Small trees – Huge volumes

Madrid September 28

Project title:
Small diameter wood utilization with innovative stand management for multifunctional forests and a growing sustainable bio-economy
website: ***www.smallwood.eu***
Acronym: **SMALLWOOD**

Tomas Nordfjell, SLU, Sweden

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 773324

Project partners and country

Swedish University of Agricultural Sciences (SLU)	**Sweden**
Universidad Politécnica de Madrid (UPM)	**Spain**
Slovenian Forest Institute (SFI)	**Slovenia**
University of eastern Finland, School of Forest Sciences (UEF)	**Finland**
Faculty of Economics and Business, University of Maribor (FEB)	**Slovenia**
Bracke Forest	**Sweden**

Total Project budget: 1 225 000 Euro
Project duration: February 2019 to June 2022

Introduction

Problem: Dense forest stands with small diameter trees are expensive to treat, but for the stand development it is important that this is done

The overall objective was to develop and evaluate new technologies and business models for a sustainable utilization of different types of small diameter wood

This project is about harvesting of whole trees including branches and tree tops

Introduction

Only the main study and general conclusions will be presented and a lot of other results can be found on the project homepage http://www.smallwood.eu/

Material and Methods

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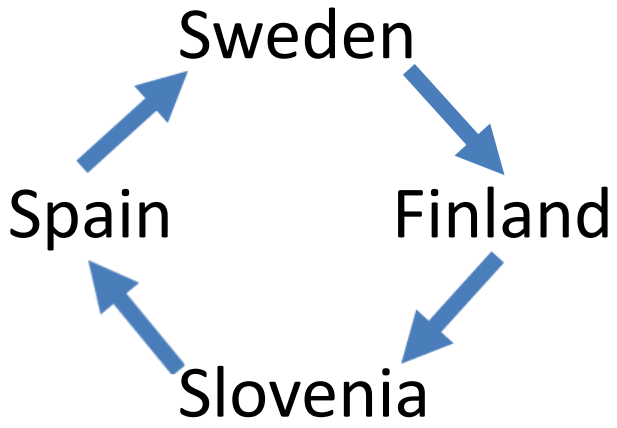

(Truck transportation of the machine in total 10 000 km)

Material and Methods

…and with two work methods (conventional selective thinning and a more geometric way to do it)

Reference:

Conventional selective thinning (S)

Boom-corridor thinning (BC)

Stand types included

Results

One dot represents 0.5 to 1 hour of working time in a balanced study on 50 m long and 20 m wide study areas with a strip road in the middle

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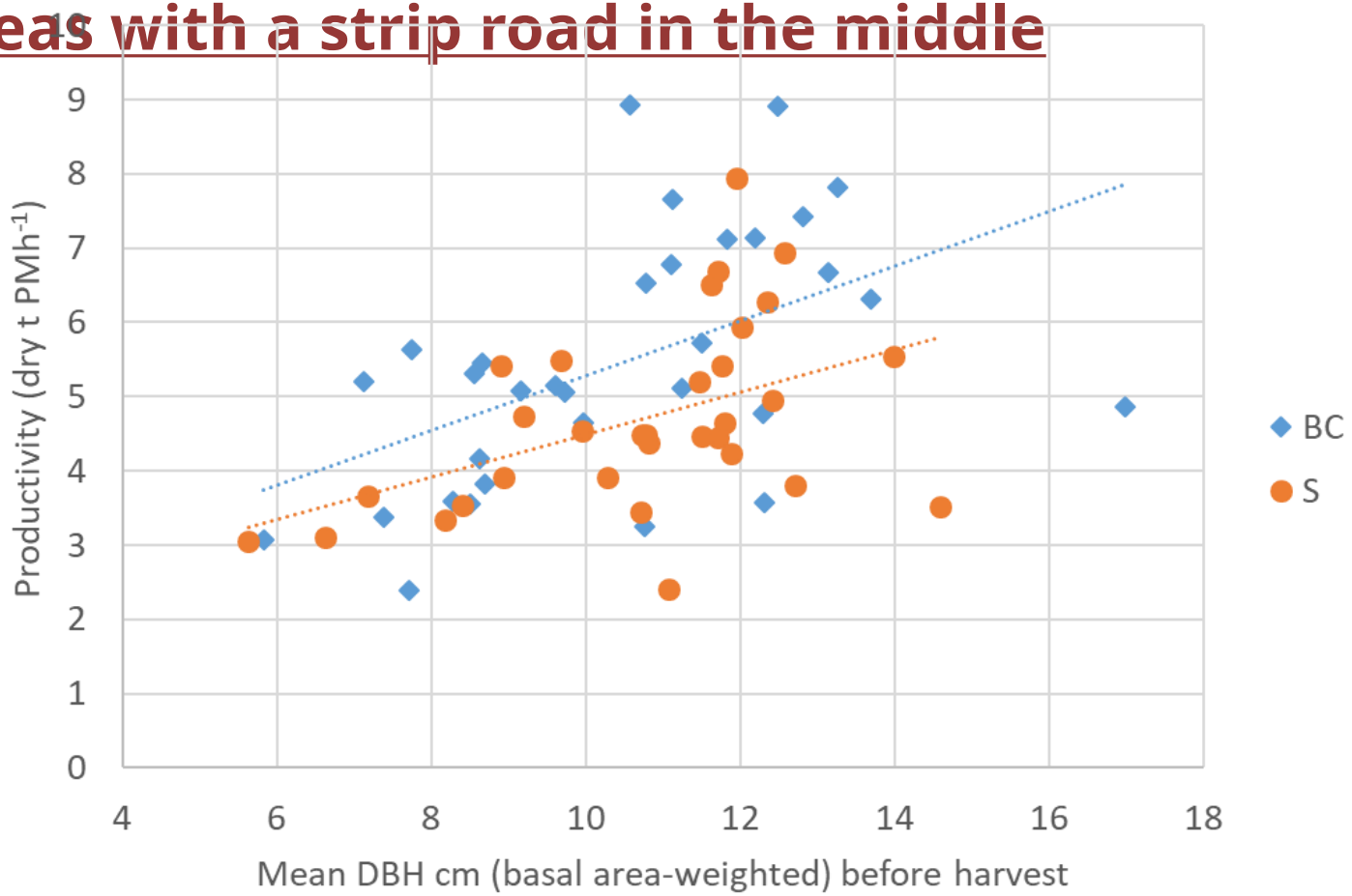
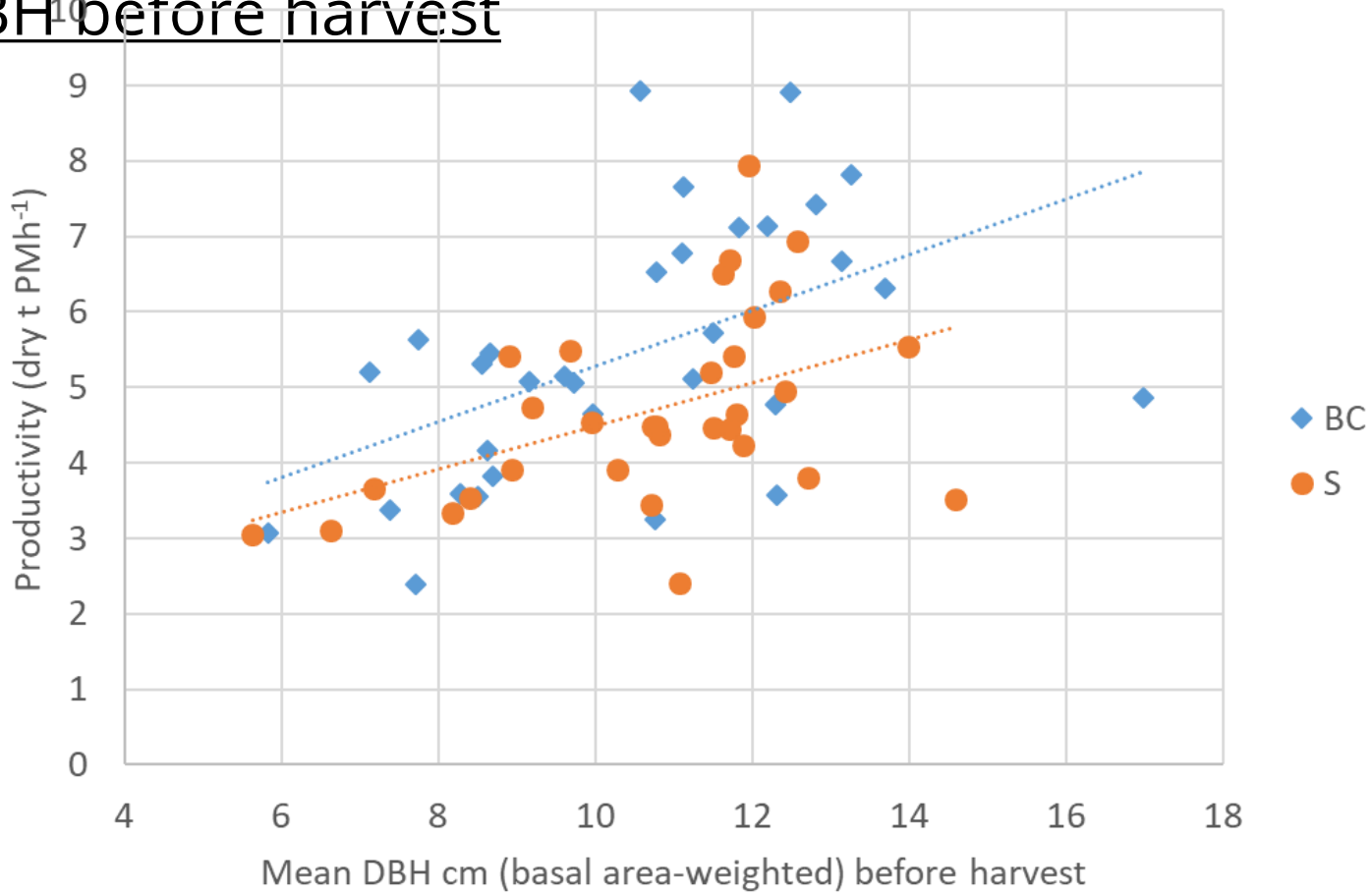


Results

The BC thinning method gave a higher producivity than the conventional S method. Productivity as function of mean DBH before harvest



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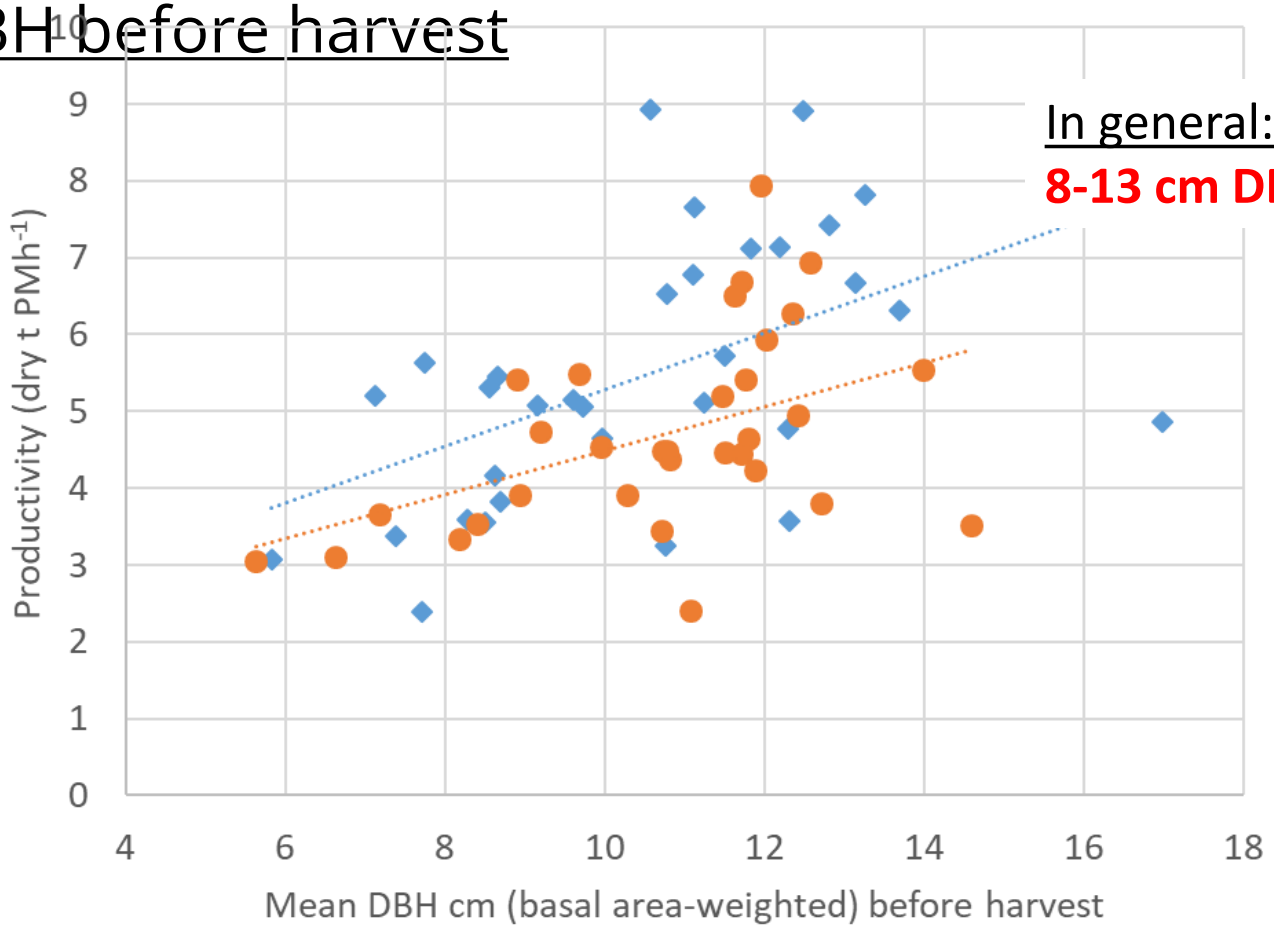
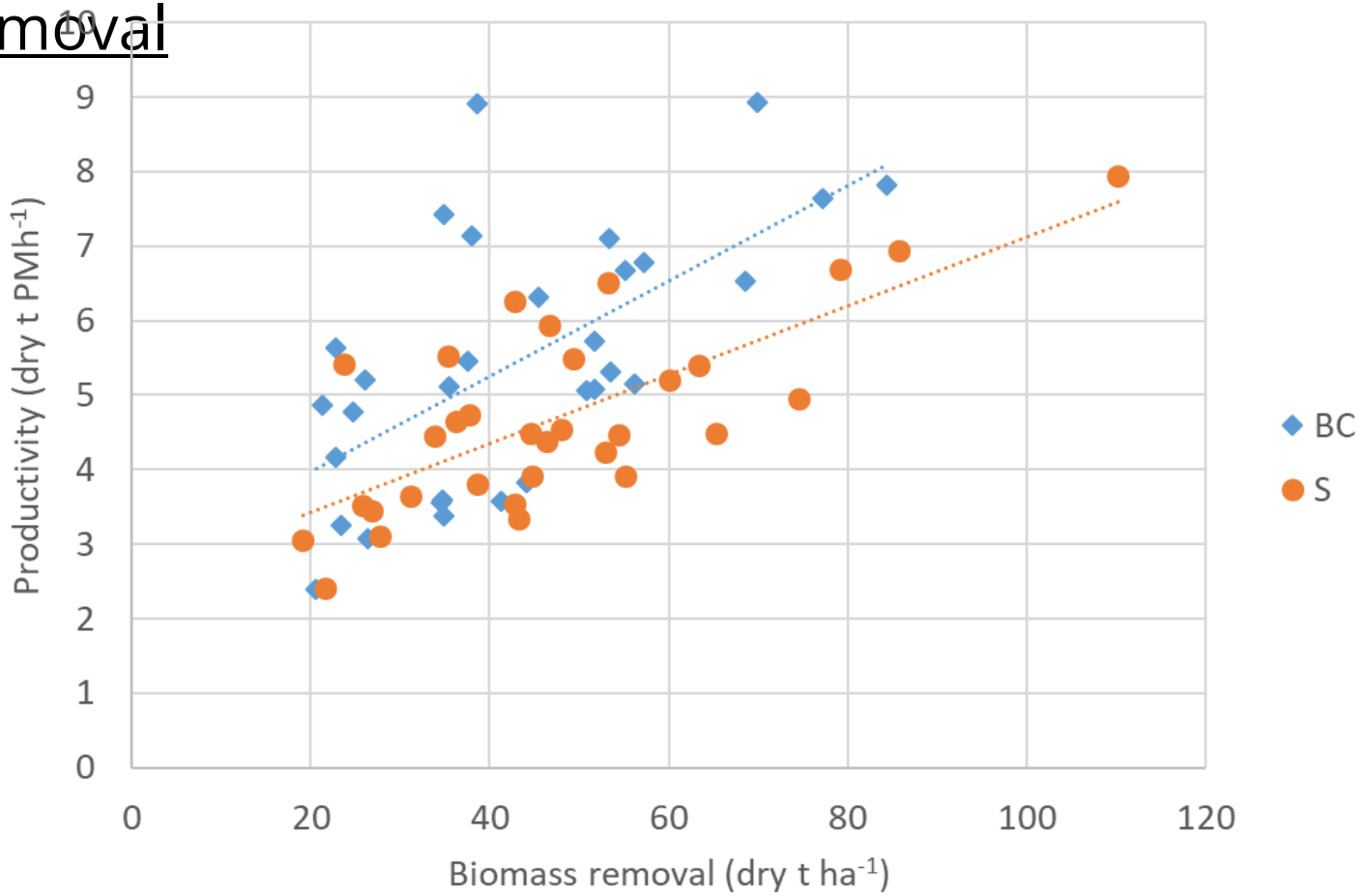


In general:

8-13 cm DBH = 4-6 dry t/PMH

Results

The BC thinning method gave a higher producivity than the conventional S method. Productivity as function of biomass removal



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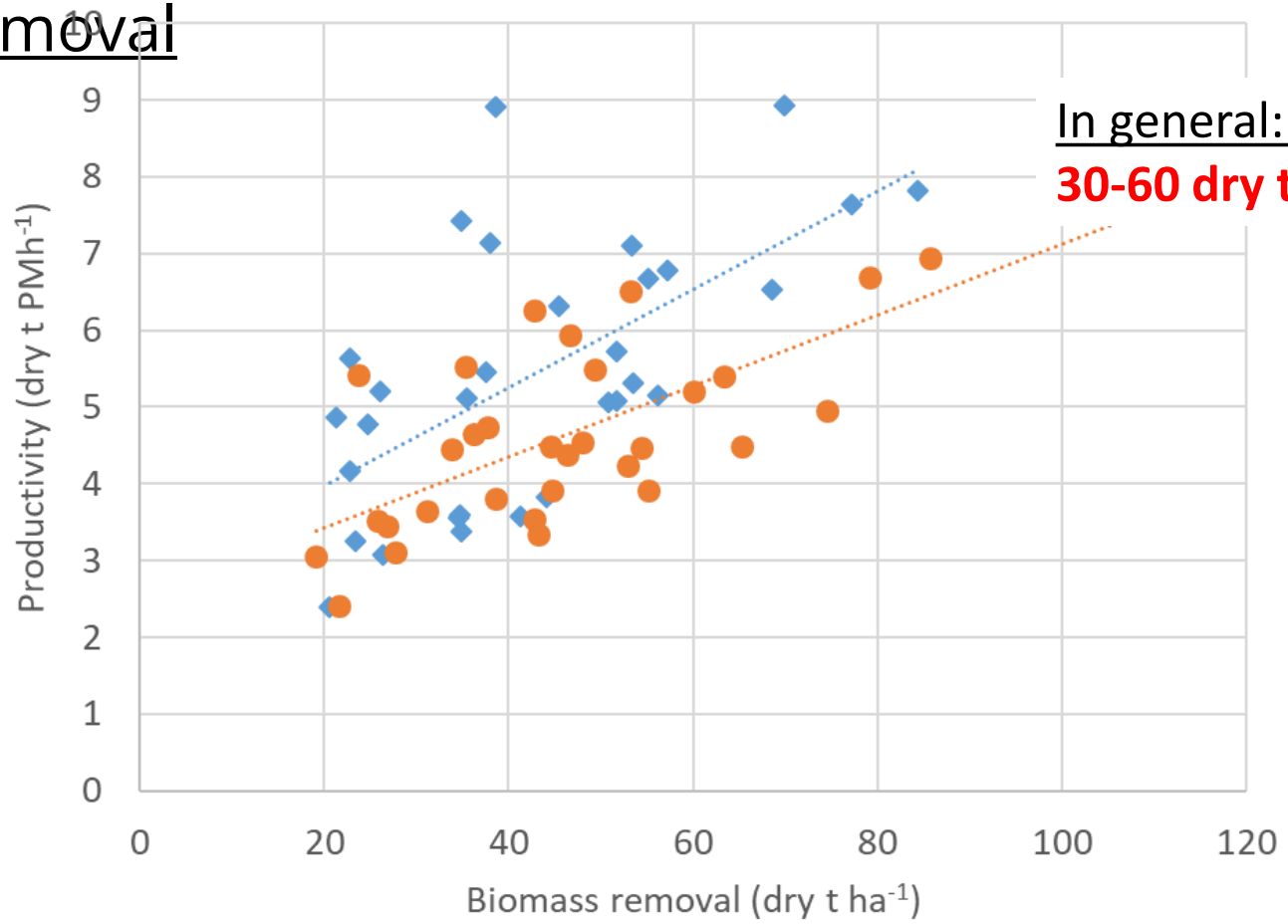


In general:

30-60 dry t/ha = 4-6 dry t/PMH

Conclusions

Studies of Bracke C16c show that it is possible to achieve economy when thinning of small dense stands while improving the development potential of the remaining stand.

Boom corridor thinning (BC) with Bracke C16c is an efficient work method.

Conclusions

If dealing with really small trees and bushes, there are other technologies that under right conditions have an interesting potential!
Especially if a treatment is needed for reducing the risk of wild-fires

Biobaler

Retrabio

Conclusions

The perception among private forest owners is mainly positive towards Boom Corridor thinning.

The perception within forestry companies or state forestry varies more.

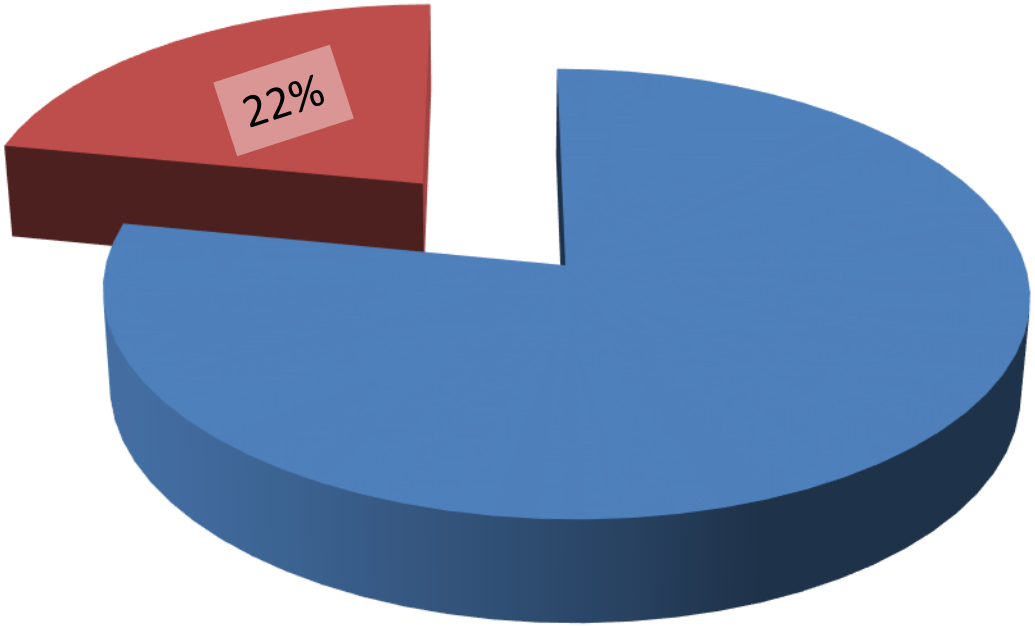
This kind of thinning does not have any important environmental drawbacks. Biomass is utilized at the same time as important stand treatment is done

Conclusions

Boom Corridor thinning may become the normal first thinning, but only under the condition that there is a long term demand for forest biomass in the form of unbranched small trees!

Impacts

In Sweden only the total standing volume in this kind of stands is about 750 million m^3, meaning 22% of the total standing volume



The situation is for sure similar in other forest countries, meaning a huge potential to increase the biomass utilization in Europe at the same time as creating valuable stands for the future

Publications

Peer reviewed scientific papers

Kronholm, T., Bengtsson, D., & Bergström, D. (2020). Family Forest Owners' Perception of Management and Thinning Operations in Young Dense Forests: A Survey from Sweden. Forests, 11(11), 1151.

Tolosana, E., Bados, R., Laina, R., Bacescu, N. M., & Fuente, T. (2021). Forest Biomass Collection from Systematic Mulching on Post-Fire Pine Regeneration with BioBaler WB55: Productivity, Cost and Comparison with a Conventional Treatment. Forests, 12(8), 979.

Fernandez-Lacruz, R., Edlund, M., Bergström, D. & Lindroos, O. (2021). Productivity and profitability of harvesting overgrown roadside verges – a Swedish case study. International Journal of Forest Engineering, 32(1), pp. 19-28.

Bergström, D., Fernandez-Lacruz, R., de la Fuente, T., Höök, C., Krajnc, N., Malinen, J., Nuutinen, Y., Triplat, M. and Nordfjell, T. (2022). Effects of boom-corridor thinning on harvester productivity and residual stand structure. International Journal of Forest Engineering, pp.1-17.

de la Fuente, T., Bergström, D., Fernandez-Lacruz, R., Hujala, T., Krajnc, N., Laina, R., Nordfjell, T., Triplat, M. and Tolosana, E., 2022. Environmental Impacts of Boom-Corridor and Selectively Thinned Small-Diameter-Tree Forests. Sustainability, 14(10), p.6075.

Scientific manuscripts

Title: Private forest owner willingness to mobilise wood from dense, small-diameter trees stands",submitted on 31. May 2022 and was accepted for the review process on 16. June 2022 in Forest Policy in Economics.

A Scientific paper or proceeding on the overall analyses of the economic, social and environmental values of the SDS managements. This is a method-oriented research note manuscript, submitted for evaluation to a scientific journal at the end of the SMALLWOOD project. (Part of the PhD dissertation for Satu Helenius).

Another scientific manuscript making more comprehensive use of all the acquired data, including the verbal comments, is left to be compiled and submitted post-project. (Part of the PhD dissertation for Satu Helenius).

Publications

Proceedings

Fernandez-Lacruz, R., Bergström, D. & Nordfjell, T. (2020). Boom corridor thinning trials with an upgraded version of Bracke C16 in biomass thinnings in Sweden, Finland and Slovenia - preliminary results from the Smallwood project. NB Nord conference proceedings in Helsingør (Denmark), 22-24 September 2020: The latest innovations, development and knowledge of forest operations in the Nordic-Baltic area.

Bergström, D., de la Fuente, T., Fernandez-Lacruz, R., Nuutinen, Y. & Triplat, M. 2021. Comparison of Cost-Efficiency of Innovative and Conventional Supply Systems for Small Trees and Shrubs in Sweden, Finland, Slovenia and Spain. Proceedings: COFE-FORMEC 2021 – Forest Engineering Family: Growing Forward Together. Corvallis, OR, U.S.A. – September 27-30, 2021

Reports and popular science publications beside project reports and info sheets on the Smallwood homepage

Bengtsson, D. (2020). Privata skogsägares inställning till klenträdsgallring. Rapport 2020:5. Institutionen för skogens biomaterial och teknologi, SLU, Umeå.

Kranjc Nike, Nordfjell Tomas. SMALLWOOD - Small diameter wood utilization with innovative stand management for multifunctional forests and a growing sustainable bio-economy : presented at Čar lesa = Charm of Wood, Ljubljana, May 13, 2019. [COBISS.SI-ID 5382822]

Kranjc, N., Nordfjell, T., Jemec, T., Zitko, U. & Triplat, M. 2020. Nove tehnologije strojne secnje in tehnike pasovnega redcenja. SIDG Slovenski drzavni gozdovi. April 2020, st. 12.

TRIPLAT, Matevž, KRAJNC, Nike, JEMEC, Tina, ŽITKO, Urban, BAŠA, Mirko. Redčenje gozdov po švedsko v Sloveniji. InfoGozd : skrbno z gozdom. 16. mar. 2020, let. 1, št. 3, str. 4-13, ilustr. ISSN 2738-5035. https://dirros.openscience.si/IzpisGradiva.php?id=14701. [COBISS.SI-ID 92545795]

JEMEC, Tina, ŽITKO, Urban, TRIPLAT, Matevž, BAŠA, Mirko, KRAJNC, Nike. Redčenje gozdov po švedsko v Sloveniji. Kmetovalec : glasilo c. kr. Kmetijske družbe vojvodstva kranjskega, Gozd in obnovljivi viri. 2020, letn. 88, št. 4, ilustr. ISSN 1318-4245, ISSN 1581-5420. [COBISS.SI-ID 5654182]

KRAJNC, Nike, NORDFJELL, Tomas, JEMEC, Tina, ŽITKO, Urban, BAŠA, Mirko, TRIPLAT, Matevž. Nove tehnologije strojne sečnje in tehnike pasovnega redčenja. Korenina : [interno glasilo družbe Slovenski državni gozdovi, d. o. o.]. [Tiskana izd.]. apr. 2020, št. 12, str. 21-22, ilustr. ISSN 2670-4234. http://sidg.si/index.php/korenine. [COBISS.SI-ID 22169859]

ŽITKO, Urban, KRAJNC, Nike, TRIPLAT, Matevž, JEMEC, Tina. Strojno redčenje mlajših sestojev. InfoGozd : skrbno z gozdom. 5. sep. 2021, let. 2, št. 9, str. 4-10, ilustr. ISSN 2738-5035. https://dirros.openscience.si/IzpisGradiva.php?id=14701. [COBISS.SI-ID 94843651]

ŽITKO, Urban, KRAJNC, Nike, TRIPLAT, Matevž, JEMEC, Tina. Strojno redčenje mlajših sestojev. InfoGozd : skrbno z gozdom, ISSN 2738-5035, 5. sep. 2021, let. 2, št. 9, str. 4-10, ilustr. https://dirros.openscience.si/IzpisGradiva.php?id=14701. [COBISS.SI-ID 94843651]

The value of scientific cooperation

The international scientific cooperation made it possible to do studies that is not limited to a narrow geographical area, and therefore much more valuable than the usual field studies of forest machines. Demonstrations in all countries revealed a lot of differences related to "normal practices".

Unexpected barriers

*Administrative and financial systems are **very, very** different in different countries, and the willingness to overcome such problems differs also!*

Noted peculiarities

Sweden and Finland have sometimes too soft ground conditions

Slovenia and Spain have sometimes too steep ground conditions

Some hardwood species are really hard to harvest and handle

Thank you!

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ForestValue

Website: https://forestvalue.org/
Twitter: https://twitter.com/ForestValue2017
LinkedIn: https://www.linkedin.com/groups/12110816/