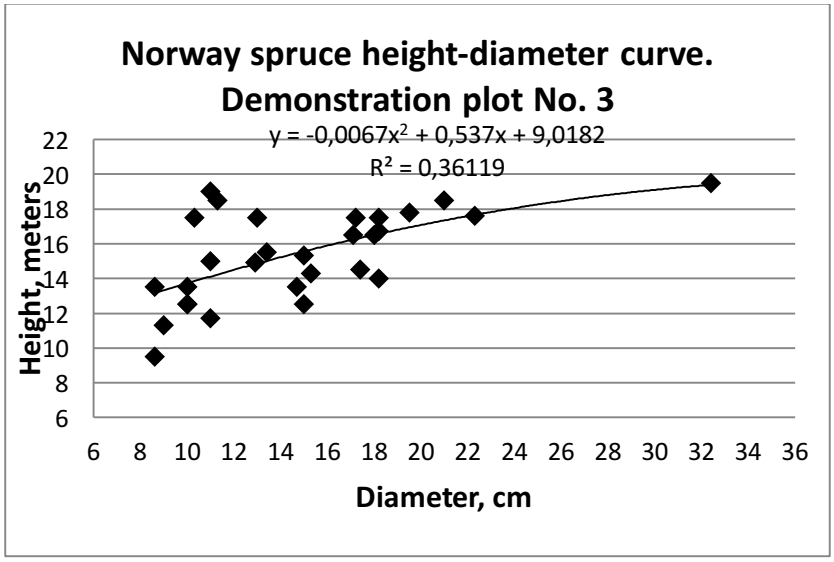
Layer	Species	Age, years	Mean		Merchantability class	Basal area, m^2/ha	Wood stock, $м^3$/ha		Number of trees per hectare
			H, m	DBH cm			GST	Dead wood	
1	Norway spruce	60	18	14,7	1	24,75	288,45	2,38	1450
2	Willow	30	12,5	13,8	3	1,53	12,46	-	90
1	Birch	30	15	10	2	0,79	7,18	-	100
1	Aspen	30	14,8	11,4	3	1,18	7,44	-	115
2	Alder	15	9,5	18,2	3	0,52	2,08	8,99	20

Forestry operations: no data

Objective: A demonstration of possibilities of growing valuable timber of Norway spruce trees by the application of an intensive approach.







Crop trees characteristics on demonstration plot and per hectare.

Main species: Norway spruce
Age: 60 years
Number of trees: Total – 290
Crop trees on plot – 52
Crop trees per hectare –260
Mean diameter: Total – 14.7 cm
Crop trees – 20.4 cm
Basal area: Total per hectare – 28.8 m^2/ha
Crop trees per hectare – 8.73 m^2/ha
Crop tress on plot – 1.75 m^2
Growing stock: Total per hectare – 317.6 m^3/ha
Crop trees per hectare – 111.8 m^3/ha
Crop trees on plot – 22.4 m^3

Demonstration plot № 4

Location: Block № 201 Compartment № 3

Compartment description

Size of the compartment: 3.2 ha

Dominating species: Norway spruce

Age: 25 years, estimated at the year 2005

Plot description

Date of plot establishment: 2017

Size of the plot: 0.23 ha

Tree stand description

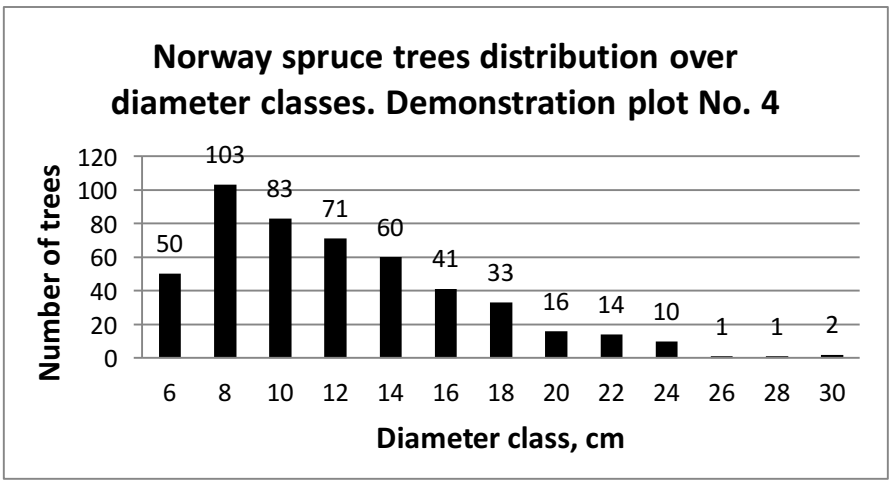
Tree stand description		Tree stand description per layers						
Dominating species	Growth class	№ of Layer	Composition and age per stand elements	Mean height, m	Density	Basal area, m^2/ha	Wood stock, m^3/ha	
Age class	Forest type						GST	Dead wood
Norway spruce	I	1	10NS+WL+ BR+AS	14,1	1,0	28,68	241	2,3
II	Sorrel	2	$10NS_I$	23,1	0,1	3,38	42,0	-

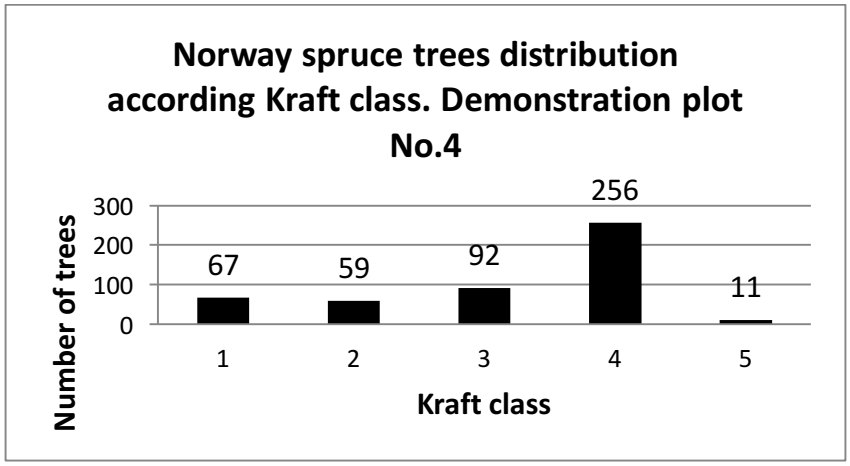
Tree stand elements description

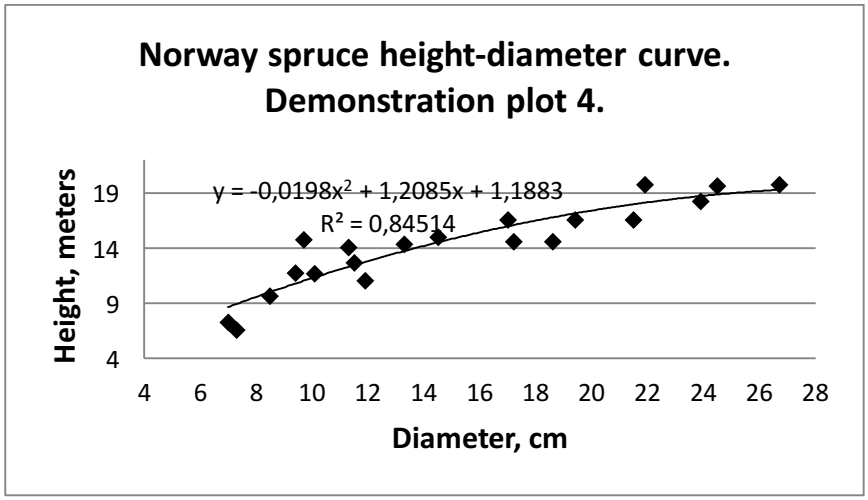
Layer	Species	Age, years	Mean		Merchantability class	Basal area, m^2/ha	Wood stock, $м^3$/ha		Number of trees per hectare
			H, m	DBH cm			GST	Dead wood	
1	Norway spruce	35	14,1	13,1	1	27,64	234,0	2,3	2061
2	Norway spruce	140	23,1	30,0	1	3,38	42,0	-	48
1	Birch	35	13,5	10,1	1	0,42	2,7	-	52
1	Willow	35	15,7	13,5	3	0,43	3,4	-	30
1	Aspen	35	13,5	9,6	3	0,13	0,9	-	17

Forestry operations: experimental cutting in the year 1980

Objective: A demonstration of possibilities of growing valuable timber of Norway spruce trees by the application of an intensive approach.







Crop trees characteristics on demonstration plot and per hectare.

Main species: Norway spruce
Age: 35 years
Number of trees: Total – 487
Crop trees on plot – 55
Crop trees per hectare –239
Mean diameter: Total – 13.8 cm
Crop trees – 18.7 cm
Basal area: Total per hectare – 32.0 m^2/ha
Crop trees per hectare – 6.82 m^2/ha
Crop tress on plot – 1.57 m^2
Growing stock: Total per hectare – 283.0 m^3/ha
Crop trees per hectare – 72.4 m^3/ha
Crop trees on plot – 16.7 m^3

Demonstration plot № 5

Location: Block № 201 Compartment № 4

Compartment description

Size of the compartment: 8.0 ha
Dominating species: Birch and Aspen
Age: 10 years, estimated at the year 2005

Plot description

Date of plot establishment: 2017
Size of the plot: 0.115 ha

Tree stand description

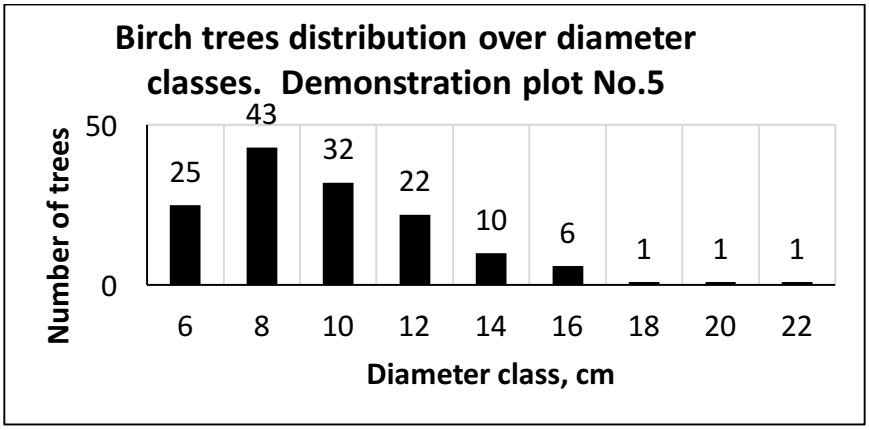
Tree stand description		Tree stand description per layers						
Dominating species	Growth class	№ of Layer	Composition and age per stand elements	Mean height, m	Density	Basal area, m^2/ha	Wood stock, m^3/ha	
Age class	Forest type						GST	Dead wood
Birch	I	1	4,6BR3,2WL 1,9AL 0,2AS0,1NS	15,0	1,0	21,255	184,96	0,66
III	Forb							

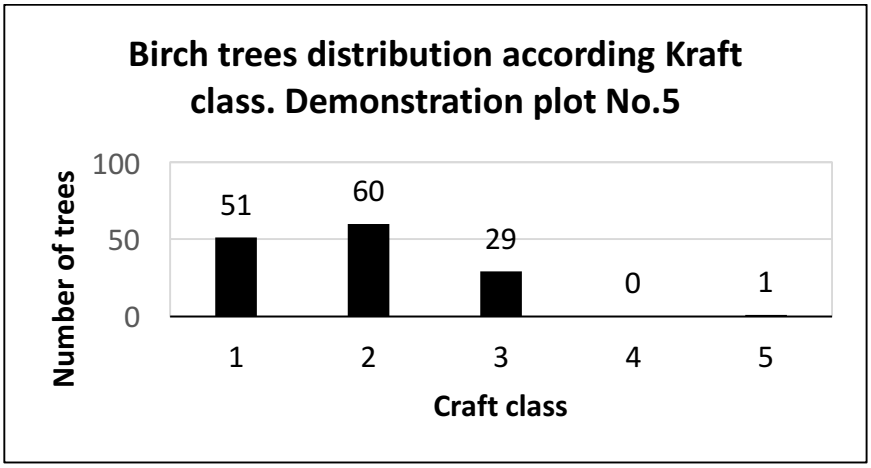
Tree stand elements description

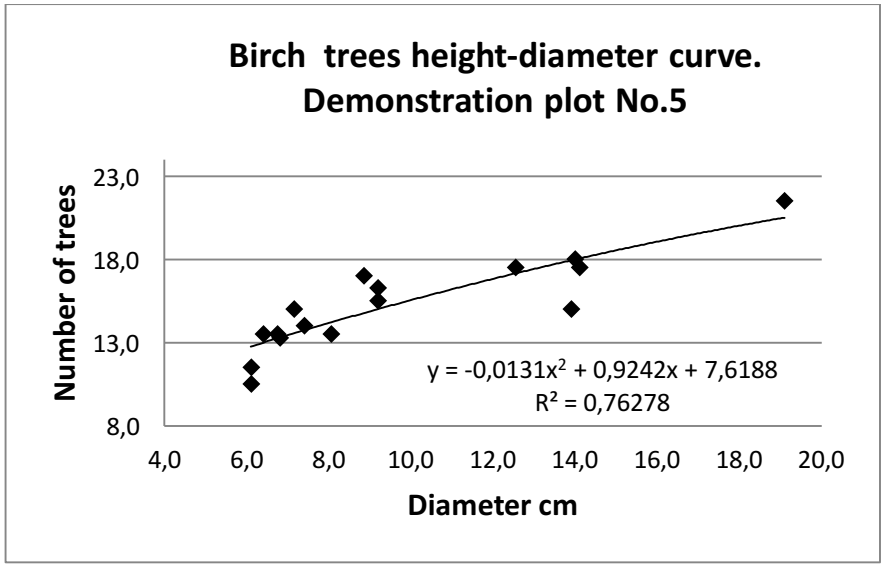
Layer	Species	Age, years	Mean		Merchantability class	Basal area, m^2/ha	Wood stock, $м^3$/ha		Number of trees per hectare
			H, m	DBH cm			GST	Dead wood	
1	Birch	30	15,5	10,2	-	10,00	85,16	0,31	1217
1	Willow	30	14,8	11,1	-	6,478	58,97		669
1	Aspen	30	14,5	11,3	-	0,347	3,21	0,11	35
1	Alder Grey	15	14,5	11,3	-	3,98	34,45	-	443
1	Norway spruce	30	11,3	9,7	-	0,45	3,17	0,24	61

Forestry operations: clear cutting in the year 1989

Objective: A demonstration of possibilities of growing valuable timber of Norway spruce trees by the application of an intensive approach.







Crop trees characteristics on demonstration plot and per hectare.

Main species: Birch
Age: 30 years
Number of trees: Total – 1217
Crop trees on plot – 19
Crop trees per hectare –165
Mean diameter: Total – 10.2 cm
Crop trees – 13.5 cm
Basal area: Total per hectare – 21.26 m^2/ha
Crop trees per hectare – 2.48 m^2/ha
Crop tress on plot – 0.29 m^2
Growing stock: Total per hectare – 185.0 m^3/ha
Crop trees per hectare – 18.1 m^3/ha
Crop trees on plot – 2.09 m^3