Development of vegetation after group selective felling in urban forest, Latvia

Edgars Bergs, Inga Straupe, Jānis Donis

Faculty of Forestry, University of Life Sciences and Technologies, Latvia, Akademijas iela 11, Jelgava, Latvia

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Introduction

The aim of the research is to characterize the regeneration of ground vegetation after the group selective felling in urban forest, Riga, Latvia.

The regeneration of the Scots pine *Pinus sylvestris* L. under the crown practically is not happening.

Group selective felling is one of the methods to promote natural regeneration of Scots pine. Urban forests differ in different ways from comercial forests. Urban forests are heterogeneous forests, often composed of man-made landscapes and generally they are very variable of species. Urban forests can consist only of a few species or have a huge variety of native and non-native species. The urban forests consist of trees of various ages and health levels. Not only abiotic and biotic factors influence trees in urban areas, but are closely linked to human activities and artificial infrastructure. Light under the crown is the main factor to natural regeneration and the strengthening, growth, survival of ground vegetation. Openings of the forest stand create a variety of light conditions in both the openings and their edges, depending on the angle of the sun and the height of the surrounding trees. As the opening increases, the amount of light in its centre increases, as a function from an stands opening diameter and height of surrounding trees.

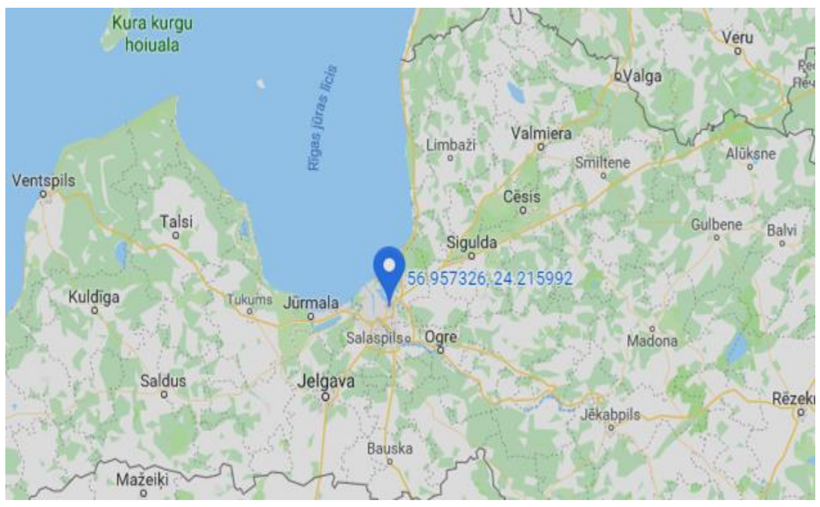

Fig.1. Location of object

Fig.2. Planted Scots pine

Methodology

The object is the forest area managed by the company SIA “Riga Meži” in Riga, Latvia (Figure 1). In 2017 this area was thinned, creating a total of 37 openings (small clear cuts), where each opening area is 0.2 ha. In spring 2018, more than 20 000 Scots pine plants were planted (Figure 2). For the research we choosed 10 openings (Figure 3) . The design of sample plots is shown in Figure 4. 17 sample plots were established in each opening, a total - 170 sample plots. The centre of opening is marked with a wooden stick. The first sample plot with radius of 2.82 m is in the centre. Four (three in the opening, one in the forest) sample plots with radius 2.82 m are oriented to N, S, E and W. In each plot Scots pine plants and seedlings were counted and measured, and other vegetation was detected according to the Braun-Blanquet method, determing the total projective coverage of vegetation and projective coverage of each species. In sample plots established in the forest, also plants of tree and shrub layers were listed and their projective coverage were detected. Data was collected in 2018 and 2020.

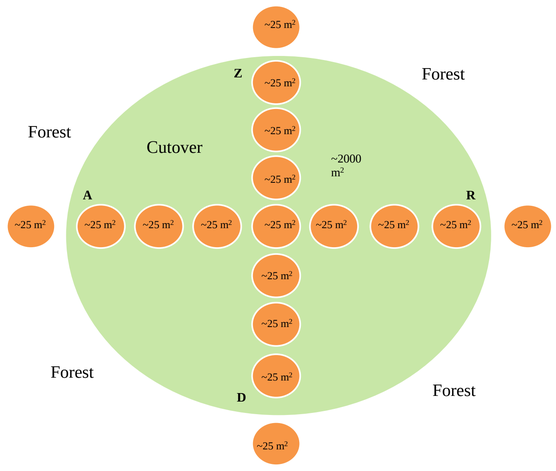

Fig.3 and 4. The design of sample plots

Results

In total 59 species – 8 tree, 13 shrub and 38 herbs was found in 2018 and 76 species – 12 tree, 15 shrub and 49 herbs were found in 2020 (Figure 5). Most of the species was found on the E side and in the centre (Figure 6). In 143 sample plots Scots pine *Pinus sylvestris* were found. The height of planted Scots pine mostly varied from 0.7 to 1.1 m and the height of Scots pine seedlings - from 0.3 to 0.4 m. In 2018 in every opening in average there were 5 Scots pines and 19 Scots pine seedlings, but in 2020 – 4 Scots pine and 4 Scots pine seedlings (Figure 7 and 8). The most dominant tree species in every opening was Scots pine *Pinus sylvestris* (100 %), than silver birch *Betula pendula* (87 %) follows, but in the area of the forest - silver birch *Betula pendula* (75 %) and rowan *Sorbus aucuparia* (67 %). The most dominant shrub species in every opening were *Rubus idaeus* L. (99 %) and *Vaccinium myrtillus* (73 %), but in the forest - *Vaccinium myrtillus* (90 %) and invasive shrub species - *Amelanchier spicata (*60 %). The most dominant herbaceous species in every opening were *Carex muricata* (95 %) and *Luzula pilosa* (91 %), but in the forest *Luzula pilosa* (90 %), *Maianthemum bifolium* (90 %) and *Trientalis europaea* (90 %). Invasive species also were found - *Impatiens parviflora* and *Sambucus racemosa*.

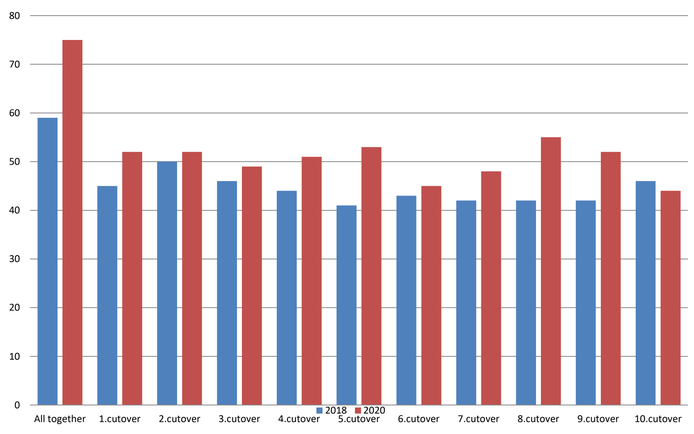

Fig. 5. Number of species in the openings

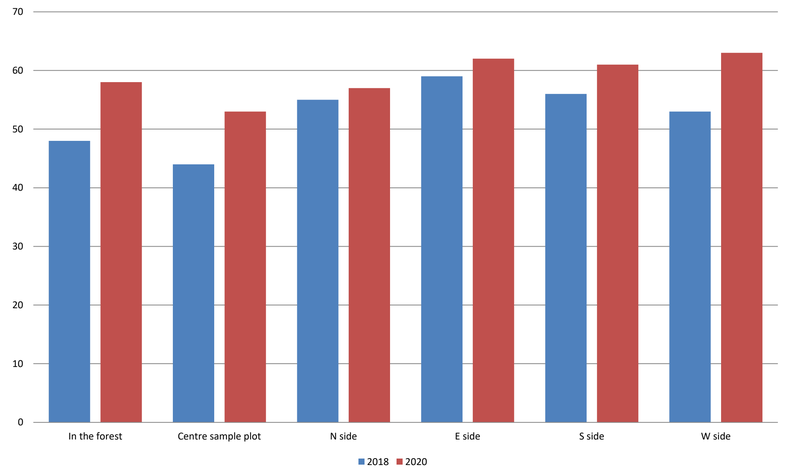

Fig. 6. Number of species by orientation

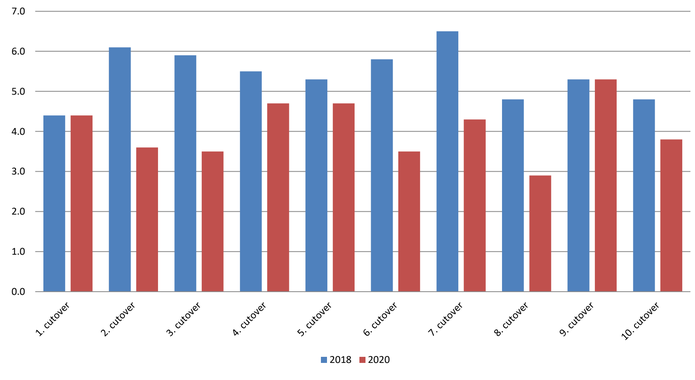

Fig. 7. The average number of Scots pines in the openings

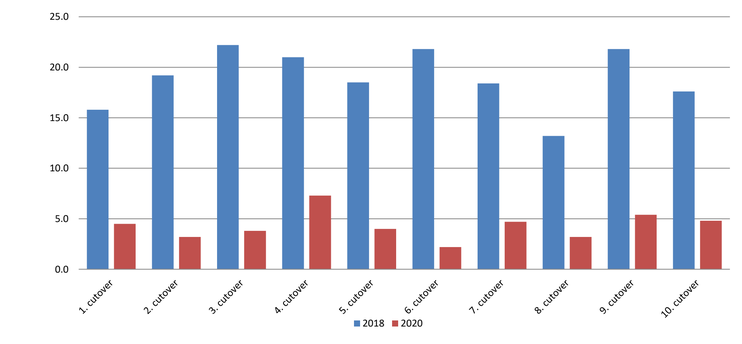

Fig. 8. The average number of pine seedlings in the openings

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The most important problem in urban forests is the synantrophisation (growth of shrubs, grasses and weeds), it is caused by eutrophication.