

CSR Estonia - Silviculture and Management of Hemiboreal Forests

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Introduction

Over half of the Cast Study Region (CSR) is covered with forests. Climate and soil conditions in Estonia are hemiboreal which means that the number of tree species in the forests is low. Six main tree species contribute approximately 99% of the total growing stock (Figure 1).

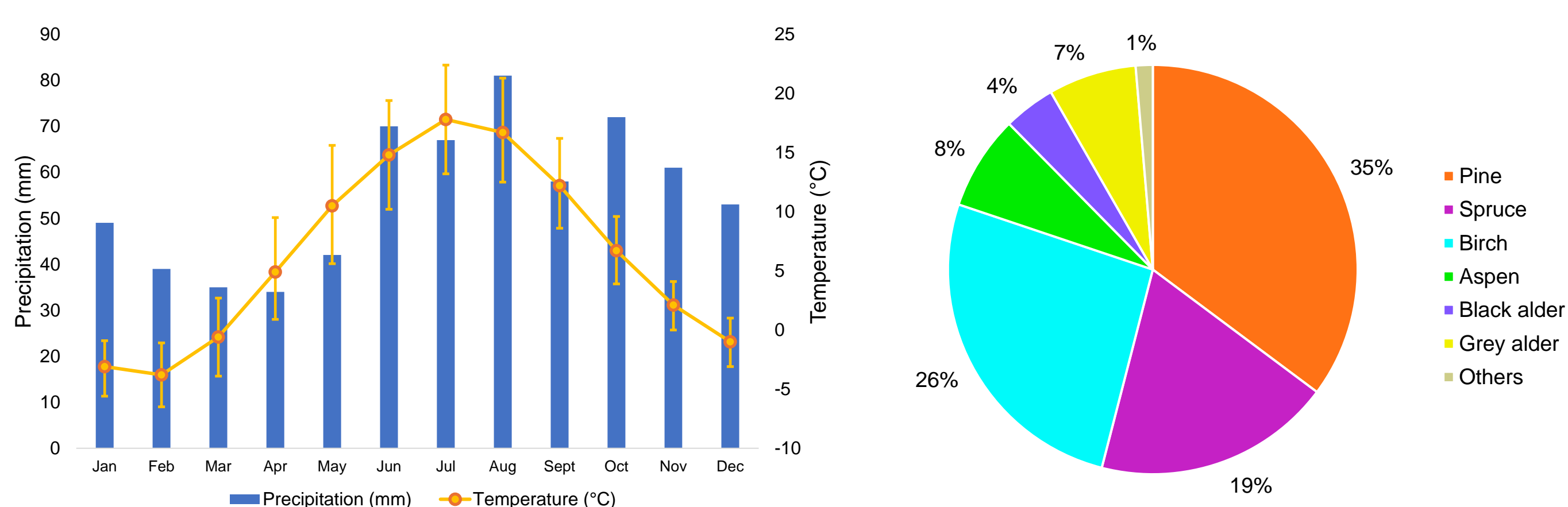


Figure 1. Left: precipitation and temperature monthly averages for period 1991-2020. The temperature error bars signify the average values of daily minimum and maximum temperatures (Estonian Environment Agency 2021). Right: The growing stock of CSR forests according to the national forest inventory (Estonian Environment Agency 2022).

Table 1. Climatic weather averages for period 1991-2020 (Estonian Environment Agency 2021)

Annual mean temperature	6.4° C
Average max temperature of the warmest month	22.4° C
Average min temperature of the coldest month	-6.5° C
Annual precipitation	662 mm
Precipitation of wettest month (August)	81 mm
Precipitation of driest month (April)	34 mm

Table 2. CSR Estonia forest characteristics according to NFI (Estonian Environment Agency 2022)

Area of forest land	2.33 million ha
Forest area %	51.3 %
Forest area % (excluding the bigger lakes)	53.5 %
Total annual increment	15.82 million m ³
Increment per hectare	6.8 m ³
Total growing stock	463.8 million m ³
Gross felling 2021	10 million m ³
Share of strictly protected forests	17.5 %

C. Climate-adapted mixed forests:

- At maturity age the stand is harvested .
- 5 m³ per hectare of retention trees are left.
- The stand is reforested using the suitable mixture of species.

D. Intensified management (focus on wood):

- Clear-cut when Mean-Annual-Increment (MAI) reaches its peak.
- No retention trees left.
- Reforested as a monoculture.



Figure 2. Different forest management systems in the CSR. Top left: close to nature harvesting and the following regeneration (photo by Jüri Pere). Top right: successful regeneration after a shelterwood cut (photo by Hardi Tullus). Bottom left: regenerated young forest with retention trees from the previous mature stand (photo by Jüri Pere). Bottom right: silver birch plantation on abandoned agricultural land (photo by Mari-Liis Siller).

The Forest Management Strategies

The different forest management concepts for monocultural and mixed forest stands were compared according to growth, yield and disturbance risk. 4 feasible forest management strategies of increasing management intensity were defined. The forest inventory data used was from the National Forest Inventory (NFI) which was obtained from the Environment Agency.

The management strategies:

A. Selection harvesting:

- Small harvest every 10 years.
- Retains a layer of mature trees.

B. Shelterwood harvesting:

- At mature age the first shelterwood cut is made, opening the canopy to allow regeneration under mature trees.
- After 10 years the remaining mature trees are removed, thus releasing the regeneration from competition of mature trees.
- 5 m³ per hectare retention trees left after the second shelterwood cut.

Summary

All the 4 defined management strategies are suitable to be used under certain site conditions with a suitable tree species, but they are not multifunctional and cannot be used interchangeably everywhere.

The biggest lack of scientific and overall knowledge is about the selection harvest which is mainly not supported by the short lifespan of the majority of the tree species which are able to grow in the region. Currently, one of the main aims of forestry science in the hemiboreal/boreal region is to find suitable techniques to use selection harvesting in a continuous cover forestry system.

With an increasing amount of forests put under nature protection, the most intensive management strategy for timber production could provide a suitable alternative to grow timber in a short-rotation forestry system on abandoned agricultural land. Currently, in CSR Estonia this management strategy is not supported by legislation and cannot be properly used.

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