

## Introduction of Net4Forest

On September 1, 2018, we started with the Erasmus+ project: Network of knowledge for efficient private forests (Net4Forest) which will last 3 years.

The lead partner is the Slovenian Forestry Institute (SFI) with project partners from:

- Latvia: Foundation Centre for Support of Forest Owner Cooperation
- Estonia: Estonian Private Forest Centre
- Sweden: Swedish University of Agricultural Sciences
- Spain: Forest Science and Technology Centre of Catalonia

The main purpose of the project is to educate stakeholders in forestry, especially advisory services and forest owners. Although literature about efficient forest products marketing and evaluation of forest services is available widely in EU, there is a big deficit in information, guidelines and training materials for forest owner's practical education, training and use.

The goal of this project is to exchange experiences, knowledge, good practice examples and to form innovative and publicly available materials, which will enable trainers and forest owners to acquire adequate knowledge for efficient forest management.

The main results of the project (handbook, hands-on guidelines, tool kit, good practice examples) will be presented to the target groups at organized events, will be published on the websites of project partners and other existing communication channels.

### PROJECT ID

**Title:** Network of knowledge for efficient private forests

**Acronym:** Net4Forest

**Co-financing program:** Erasmus+

**Project number:** 2018-1-SI01-KA202-047016

**Start:** 1. 9. 2018

**Finish:** 31. 10. 2021

**Total budget:** 326.460 EUR

**No. of partners:** 5 partners

**Lead partner:** Gozdarski inštitut Slovenije

**Website:** <http://www.gozdis.si/projekti/net4forest-mreza-znanja-za-ucinkovitejse-gospodarjenje-z-zasebnimi-gozdovi/>



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# Good practice example FULLY MECHANIZED THINNING IN SMALL DIAMETER STANDS



## 1. The first thinnings

Small diameter wood is an important but underutilized wood resource in many European countries. In addition to this wood from forests, an often overlooked potential can be found in overgrown areas and under power lines, as well as on the banks of roads and water bodies. The first thinnings are a challenge for successful forest management. It increases the cost of forest management as it usually does not generate revenue as the felled wood is left in the forest.

Realization of forest tending is lowest in pole-stage forest stands. Traditional motor-manual forest tending is economically unattractive and physically difficult work.

A viable alternative to traditional motor-manual forest tending is mechanized thinning, which allows exploitation of small diameter wood. The long-term goal of these activities is to increase extraction efficiency, reduce operating costs, and provide a well-tended forest for the future. The innovative mechanized thinning of young forests must first be fully evaluated. This important task involves partners from Slovenia, Sweden, Finland, and Spain, who are connected in the international Smallwood project. A unique feature of the project is that the same harvester is used for the field trials in the participating countries, equipped with a technologically improved, accumulating felling head and operated by the same, experienced operator.



## 2. Advantages of mechanized cutting

The Scandinavians have been doing most of the forest thinning with harvesters for some time, but they have different natural conditions – low diversity of tree species (e.g. spruce, pine, birch), more favourable terrain (slopes, relief), and a different silvicultural tradition - clear-cutting and planting. The advantage of fully mechanized felling is increased work safety, high productivity, and lower physical demands of the work. From an ergonomic point of view, such work is somewhat similar to office work, but the pitfalls can be partially avoided by well-designed work organization.

## 3. Machinery used



In the field trials, we used a Komatsu 901.4 harvester purchased by Swedish Smallwood project partners. The machine weighs about 16 tons, has a reach of 11 m and is 270 cm wide. It is equipped with a special accumulating felling head made by Swedish manufacturer Bracke C16.c, which collects bunches of thin trees. The accumulating felling head can be very effective in suitable stands. The advantages of this accumulating felling head are its robust construction and easy maintenance.

It is specially adapted to small diameter trees, the cutting capacity is 26 cm. In the upper grip, it collects bunches of trees, without depositing them on the ground. It has no feed rollers like a normal felling head, so extra bucking of taller trees is an additional challenge for the operator. The patented cutting mechanism consists of a cutting chain mounted in a groove on the circumference of the disk. The entire disk rotates, and the chain tension is always maintained. Compared to the conventional cutting mechanism, chain on a bar, there is no twisting and no risk of the chain derailing from the circumferential groove. The diameter of the disk is 795 mm, the head itself weighs 625 kg. It is intended for first thinnings, clearing roadsides, under power lines, etc. The Bracke C16.c can be mounted on harvesters, forwarders or similar machines with a suitable boom and hydraulic support system. This is the technology that enables the most efficient thinning of small diameter stands. Efficiency is highest at high stand densities, dbh of about 10 cm, and average stand height should not exceed 8 m.



We used Bracke C16.c accumulating felling head in the field trials, but this is not the only processor head of this type on the market.

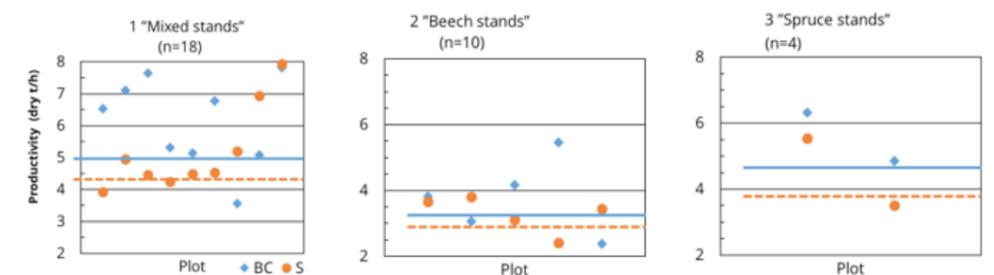
## 4. Test plots in Kočevje

Two different mechanized thinning work techniques were tested on the experimental plots. In practice, the conventional selective thinning technique is more established and commonly used technique, where the operator selects trees according to the thinning objectives without following a specific order. However, in recent years, boom-corridor thinning has gained popularity. This is a geometric thinning technique in which trees are cut according to the corridor created in front of the extended boom. Work technique is adapted for thinning smaller diameter stands with an accumulating felling head. The corridors are narrow and relatively randomly laid out. Thinning objectives and operator experience are very important in placing the corridors in the stand. Compared to conventional selective thinning, the stand looks visually similar after thinning with one or the other method.

## 5. Test plots results

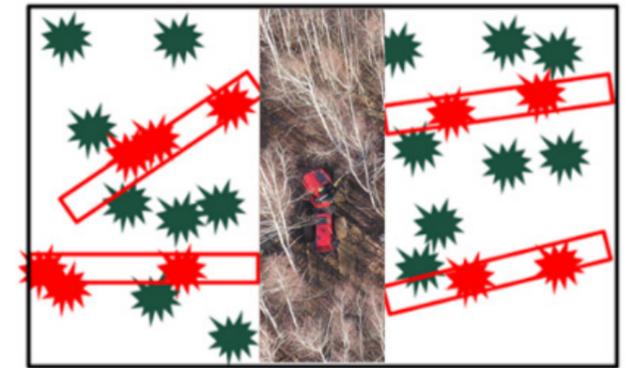
Field studies were conducted in Kočevje in January and February 2020 to assess the applicability of mechanized felling for thinning small diameter stands in Slovenia. We thinned three different types of younger stands: beech stands, spruce stands and abandoned agricultural land consisting mainly of hazel and birch. Field conditions were not always favourable for harvesters, but they were representative of the diverse Slovenian landscapes. Thinning was relatively heavy compared to current practice and we will strive to monitor the development of these stands in the future. We have obtained 30-64 dry tons/ha, with a thinning intensity of 34-68%. Productivity was 3,3-6,1 dry tons/h. It was found that in most stands, the use of the new boom-corridor thinning technique resulted in higher productivity compared to conventional selective thinning method.

Comparison of effects and productivity in three different stands



<b>Biomass removal (dry t/ha)</b>	<b>64</b>	<b>30</b>	<b>32</b>
<b>Basal area removal (%)</b>	<b>68</b>	<b>47</b>	<b>34</b>
<b>Productivity BC (dry t/h)</b>	<b>6.1</b>	<b>3.8</b>	<b>5.6</b>
<b>Productivity S (dry t/h)</b>	<b>5.2</b>	<b>3.3</b>	<b>4.5</b>

## Boom-corridor thinning



## Conventional selective thinning



Mechanized thinning of small diameter stands is one of the promising ways to achieve higher realization of forest tending in Slovenia and Europe in the future. In the long term, it can help to increase the efficiency of timber extraction, reduce operating costs, and make an important contribution to the mobilization of wood from the forest.