EU Hardwoods

5th meeting Uni LJ / 02.06.2016

Agenda

02.06.2016			
12:00 – 12:15 hrs	WP0	• introduction • acceptance of last minutes	HFA
12:15 – 13:00 hrs	WP1	• presentation of recent results • discussion / outlook	FVA
13:00 – 13:30 hrs	WP2	• lamella data evaluation • discussion / outlook	FCBA
13:30 – 14:30 hrs	WP2	• first results beech and ash lamella (microwave) grading and testing • sampling Austrian beech • discussion / outlook	HFA
14:30 – 15:00 hrs	WP6	• dissemination status • discussion / outlook	UL
15:00 – 16:00 hrs	WP0	• concept for workshops in Bordeaux and Stuttgart	ALL

Agenda

03.06.2016			
09:00 – 11:00 hrs	WP3 WP4 WP5	• presentation of recent results • discussion / outlook	MPA FCBA MPA
11:00 – 11:30 hrs	WP0	• controlling milestone plan	ALL
11:30 – 12:00 hrs	WP0	• any other business • date and place for next meeting	ALL

WP2

2	**WP2 - Basic hardwood strength data and grading tools**	HFA (lead), FCBA, Uni LJ, FVA, FVH
2.1	survey on existing lamella data with respect to species and dimensions	
2.2	allocation of hardwood lamellas to strength classes, lamella testing if necessary	
2.3	consolidate visual grading rules, obstacles machine strength grading	

WP2.2 – German beech / ash

FVA

- beech logs → CT-scanner
- cut to lamellas with defined sawing pattern
- dried, planed

HFA

- visual grading acc. to DIN 4074-5
- tension testion acc. to EN 408

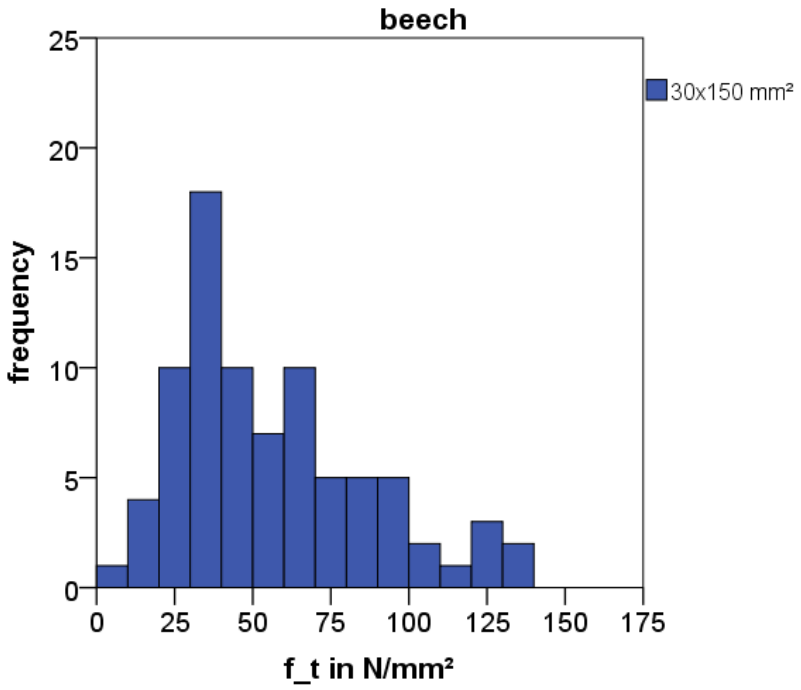
FVA / HFA

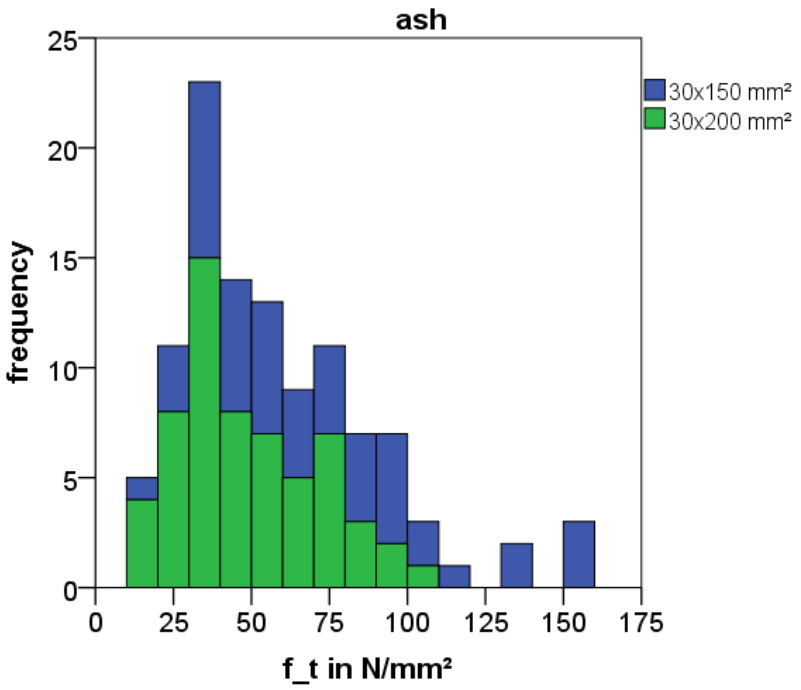
- strength data
- connex to sawing pattern

WP2.2 – German beech / ash

	beech	ash	
origin	16 logs (growth trial plots) from Swabian Jura	14 logs (regular cutting) from Freiburg city	
cross-section	30 x 150 mm²	30 x 150 mm²	30 x 200 mm²
N	86	54	62
excluded	3	5	2
reason	failure in clamping, MOE not measured	failure in clamping	failure in clamping, MOE not measured
for analysis	**83**	**49**	**60**
microwave	41	37	-

WP2.2 – German beech / ash

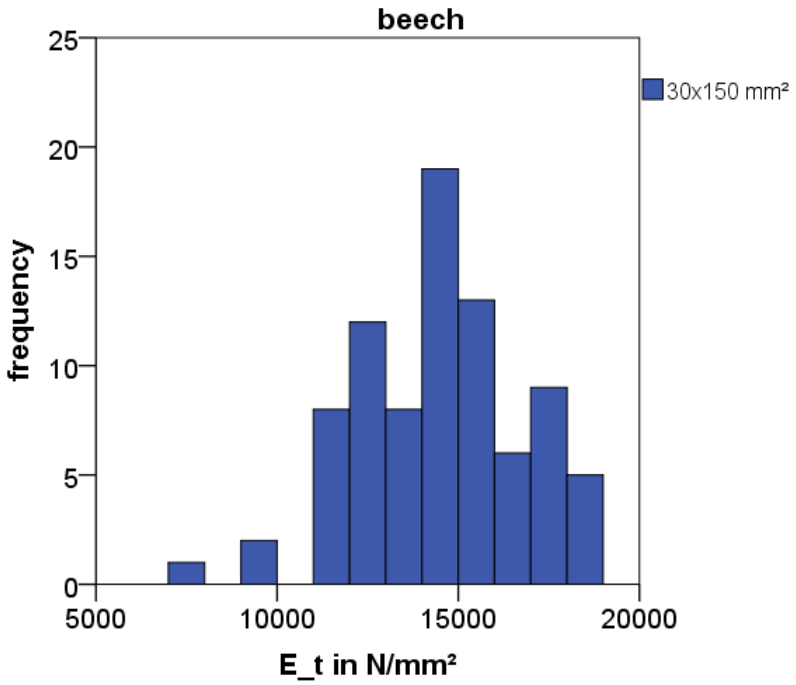


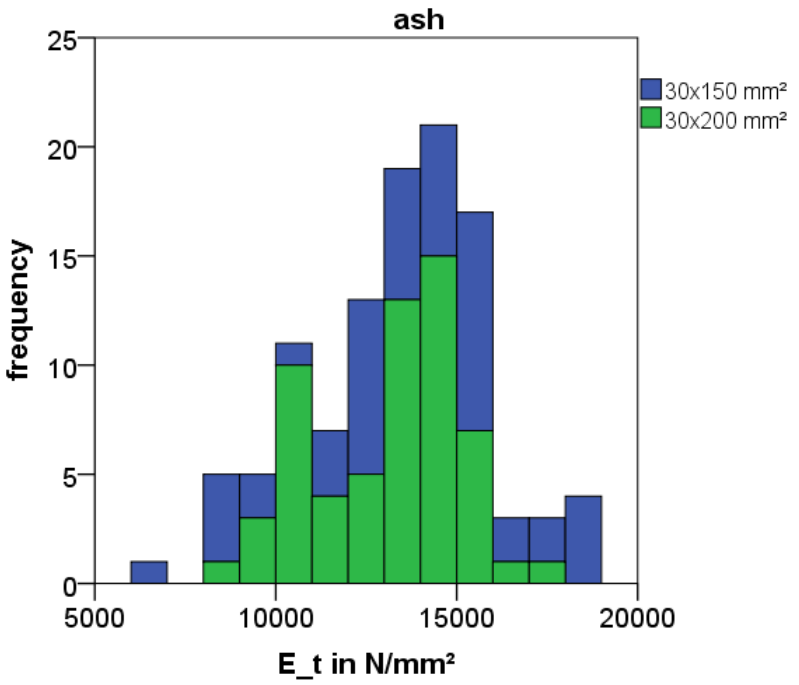


N	83
mean	50,4 N/mm²
s	30,3 N/mm²

	30x150 mm²	30x200 mm²
N	49	60
mean	69,9 N/mm²	48,5 N/mm²
s	35,0 N/mm²	22,6 N/mm²

WP2.2 – German beech / ash

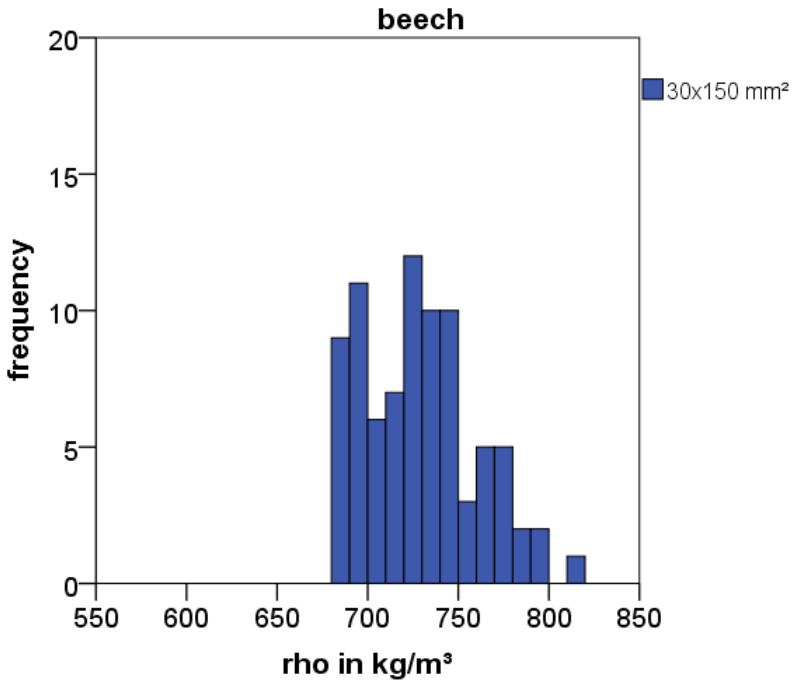


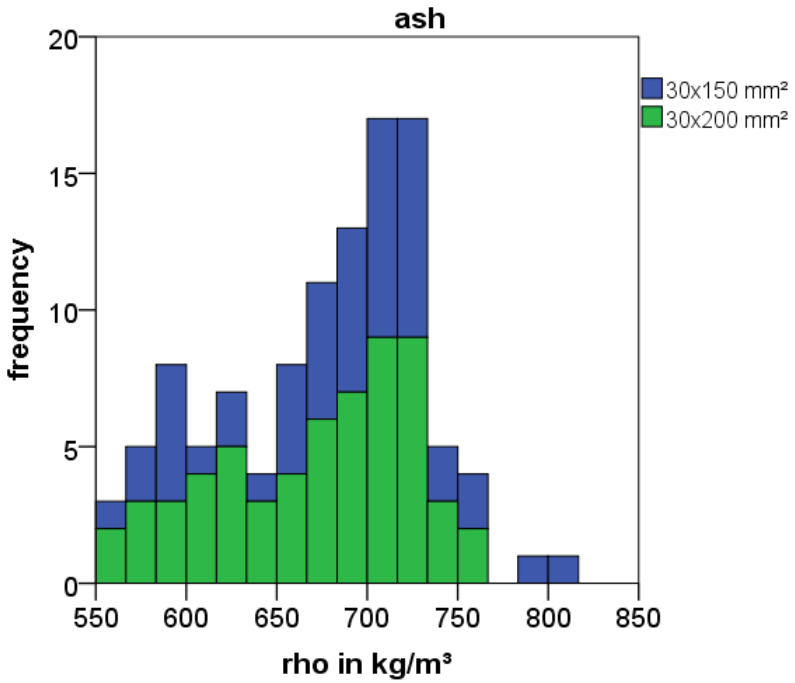


N	83
mean	14,5 kN/mm²
s	2,3 kN/mm²

	30x150 mm²	30x200 mm²
N	49	60
mean	13,7 kN/mm²	13,2 kN/mm²
s	2,8 kN/mm²	2,0 kN/mm²

WP2.2 – German beech / ash

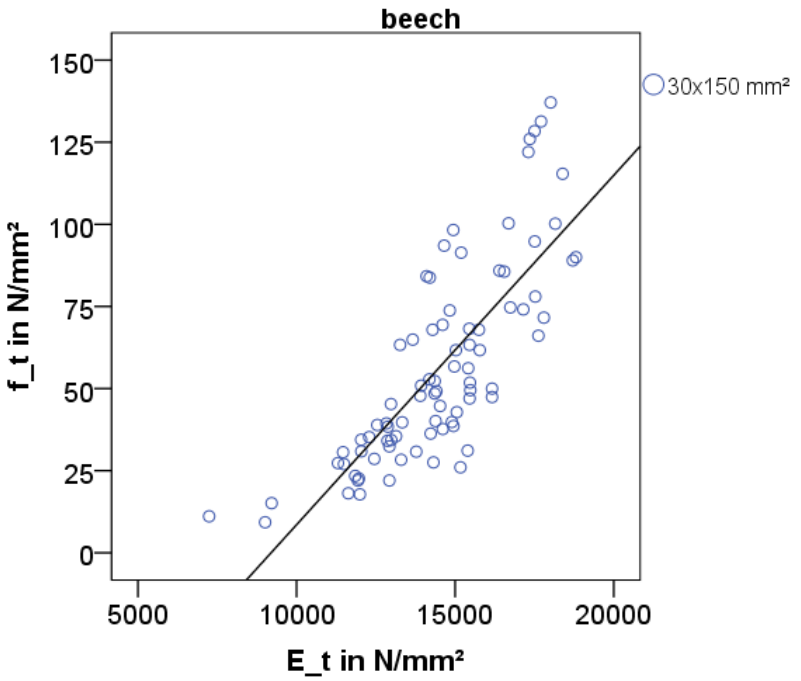


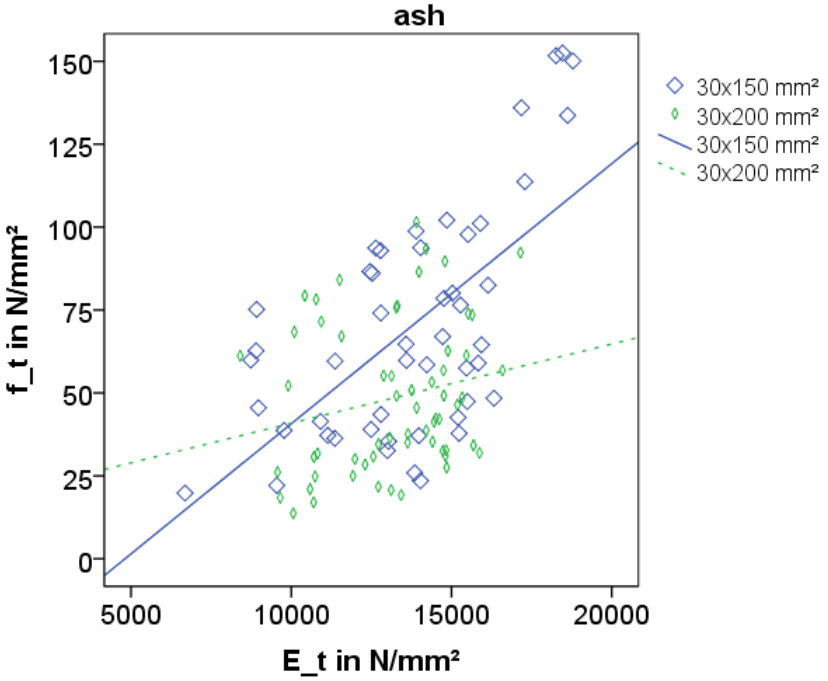


N	83
mean	728 kg/m³
s	31 kg/m³

	30x150 mm²	30x200 mm²
N	49	60
mean	682 kg/m³	671 kg/m³
s	59 kg/m³	54 kg/m³

WP2.2 – German beech / ash

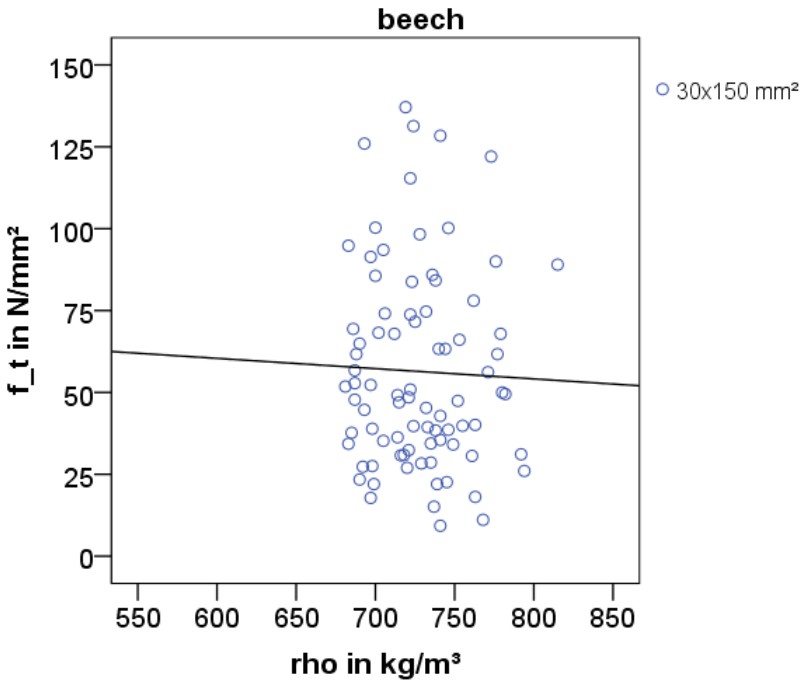


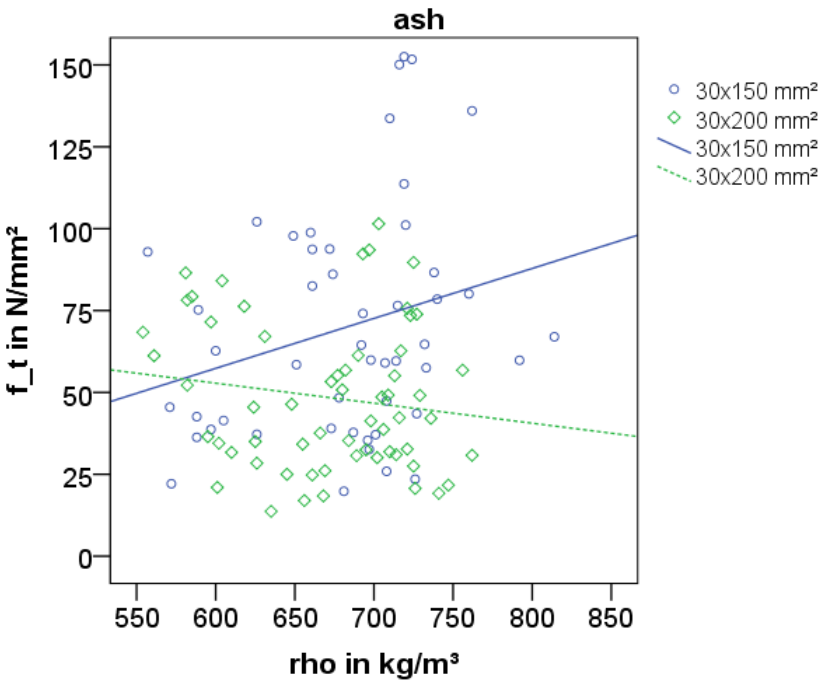


N	83
R^2	0,627

	30x150 mm²	30x200 mm²
N	49	60
R^2	0,394	0,045

WP2.2 – German beech / ash





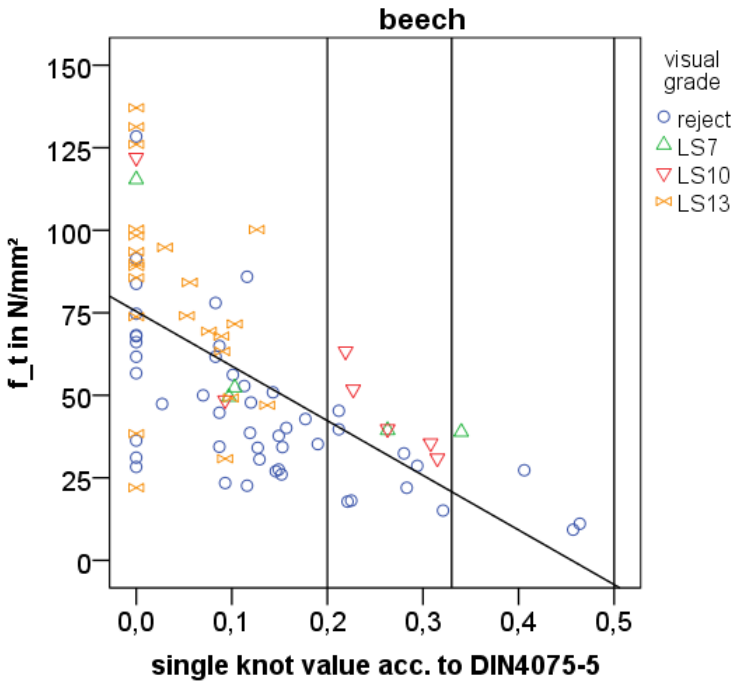
N	83
R^2	0,001

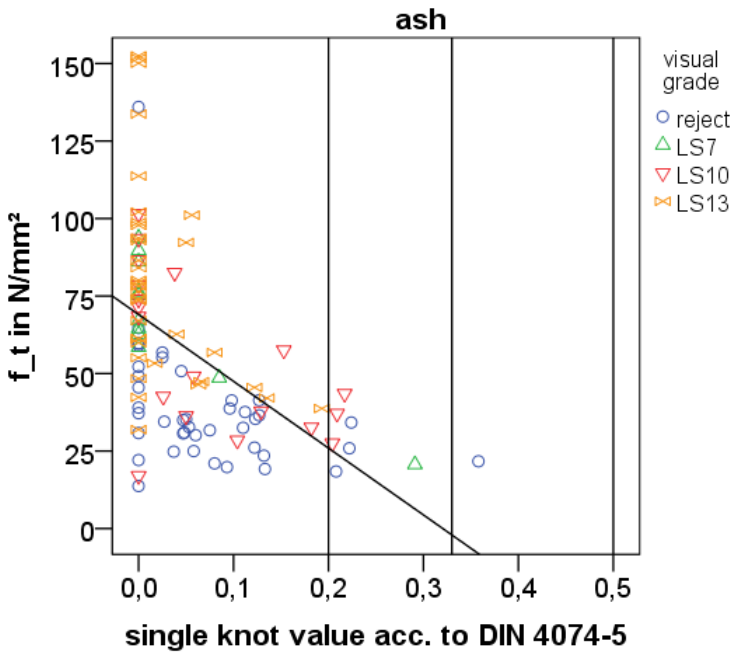
	30x150 mm²	30x200 mm²
N	49	60
R^2	0,066	0,021

WP2.2 – German beech / ash

DIN 4074-5				
	LS13	**LS10**	**LS7**	**reject**
beech	23	7	5	48
ash (total)	36	19	12	42
ash (30x150)	17	10	7	15
ash (30x200)	19	9	5	27
EN 14081-1 Annex A.1				
beech	30	7	2	44
ash (total)	49	22	2	36
ash (30x150)	25	10	2	12
ash (30x200)	24	12	0	24

WP2.2 German beech / ash





N	83
R^2	0,395

N	109
R^2	0,268

WP2.2 – microwave 2d measurement

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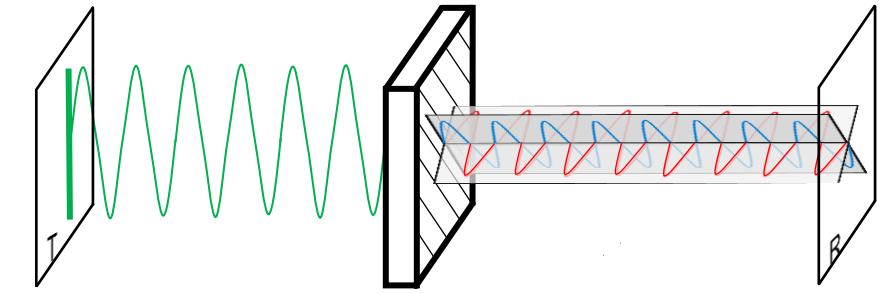
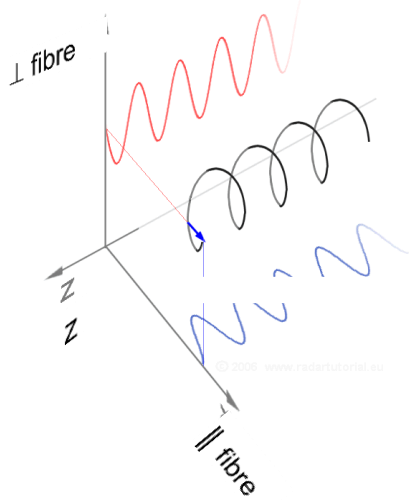
mw transition

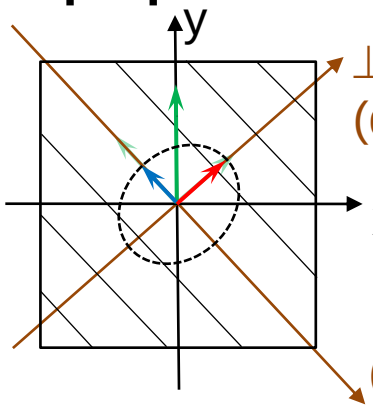


transmitter specimen receiver

elliptical polarisation



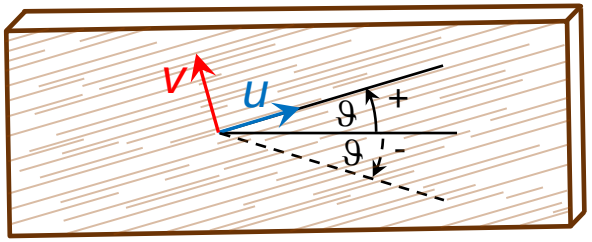
parallel / perp. to fibre



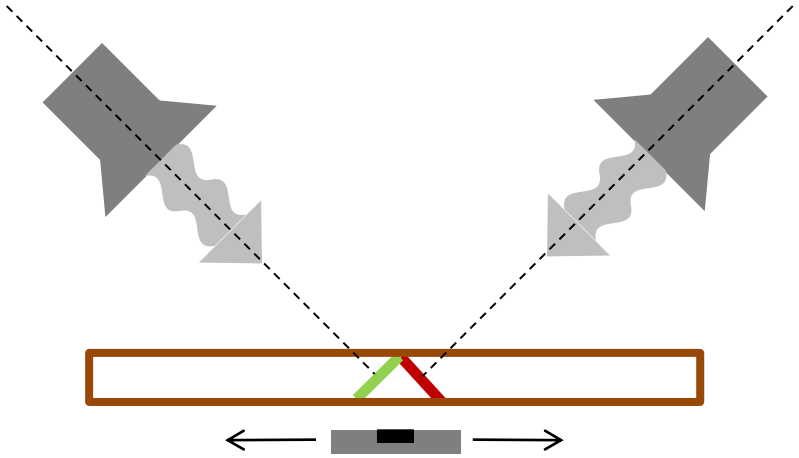
⊥ fibre
(direction v)

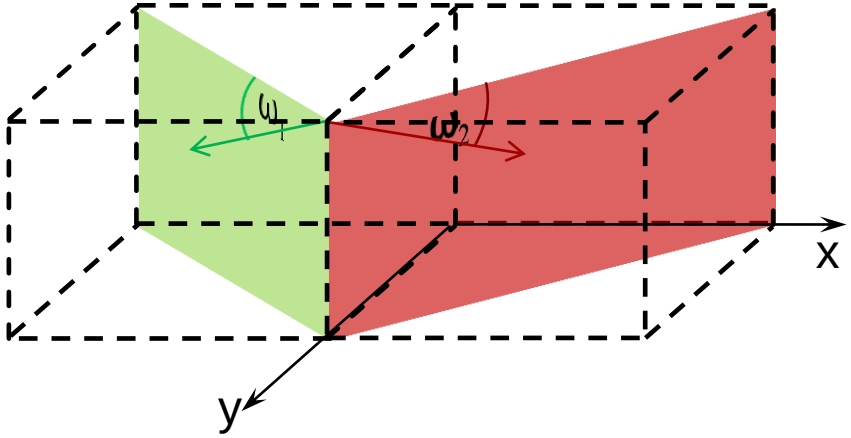
∥ fibre
(direction u)

determination of 2d fibre orientation (horizontal)

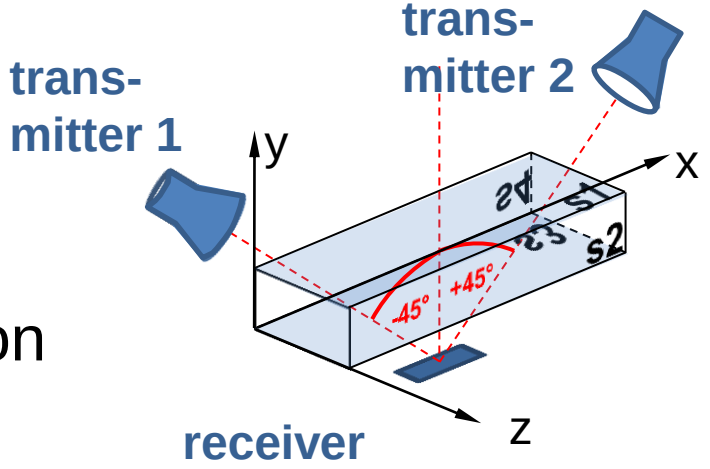


WP2.2 – microwave 3d measurement





- two measurements -45° / +45°
- two angles ω_1, ω_2
- determination of vertical fibre orientation → spatial direction



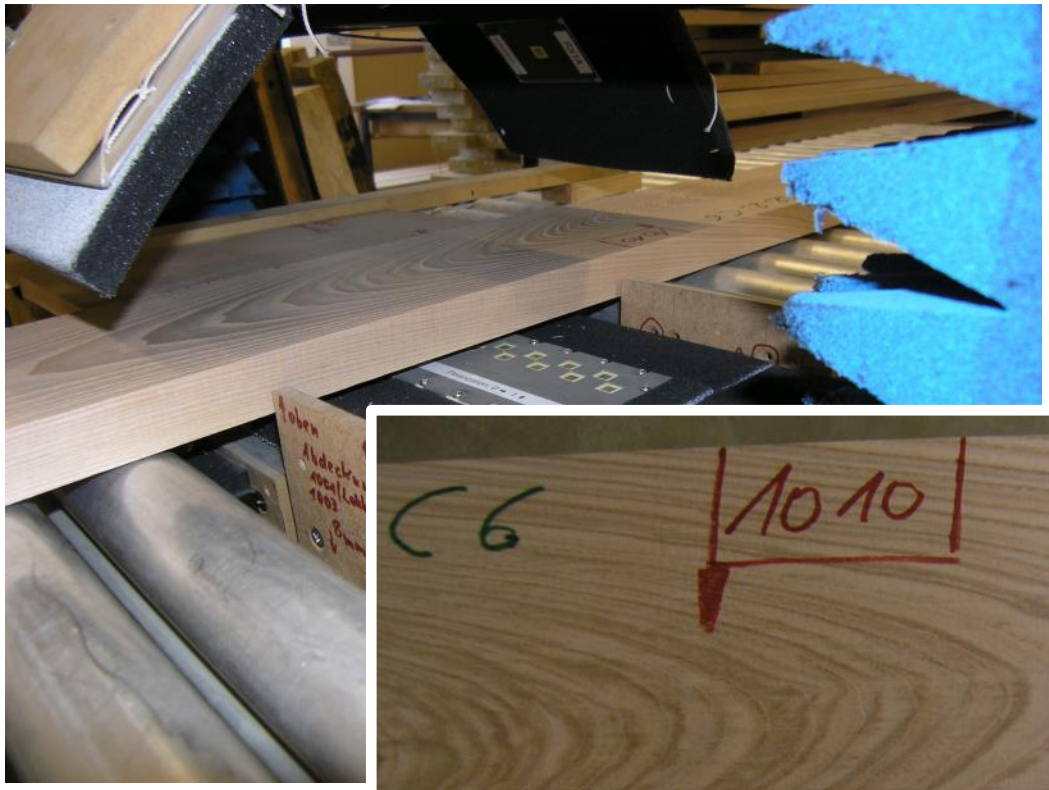
WP2.2 – microwave sampling

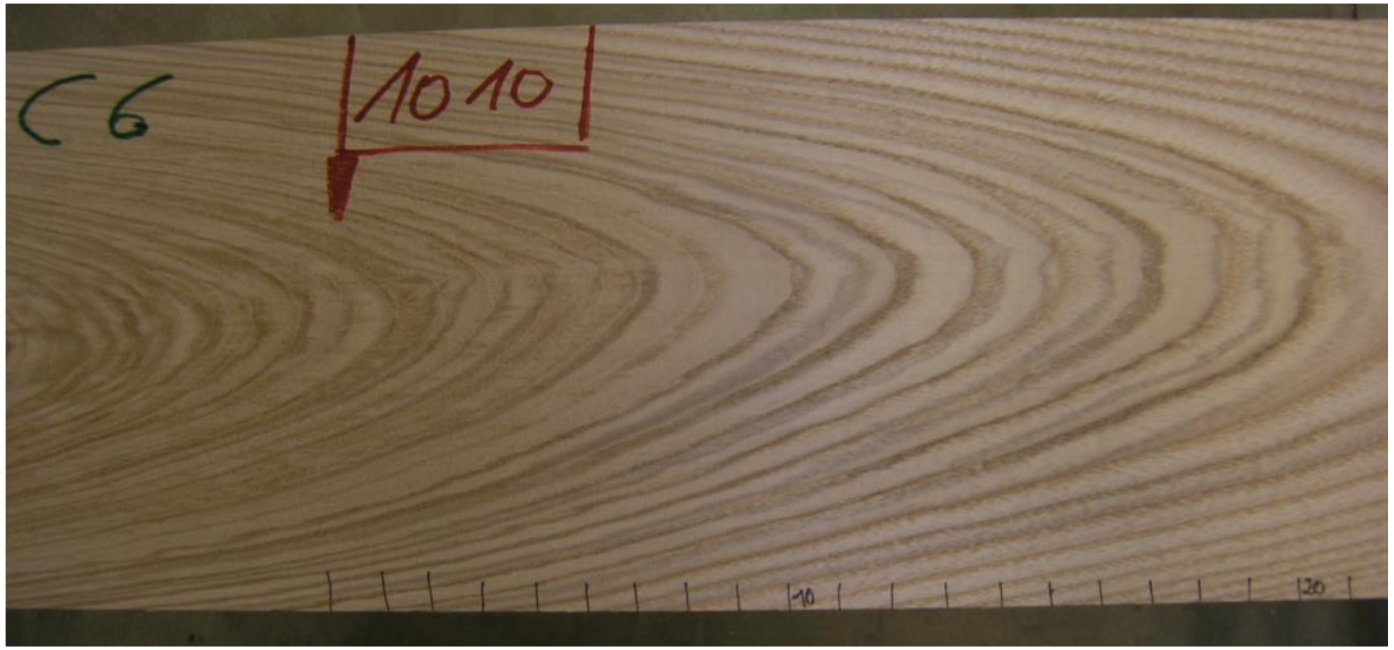
- sampling plan
  - 40 lamellas per species
    - 50% high quality: no or small knots, even fibre
    - 50% low quality: large knots, strong fibre deviation (e.g. branches)
  - only specimens with width = 150 mm

➔ 41 beech specimens
37 ash specimens

WP2.2 – microwave grading

WP2.2 – microwave grading





WP2.2 – microwave first models

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1. step
- „basis model“
- E_dyn & rho & tkar_150

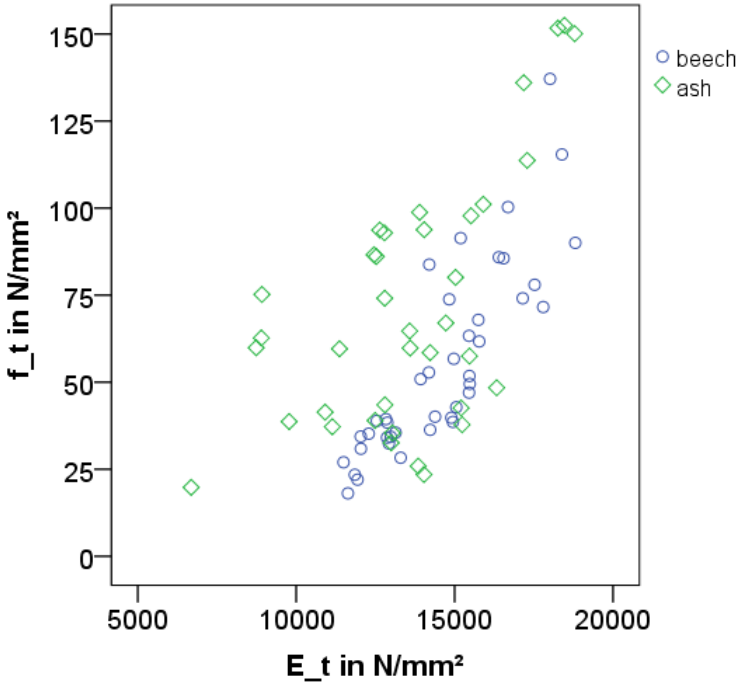
2. step
- E_dyn & rho & tkar_150
- microwave data (ϑ, ω, rho_mw)

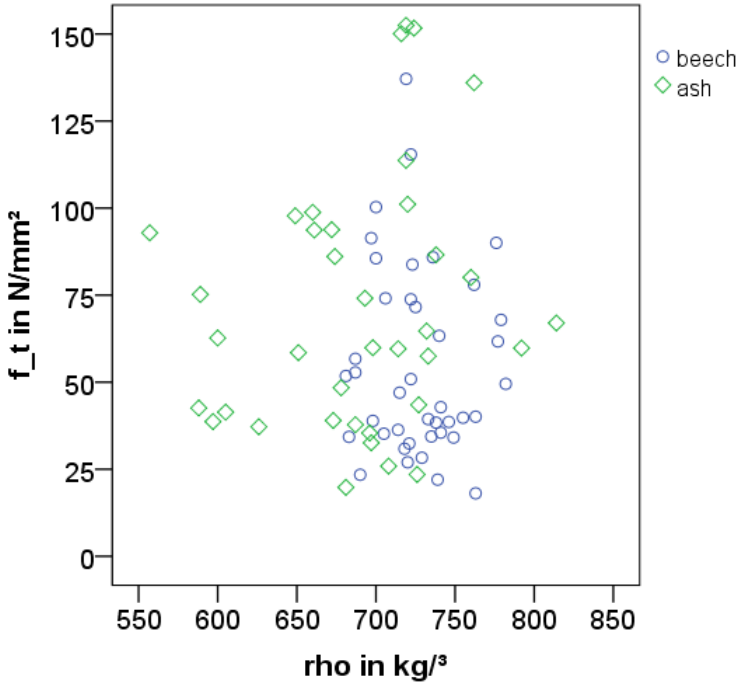
3. step
- ~~tkar_150~~
- E_dyn & rho
- microwave data (ϑ, ω, rho_mw)

4. step
- ~~rho & tkar_150~~
- E_dyn
- microwave data (ϑ, ω, rho_mw)

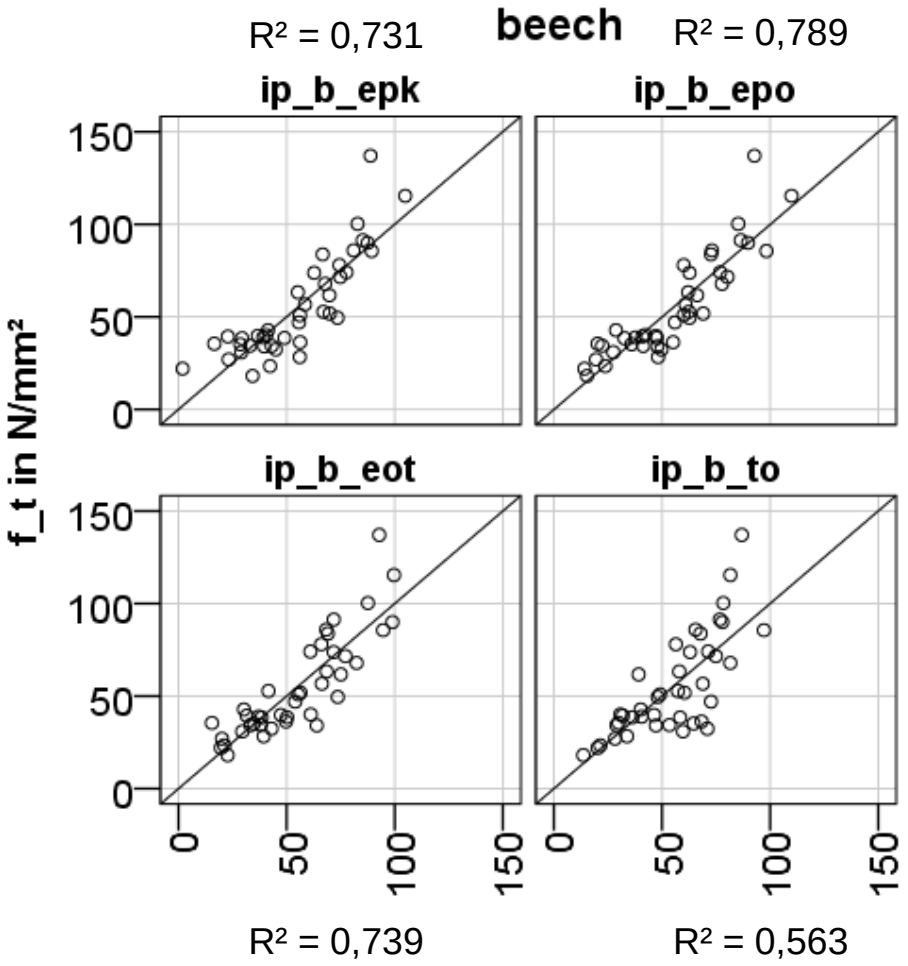
5. step
- ~~E_dyn & rho & tkar_150~~
- microwave data (ϑ, ω, rho_mw)

WP2.2 – microwave overview



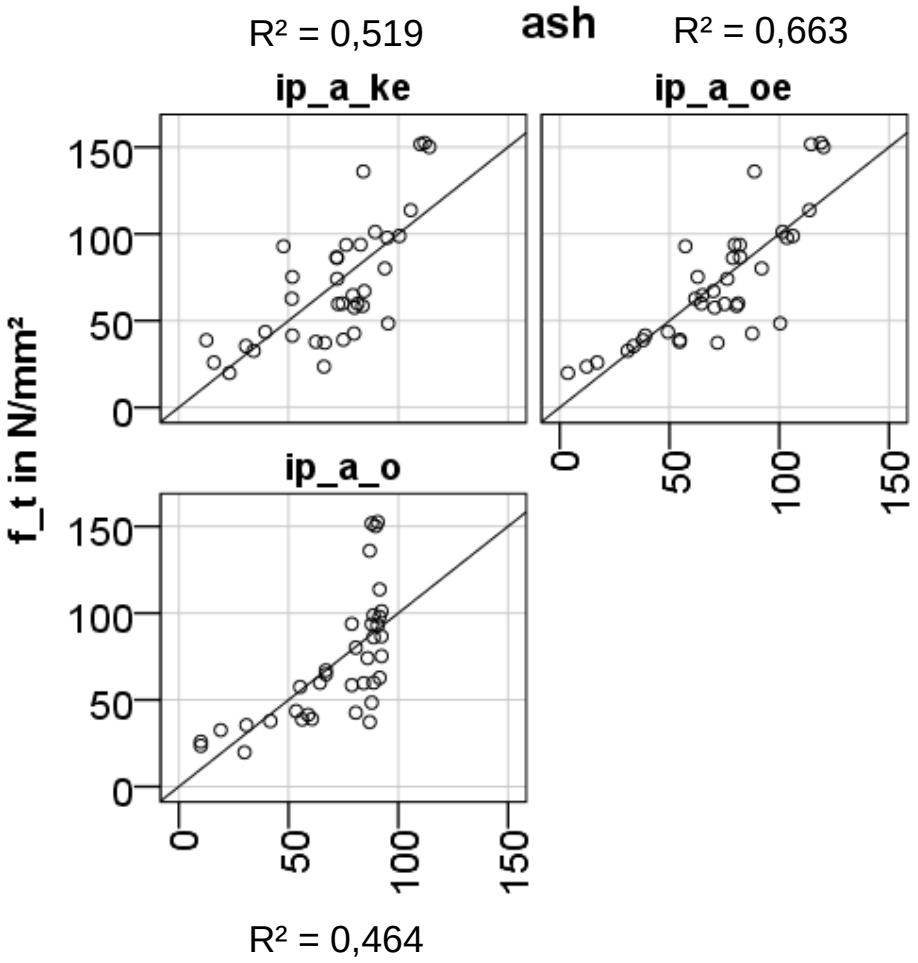


WP2.2 – microwave first models



- abbreviations
  - b = beech
  - a = ash
  - e → E_dyn
  - p → rho
  - k → tkar_150
  - o → angle ω („diving“)
  - t → anlge ϑ („in plane“)

WP2.2 – microwave first models



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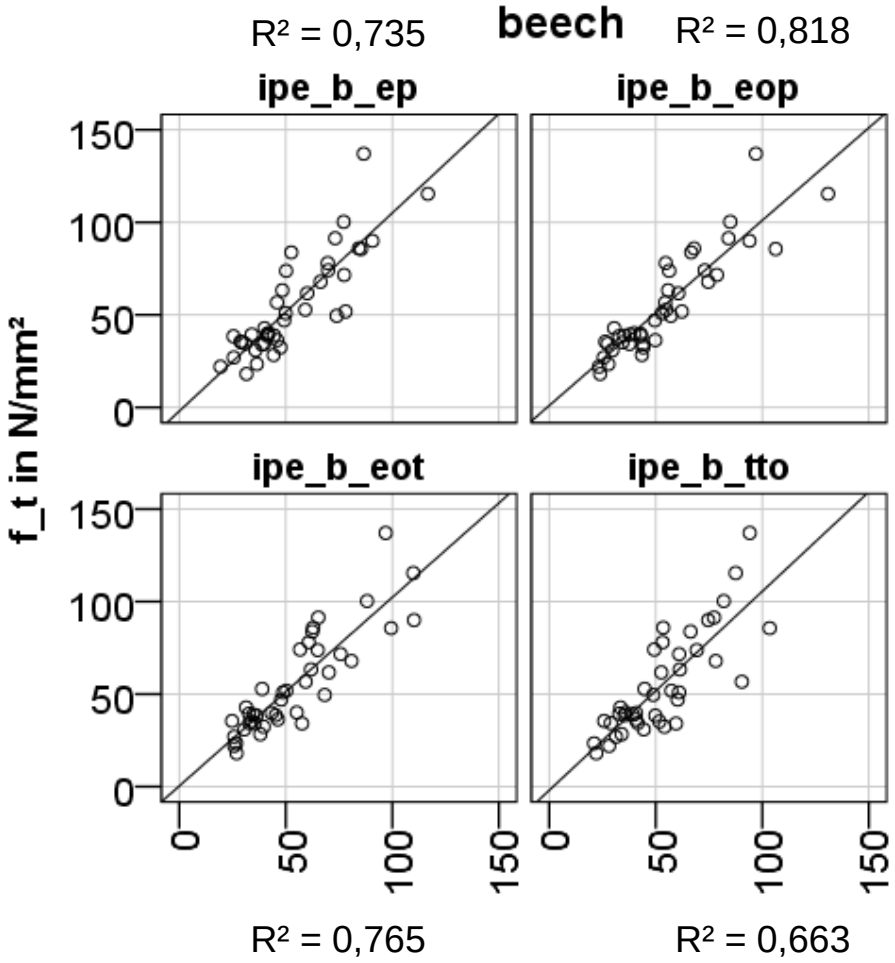
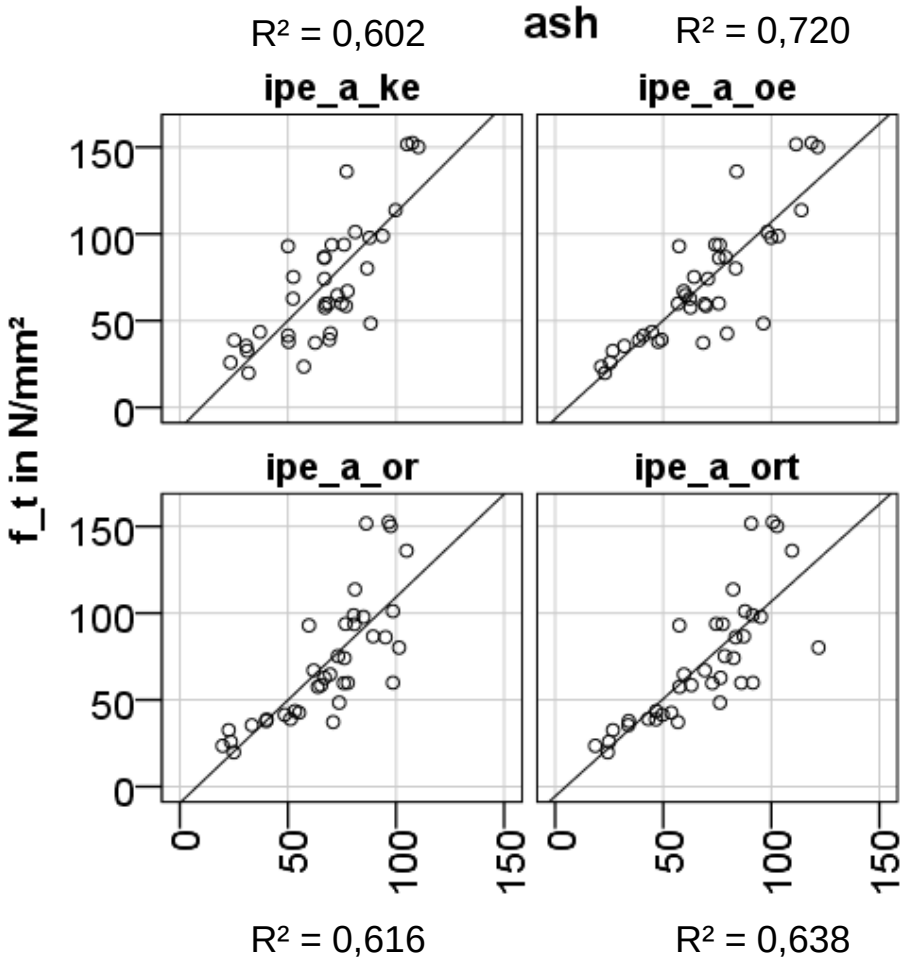
WP2.2 – microwave first models (logarithmic)



- abbreviations
  - ipe = IP based on log(f_t)
  - b = beech
  - a = ash
  - e → E_dyn
  - p → rho
  - k → tkar_150
  - o → angle ω („diving“)
  - t → anlge ϑ („in plane“)

WP2.2 – microwave first models (logarithmic)



- abbreviations
  - ipe = IP based on log(f_t)
  - b = beech
  - a = ash
  - e → E_dyn
  - p → rho
  - k → tkar_150
  - o → angle ω („diving“)
  - t → anlge ϑ („in plane“)

WP2.2 – Austrian beech

- 15.10.2015: „Österreichischer Laubholztag“
  - support for EU Hardwoods for allocation of LS7 and LS10+ in EN1912
- 25.02.2016: meeting at partner‘s sawmill for details
  03. / 10.05.2016: visual grading at partner‘s sawmill
  - traceability of logs possible
  - logs with sufficinent length for testing and LS7 hard to come by

WP2.2 – Austrian beech

- sampling
  - Viennese Wood, Lower Austria, Upper Austria, Styria
  - 26 x 100 mm² / 26 x 150 mm² / 35 x 150 mm²

WP2.3

		2015												2016											
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
2.3	consolidate visual grading rules, obstacles machine strength																								
	pt. 2 (attempt to consolidate visual grading rules, obstacles in																								
	compendium hardwood usage																								

WP2

- outlook
  - microwave prototype calibration of moisture content for hardwoods
  - data evaluation of German beech and ash (HFA – FVA)
  - visual grading, microwave measurement and testing of German oak and Sweet chestnut (HFA – FVA)
  - publication together with FVA
  - visual grading and testing of Austrian beech
  - allocation of Austrian beech in EN1912
  - “big picture” for adopting visual grading rules for hardwood


Standort Stetten


Standort Arsenal

Dipl.-Forstw. Peter Linsenmann

p.linsenmann@holzforschung.at

Tel. +43/1/798 26 23-51

www.holzforschung.at