

Fire risk assessment of thinning with Bracke C16c

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Smallwood



Smallwood is supported under the umbrella of ERA-NET Cofund ForestValue. ForestValue has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 773324.



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Objective



✔ To quantify and compare the woody fuel load after thinning performed by whole tree systems



Methodology

8 locations in 4 countries



Sample units



Shears, scale and bags

Weighting samples and collecting them for humidity analysis



Go No Go Gauge

To separate fractions



Introduction

Fuel Model




[Guide to determine fuel model](#)

BehavePlus 6.0.0 Input Guide

Number	Code	Fuel Model Name
1	1	Short grass (S)
2	2	Timber grass and understory (S)
3	3	Tall grass (S)
4	4	Chaparral (S)
5	5	Brush (S)
6	6	Dormant brush, hardwood slash (S)
7	7	Southern rough (S)
8	8	Short needle litter (S)
9	9	Long needle or hardwood litter (S)
10	10	Timber litter and understory (S)
11	11	Light logging slash (S)
12	12	Medium logging slash (S)
13	13	Heavy logging slash (S)
101	gr1	Short, sparse, dry climate grass (D) (101)
102	gr2	Low load, dry climate grass (D) (102)
103	gr3	Low load, very coarse, humid climate grass (D) (103)
104	gr4	Moderate load, dry climate grass (D) (104)

Picture Help

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Fire Behavior Fuel Model 9 -- Long Needle or Hardwood Litter

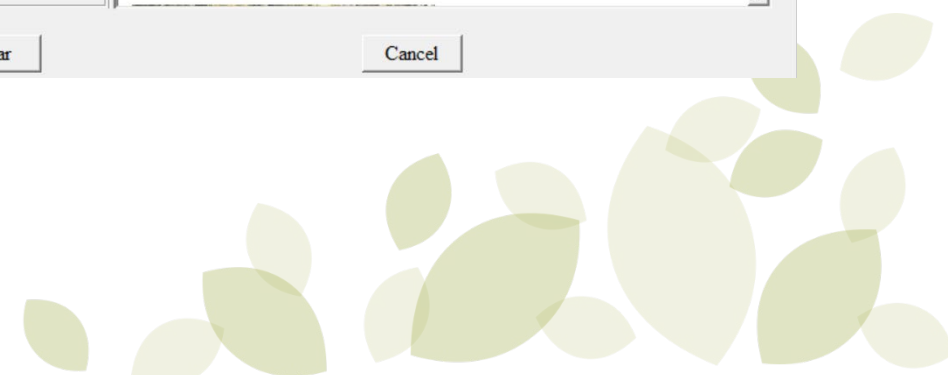
Anderson (1982) classifies Fire Behavior Fuel Model 9 in the *Timber Fuel Type* and describes it as follows:

Fires run through the surface litter faster than model 8 and have longer flame height. Both long-needle conifer stands and hardwood stands, especially the oak-hickory types, are typical. Fall fires in hardwoods are predictable, but high winds will actually cause higher rates of spread than predicted because of spotting caused by rolling and blowing leaves. Closed stands of long-needled pine like ponderosa, Jeffrey, and red pines or southern pine plantations are grouped in this model. Concentrations of dead-down woody material will contribute to possible torching out of trees, spotting, and crowning.

Fuel model parameters are available by viewing the [Fuel Model Table of Parameters](#) or right-clicking on the fuel model description in the Input Guide window and selecting **View parameters**.

Anderson's (1982) photographs 25, 26, and 27 on page 12 are examples of fuels fitting this model.

Ok Clear Cancel



Introduction to fire behaviour



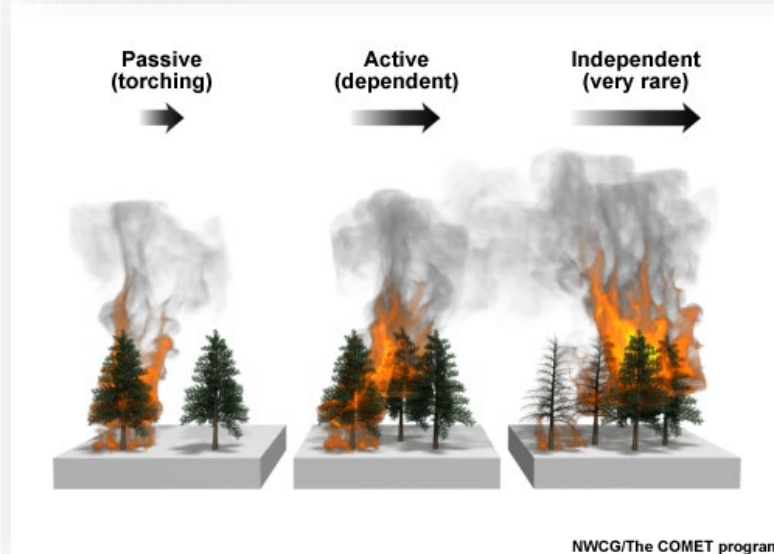
Surface



Types of wildfires

Stages of Crown Fire

Crown



Severity: trees mortality, soil disturbance, buildings & roads affection

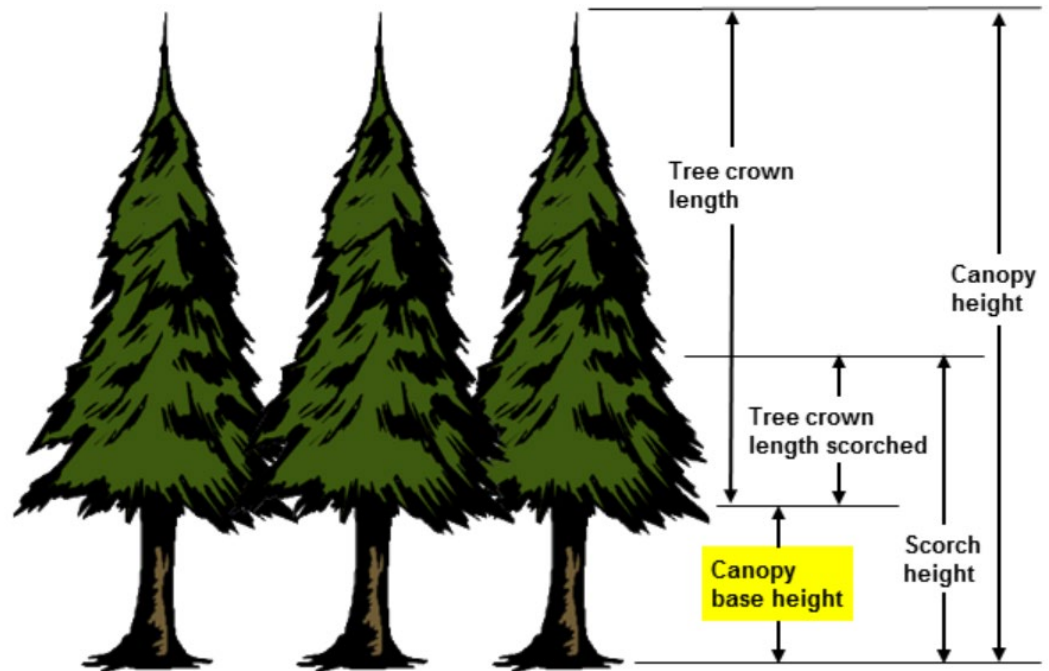


Introduction



Main variables determining type of wildfire:

1. Wind speed
2. Humidity of leaves/needles (Meteorological factor)
3. Crown base height and crown bulk density
4. Available surface fuel load, mainly fine woody fuel load



Introduction



Main effects of silvicultural treatments, Agee and Skinner, 2005

Principle	Effect	These effects interact with weather conditions: wind at stand level and fuel shading at ground level, and are dynamic over the time
Reduce surface fuels	Reduce potential flame length	
Increase height to live crown	Requires longer flame length to begin torching	
Decrease crown density	Makes tree-to-tree crown fire less probable	
Keep big trees of resistant species	Less mortality for same fire intensity	

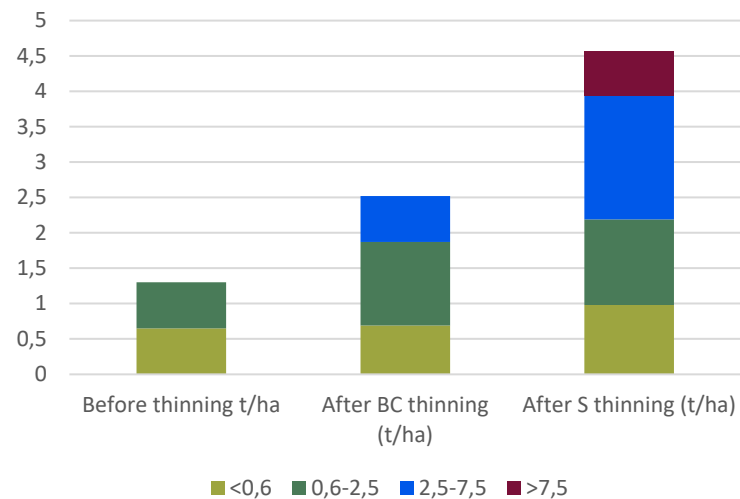


RESULTS



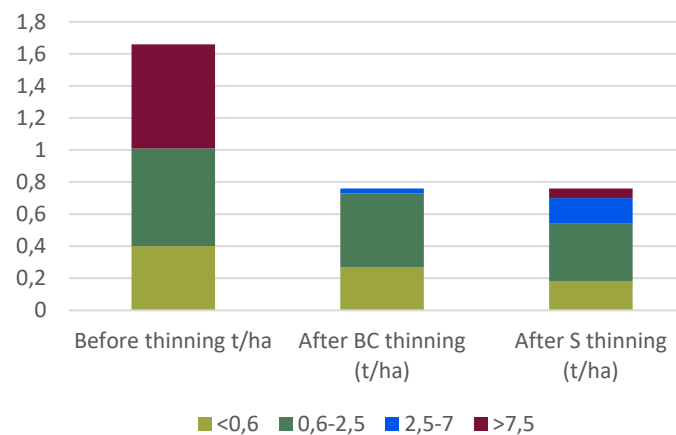
Woody fuel load

Woody downed fuel



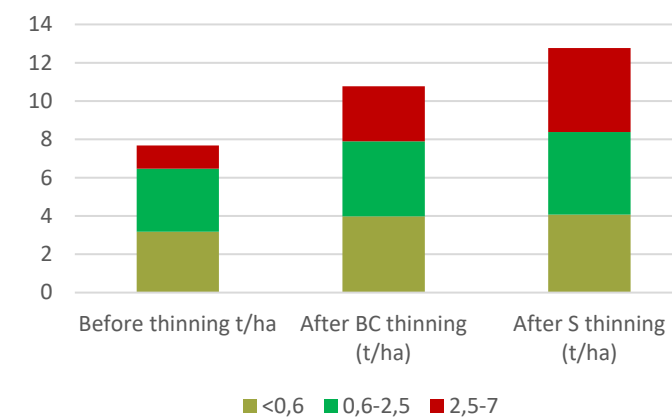
Sweden

Woody downed fuel



Finland

Woody downed fuel



Spain

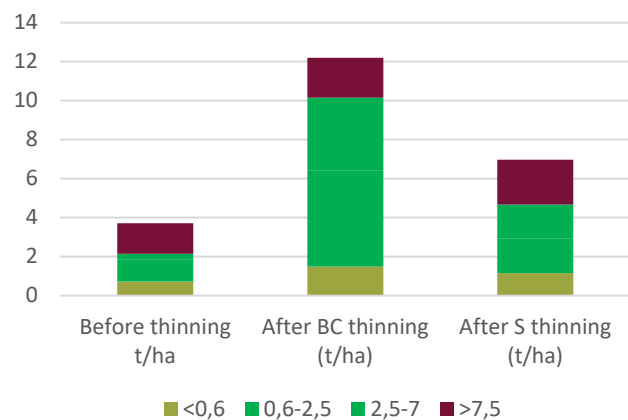


RESULTS

SLOVENIA



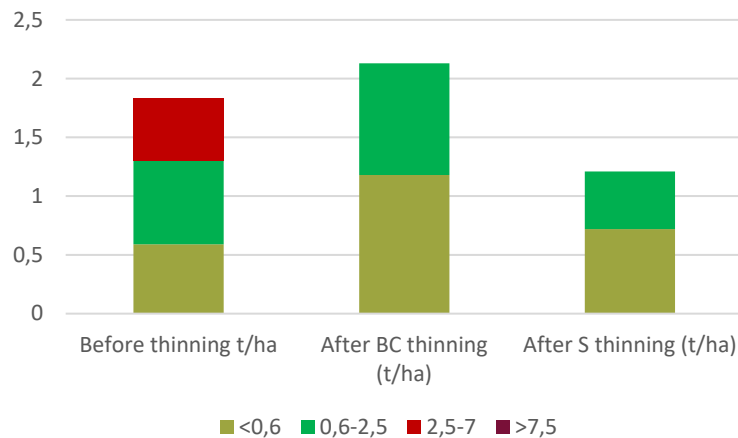
Slovenia beech



BEECH (*)

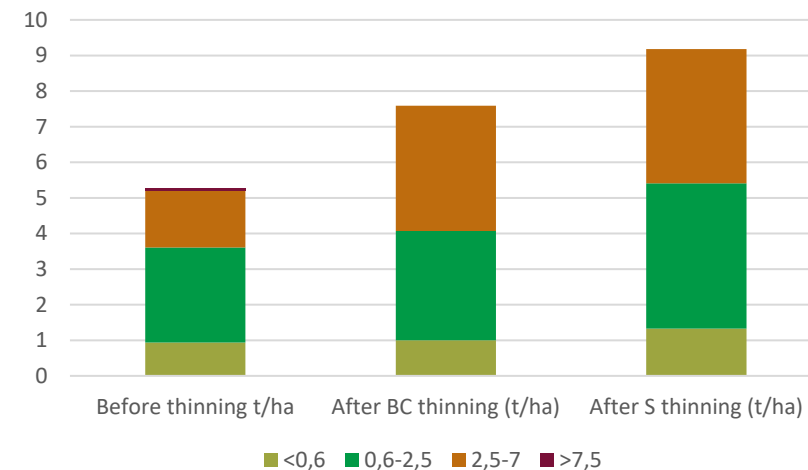
Statistically different

Slovenia spruce



SPRUCE

Slovenia mixed



MIXED



Results

SLOVENIAN BEECH STAND

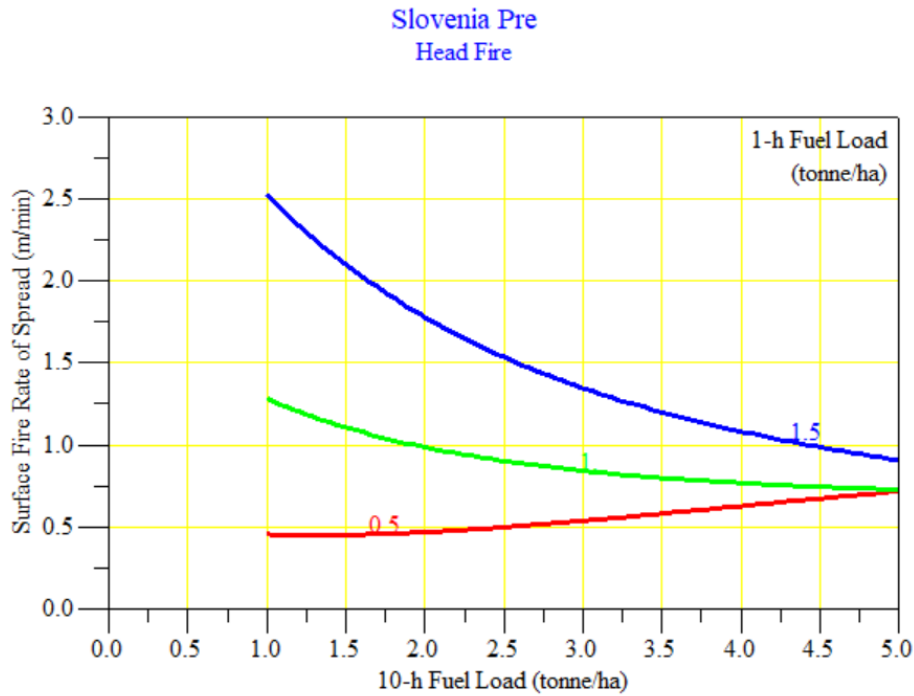


RESULTS

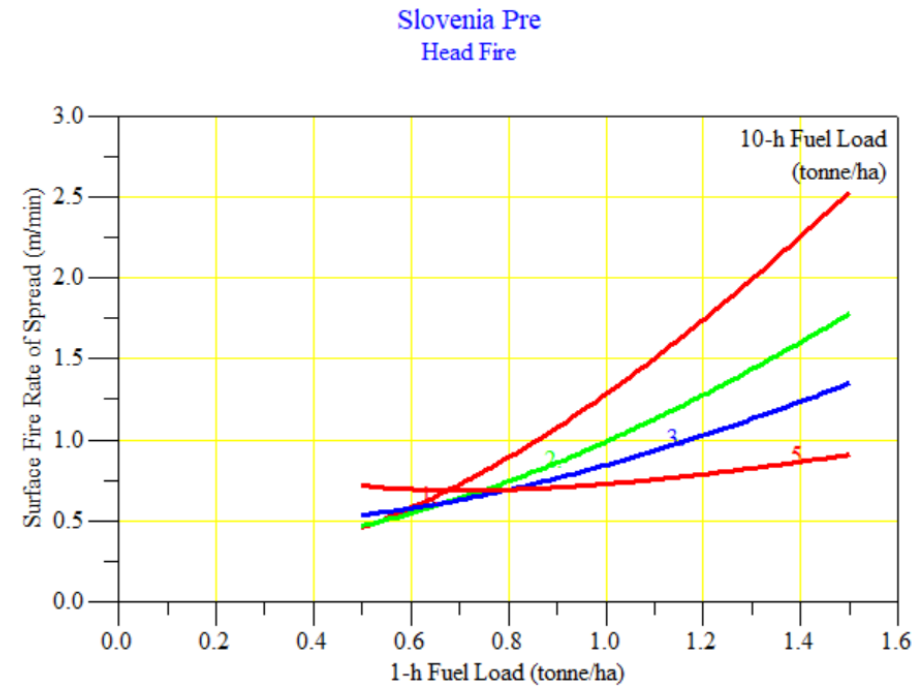
RATE OF SPREAD Simulation results from BEHAVEPLUS 6.0



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EXPERIMENTAL DESIGN	FIELD DATA		
	1h ($\phi < 0,6$ cm)	10 h ($0,6\text{cm} < \phi < 2,6$ cm)	100h ($2,6\text{cm} < \phi < 7,5$ cm)
Pre thinning	0.7	1.1	0.3
Post thinning (BC)	1.5	4.9	3.7



RESULTS

FLAME LENGHT



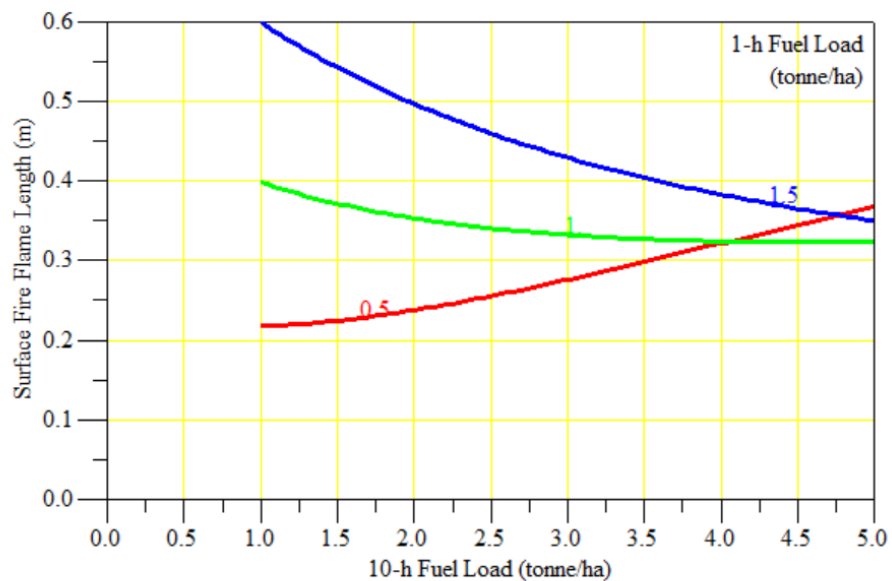
BehavePlus 6.0.0 - [SloveniaPre]

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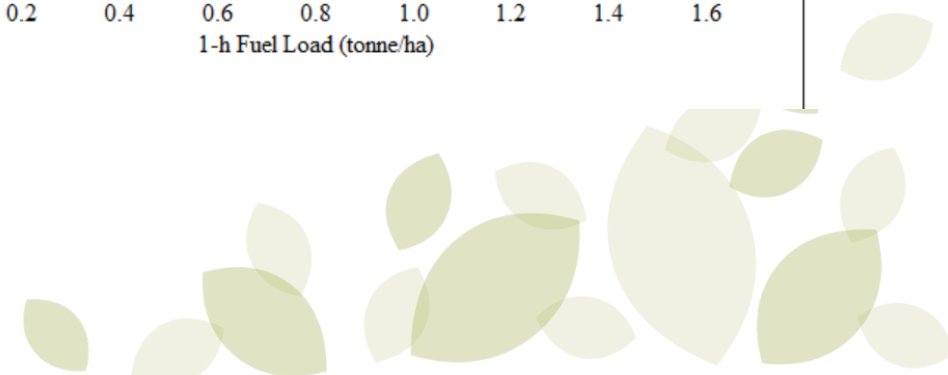
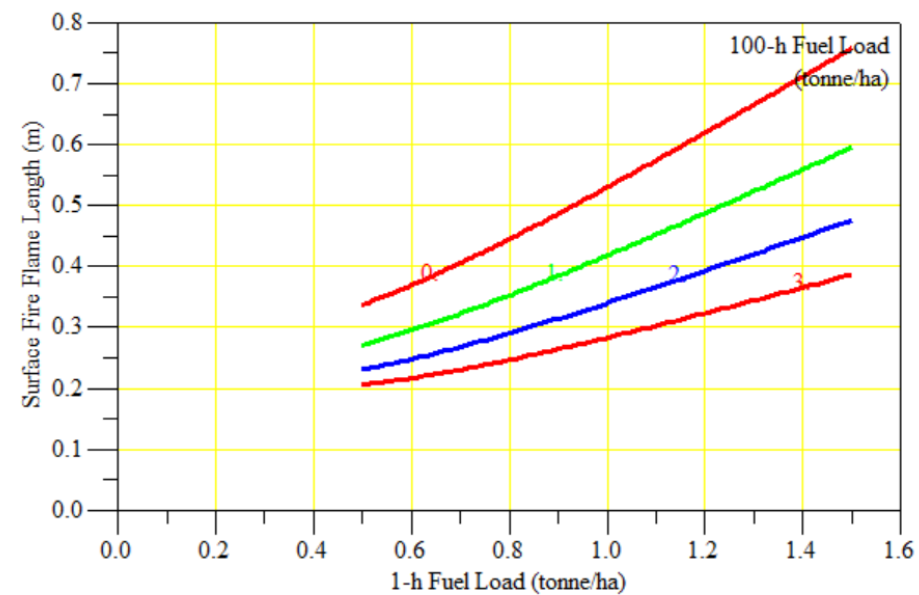
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Slovenia Pre
Head Fire



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Slovenia Pre
Head Fire



RESULTS



Mechanized whole-tree system does not increase surface downed woody fuel loads

No difference has been found between the two whole tree system options: BC and S

The only trial in which there has been an increase in the woody fuel load has been in thinning on very high density beech stands, and the increase of the 1 h, 10 h and 100 h fractions have produced opposite effects on flame length and rate of spread.

CONCLUSION



Mechanized whole tree system adds to the benefits of thinning the saving of any surface fuel load treatment such as prescribed burning or mastication.



Thanks!

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