Biomass equations for sessile oak and hornbeam in aged coppiced forests in southwest Germany

Patrick Pyttel, Christian Suchomel, Jürgen Bauhus and Gero Becker

Chair of Silviculture
Albert-Ludwigs-Universität Freiburg

Ecology and Silviculturel Managment of Coppice Forests in Europe

Bucharest, Romania
21st October 2015

UNI FREIBURG

introduction

Introduction

Why bother?

By re-activation of aged coppice forests:

- preserve historical landscape elements
- support biodiversity
- use of „unexploited“ timber resources

! Biomass available???

Objectives

Research issue:

• No information about the amount of biomass stored in aged coppice forets.

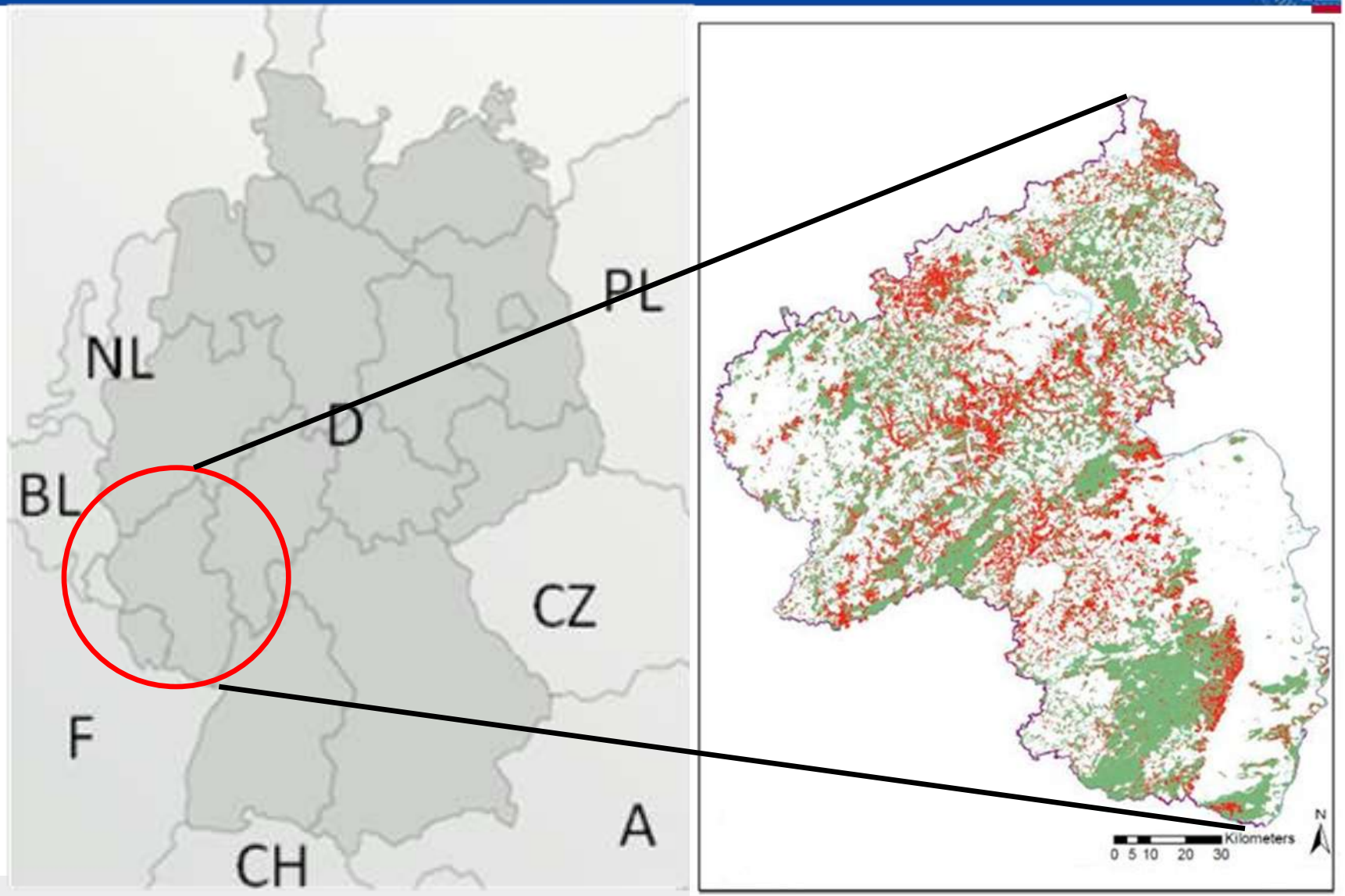
• No tools availabel to estaimate biomass ressources.

Objectives:

• Development of biomass equations for oak and hornbeam.

• Development of biomass equations in order to calculate mass of tree compartements.

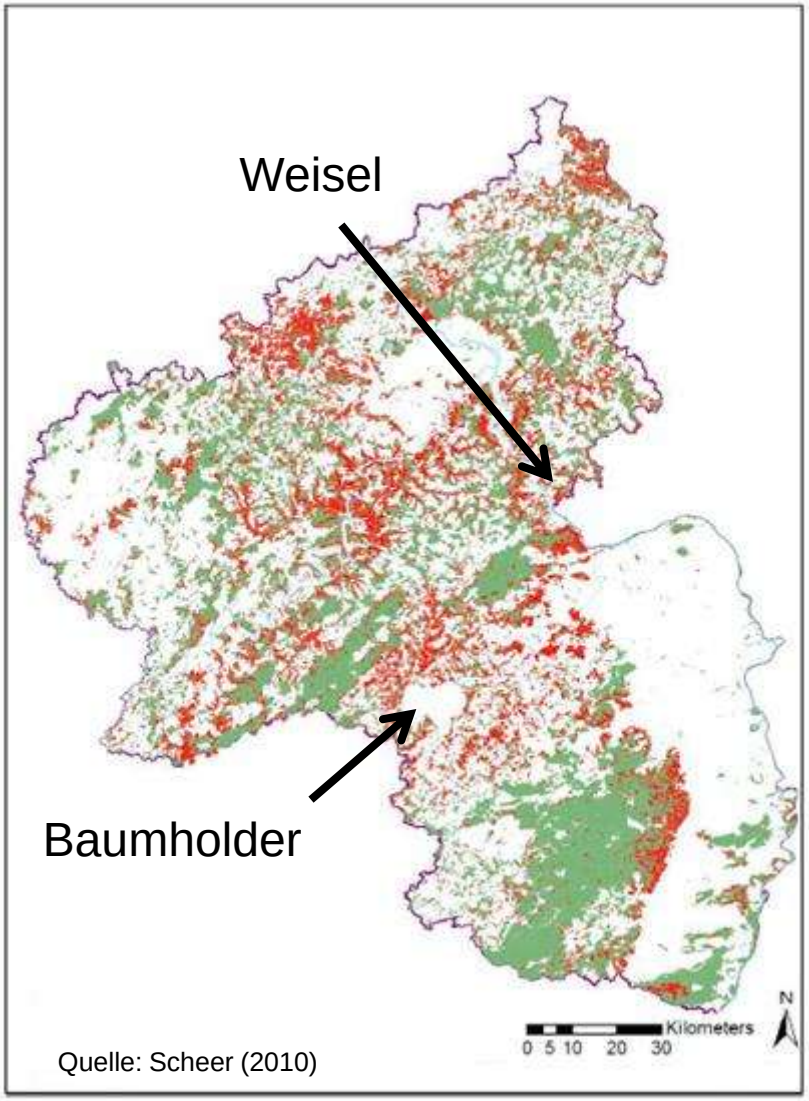
Research area



Research area

Selection criteria:

- former/aged oak coppice (*Quercus petraea*)
- stand age ≈ 90 years
- no silvicultural measures since last coppicing
- trafficability

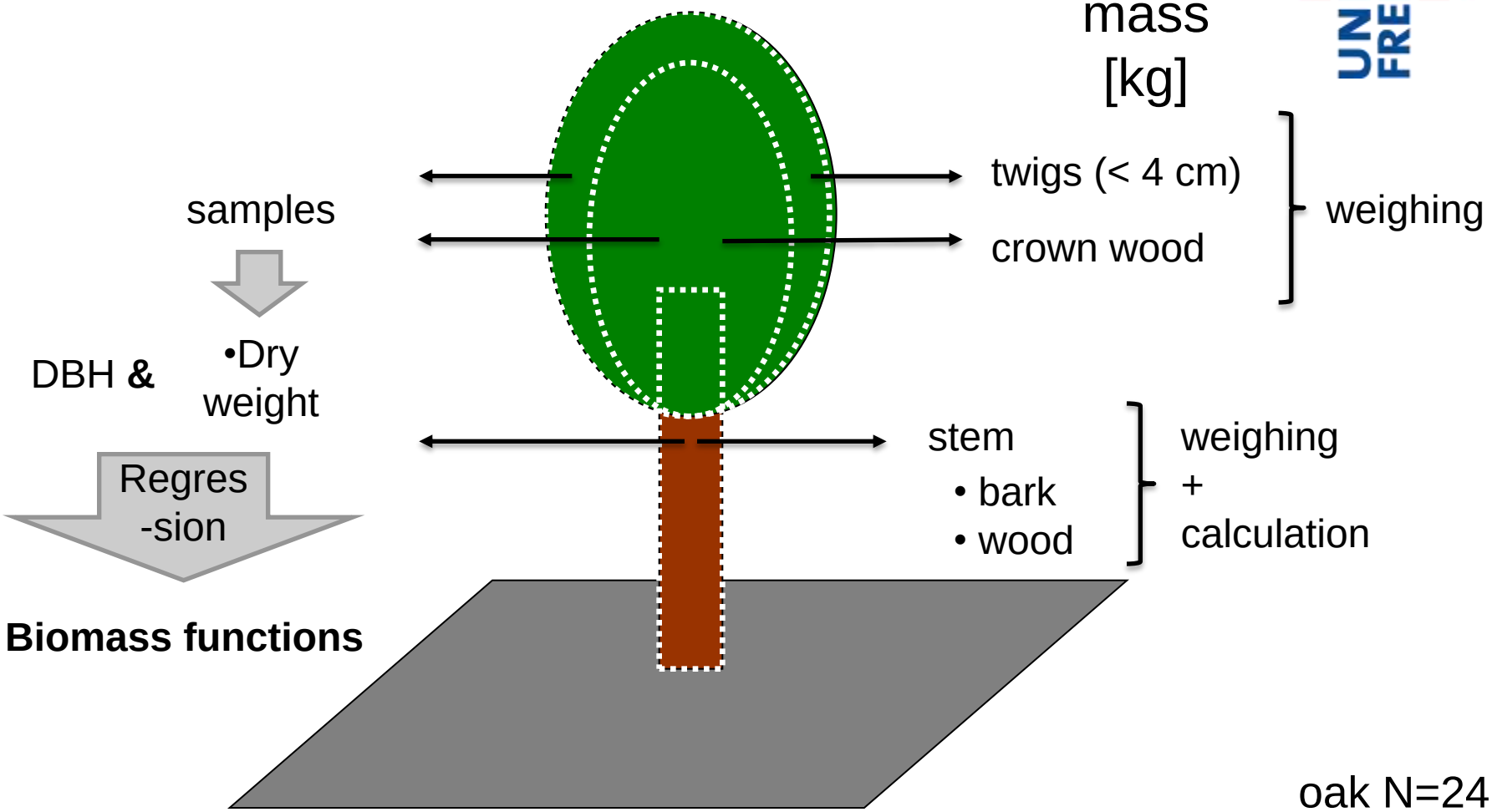


Quelle: Scheer (2010)

Methods

1. Full inventory of study stands → species, DBH, ID
2. Generation of DBH classes
3. Selection of max. 2 study trees per DBH class

Methods



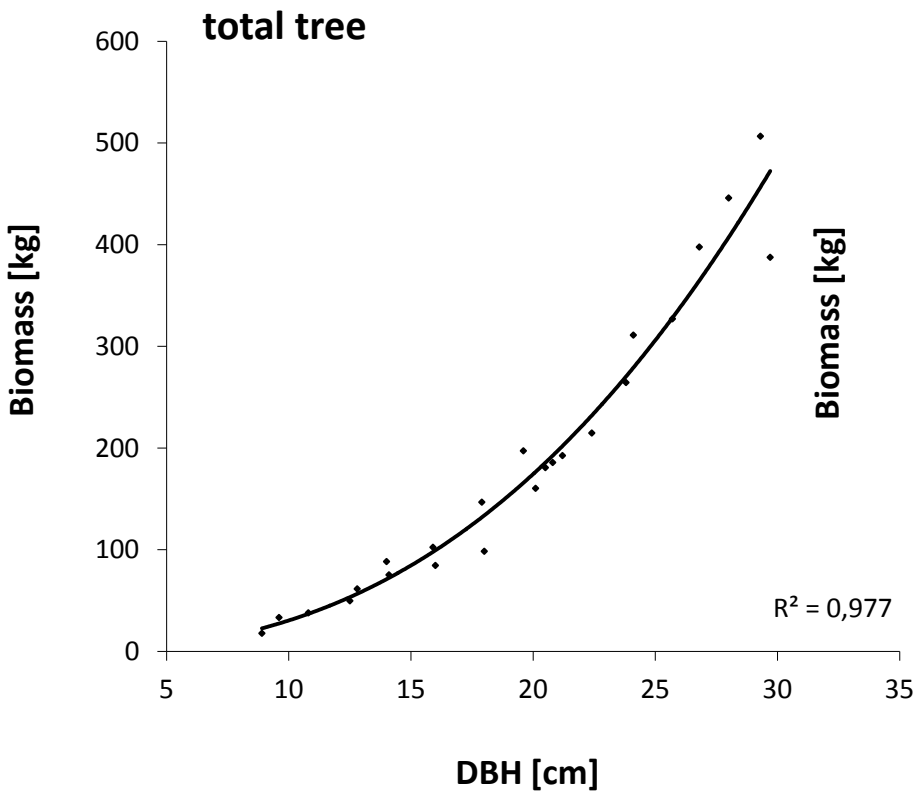
oak N=24
hornbeam N=24
(12/species/site)

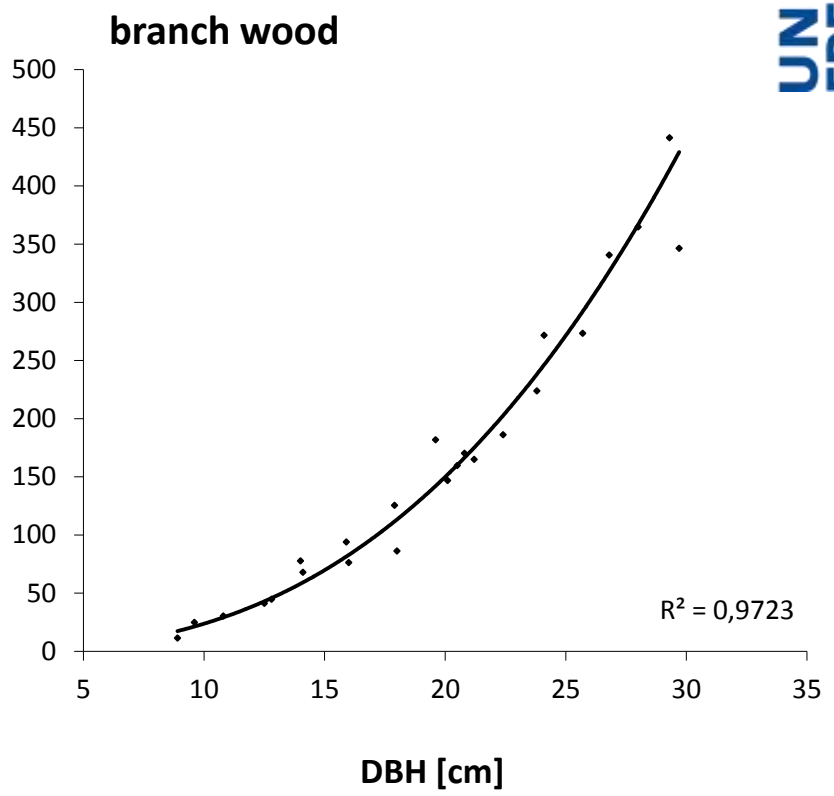
Results

Stand characteristics:

Site	Species	n/ha	DBH [cm]		Basal area
			Mean	Range	[m²/ha]
Site B	*Q. petraea*	1433	16	7.0-33.6	32,6
	C. betulus	88	9,9	7.0-19.9	0,7
	Total	1521			33,3
Site W	*Q. petraea*	1228	18,4	7.0-34.5	35,5
	C. betulus	88	12,8	7.0-24.9	1,3
	Total	1316			36,7

Results



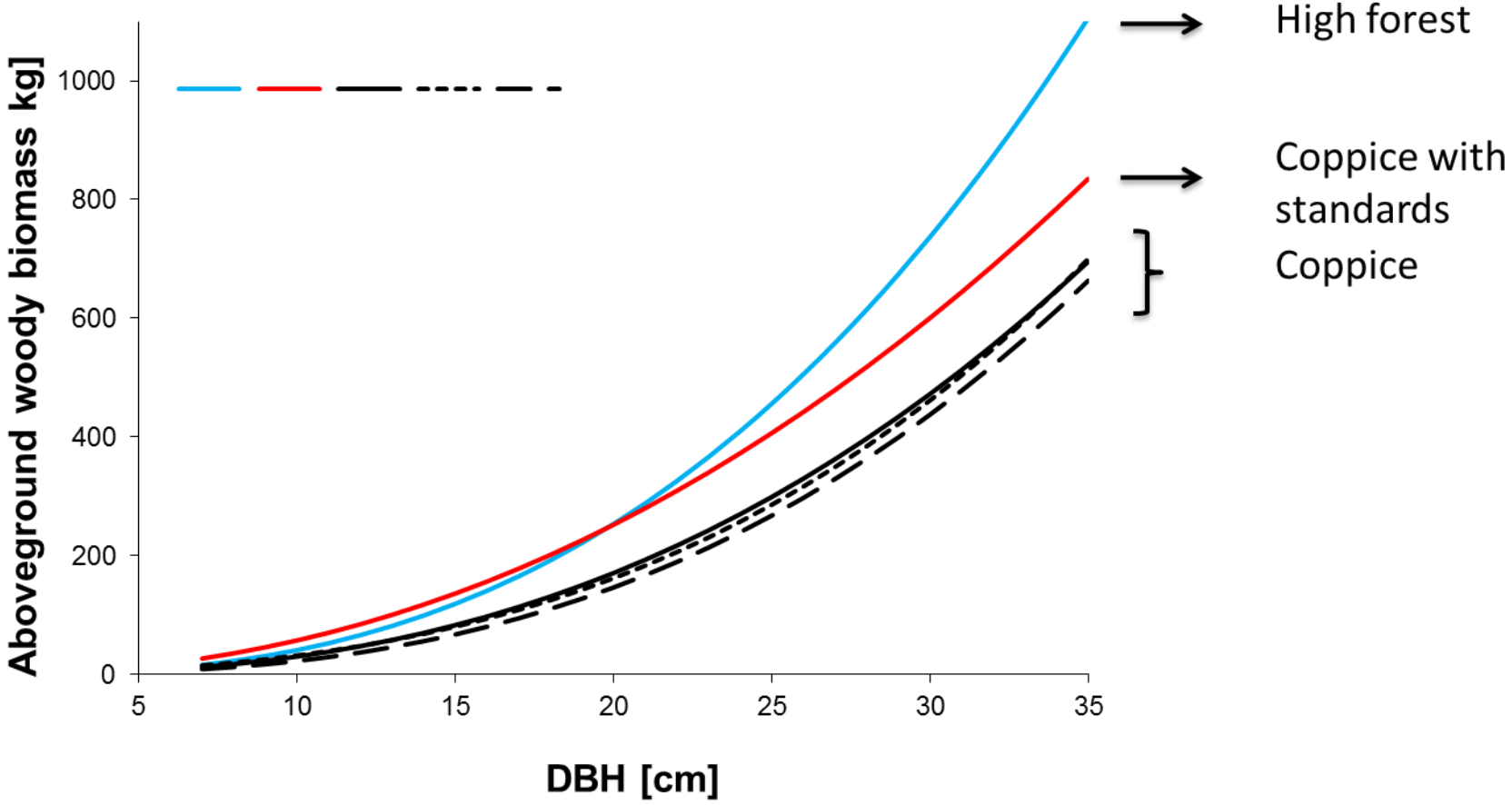


- biomass modelling → power functions
- equation: compartment mass [kg]= a • DBH^b
- equations for 12 oak - & 10 hornbeam compartments

Results

Species	Compartment*	Biomasse			
		Site B		Site W	
		t/ha	%	t/ha	%
	SHW	69.75	41,67	81,6	41,3
	SSW	36,37	21,73	42,7	21,6
	SBA	22,3	13,32	24,9	12,6
	ST	**128,42**	**76,72**	**149,2**	**75,5**
Q. petraea	T	11,18	6,68	12,3	6,2
	S	10,72	6,4	11,9	6
	BW	13,46	8,04	17,4	8,8
	CW	**35,36**	**21,12**	**41,6**	**21,1**
	ABW	**163,78**	**97,84**	**190,8**	**96,6**
	SBA	0,15	0,09	0,26	0,13
	SW	1,73	1,03	3,41	1,72
	ST	**1,88**	**1,12**	**3,67**	**1,86**
C. betulus	BR	1,38	0,83	2,01	1,02
	BW	0,35	0,21	1,11	0,56
	CW	**1,73**	**1,04**	**3,12**	**1,58**
	ABW	**3,61**	**2,16**	**6,79**	**3,44**
	total stand	**167,39**	**100**	**197,56**	**100**

Results


Aboveground woody biomass kg]
1000
800
600
400
200
0
5
10
15
20
25
30
35
DBH [cm]
High forest
Coppice with standards
Coppice

Conclusions

- In this study simple power functions were developed to estimate total aboveground woody biomass of trees or tree compartments using only dbh as an easily measurable input variable.
- Application of biomass equations developed for other coppice forest resulted in very similar biomass estimates compared to our own.
- In absence of a locally developed or validated function, a general biomass function for oak and hornbeam from coppice forests can be used.

Read the whole story (and how it continued)

BIOMASS AND BIOENERGY 46 (2012) 722–730

Available online at www.sciencedirect.com

SciVerse ScienceDirect

http://www.elsevier.com/locate/biombioe

ELSEVIER

Biomass equations for sessile oak (*Quercus petraea* (Matt.) Liebl.) and hornbeam (*Carpinus betulus* L.) in aged coppiced forests in southwest Germany

Christian Suchomel [a,*,1], *Patrick Pyttel* [b,1], *Gero Becker* [c], *Jürgen Bauhus* [d]

Contents lists available at ScienceDirect

Forest Ecology and Management

journal homepage: www.elsevier.com/locate/foreco

ELSEVIER

Effects of different harvesting intensities on the macro nutrient pools in aged oak coppice forests

Patrick L. Pyttel *, Merle Köhn, Jürgen Bauhus

University of Freiburg, Chair of Silviculture, Tennenbacherstr. 4, D-79085 Freiburg, Germany

Thank you for listening!

This presentation was supported by: