

Tree sample cores of the National Forest Inventory from Romania

Gheorghe MARIN

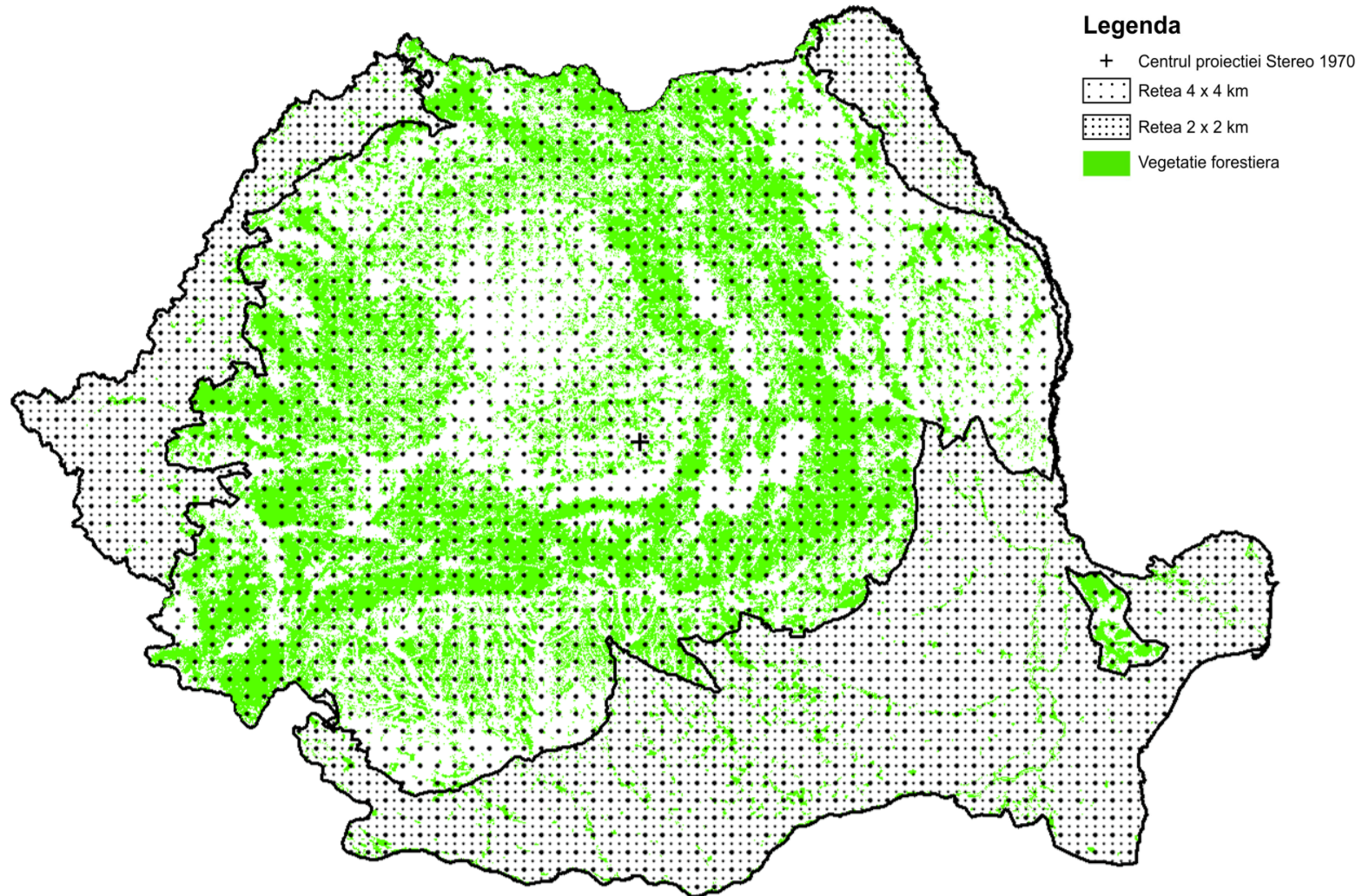
21.02.2024

- Romanian NFI
- Extraction of the tree sample cores
- Processing of the tree sample cores
- The use of the tree sample cores

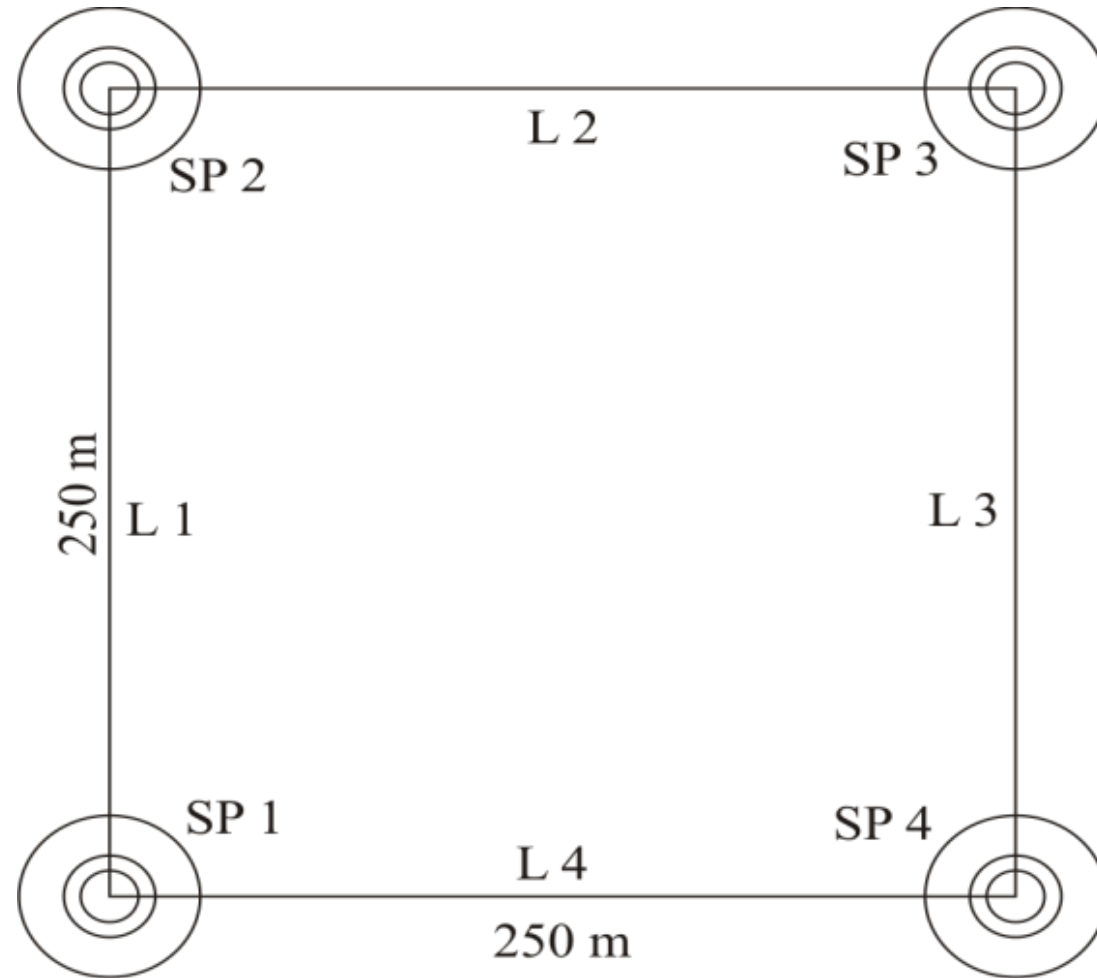
1. Romanian NFI

- Continuous Forest Inventory
- 5 Years Cycle
- Systematic Sampling Grid
- In the mountains and hills regions, the NFI grid has cells of 4 km x 4 km, whereas in the plains region the cells are 2 km x 2 km
- The NFI measures permanent sample clusters (PSC) of 4 sample plots (SP)
- Romanian NFI has 31,201 PSC and 124,804 SP

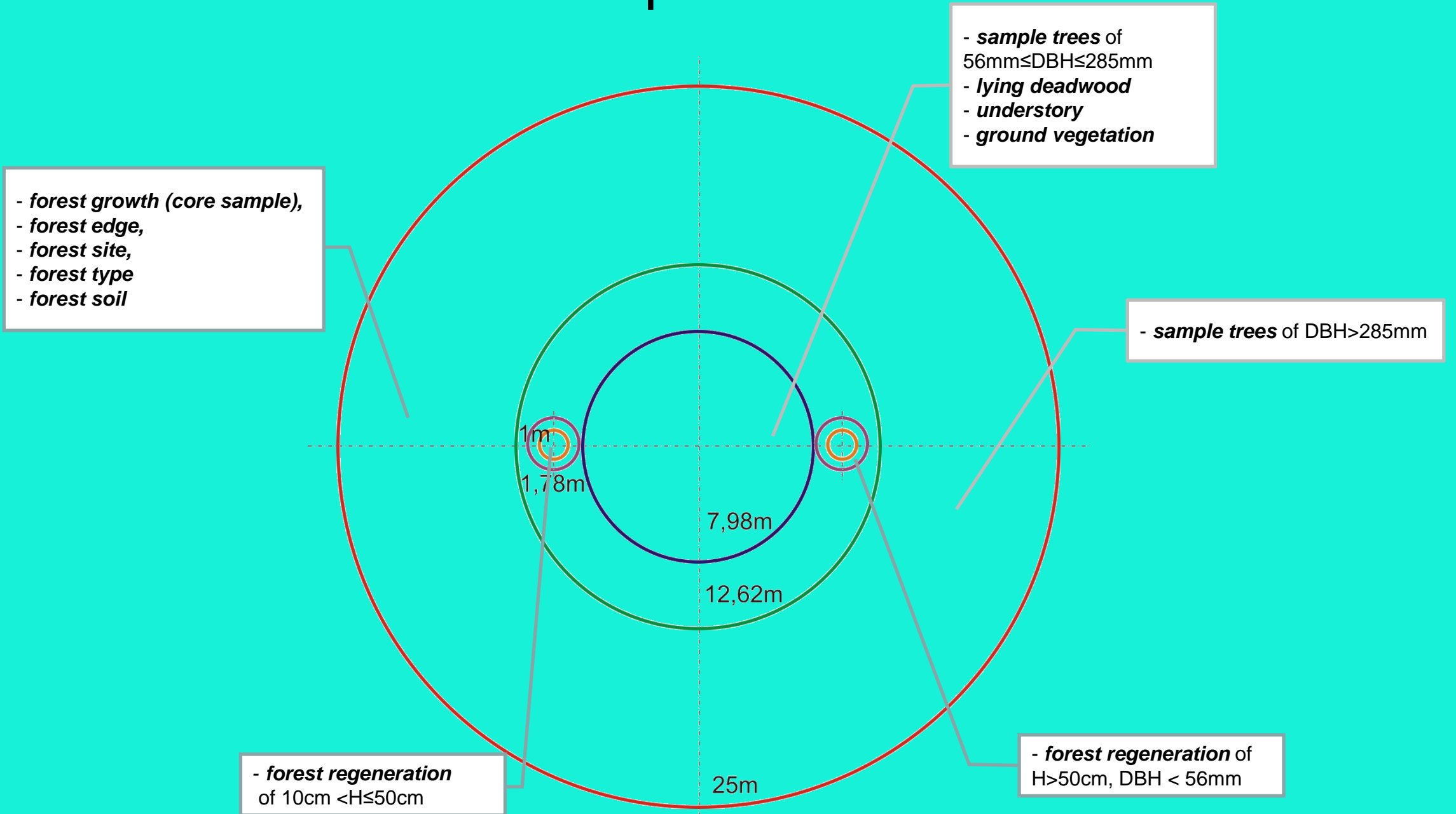
NFI Sample Grid



NFI Sample Cluster



NFI Sample Plot



2. Extraction of the tree sample cores

- More than 50,000 incremental cores were collected by the Romanian NFI (I)
- Pressler increment borer
 - internal diameter 5 mm
 - length 40 cm
- The cores were bore at 1.3 m from the ground, parallel with the contour line



2. Extraction of the tree sample cores

- The number of trees appropriated to each SP from which cores were taken depends on the number of species, such that for one species 3-4 cores were extracted, otherwise 2-3 cores / species were collected
- For each tree identified as a core provider, only one incremental core was collected
- When two obvious cohorts exist in the same PSC, for each cohort two increment cores were extracted

2. Extraction of the tree sample cores

- The trees from which cores will be extracted were selected randomly, conditioned to the following constraints:
 - The trees are located within a 25 m radius from the center of the SP,
 - The trees belong to the dominant and co-dominant canopy class,
 - The diameter at breast height (dbh) should be equal or larger than the average dbh of the SP and larger than 12 cm,
 - The trees do not exhibit exterior damages, exposure to diseases, or significant ellipticity.

2. Extraction of the tree sample cores

- After extraction, the increment cores were stored in a rigid plastic case to avoid damage during transportation
- A Field File attached to each plastic case were recorded the PSC, SP, species, and two dbh, one measured on the direction of the core and one perpendicular to the core

Rigid plastic case



Field File

Placa nr.

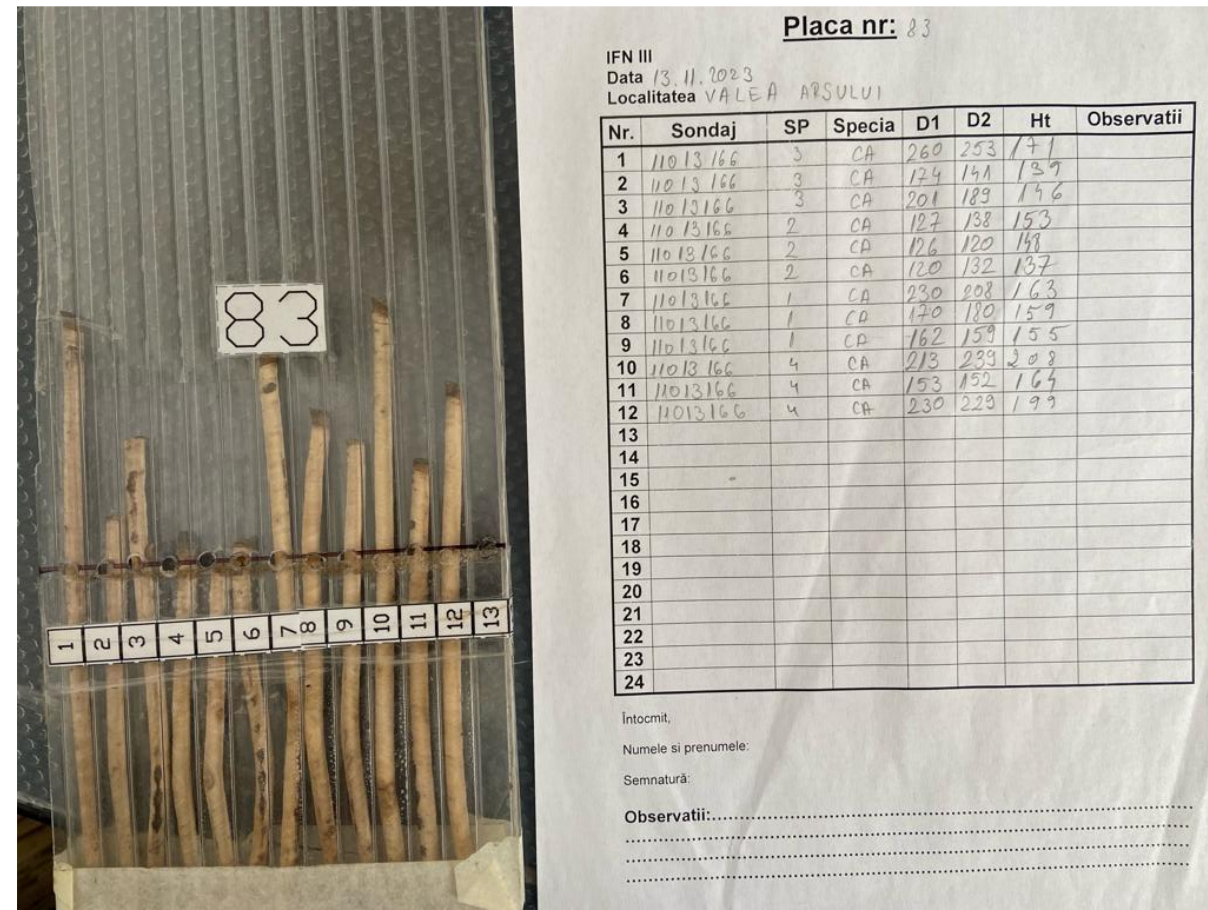
IFN III anul 4
Data:
Localitatea:

Nr.	Sondaj	SP	Specia	D1	D2	Ht	Observații
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							

Întocmit,
Numele și prenumele:
Semnătură:
Observații:.....
.....
.....

2. Extraction of the tree sample cores

- Rigid plastic cases with stored cores
- Filled in Field Files



3. Processing of the tree sample cores

- The main information extracted from the incremental cores is the **width of each ring** and their **succession**.
- To obtain this information, the incremental cores were processed using a four steps procedure, similar to Lebourgeois and Merian (2012).
- The steps supplying the width of each ring and their relative location within a core are **mounting, sanding, measurement, and cross-dating**.

3.1. Mounting of the sample cores

- on a solid support, on which physical enhancements are executed
- wooden board with the dimensions of 620 mm x 90 mm x 18 mm
- on each side of a board, 8 circular channels were carved (i.e., 16 channels/board)
 - channel width 5mm
 - channel depth 3mm



3.1. Mounting of the sample cores

- Each channel was painted with a slow-drying wooden glue from the vinyl acetate family
- To ensure that the increment cores are not moving once mounted, staples are used
- The increment cores were mounted on one board if less than 16 cores/ PSC were collected, or on two board otherwise
- If the incremental core was received broken, the parts were mounted on the board in the order mirroring the natural succession
- After mounting, the glue was left to dry for at least two days



3.2 Sanding of the sample cores

- Enhance the differences among the rings

Preparing for sanding – remove the used staples



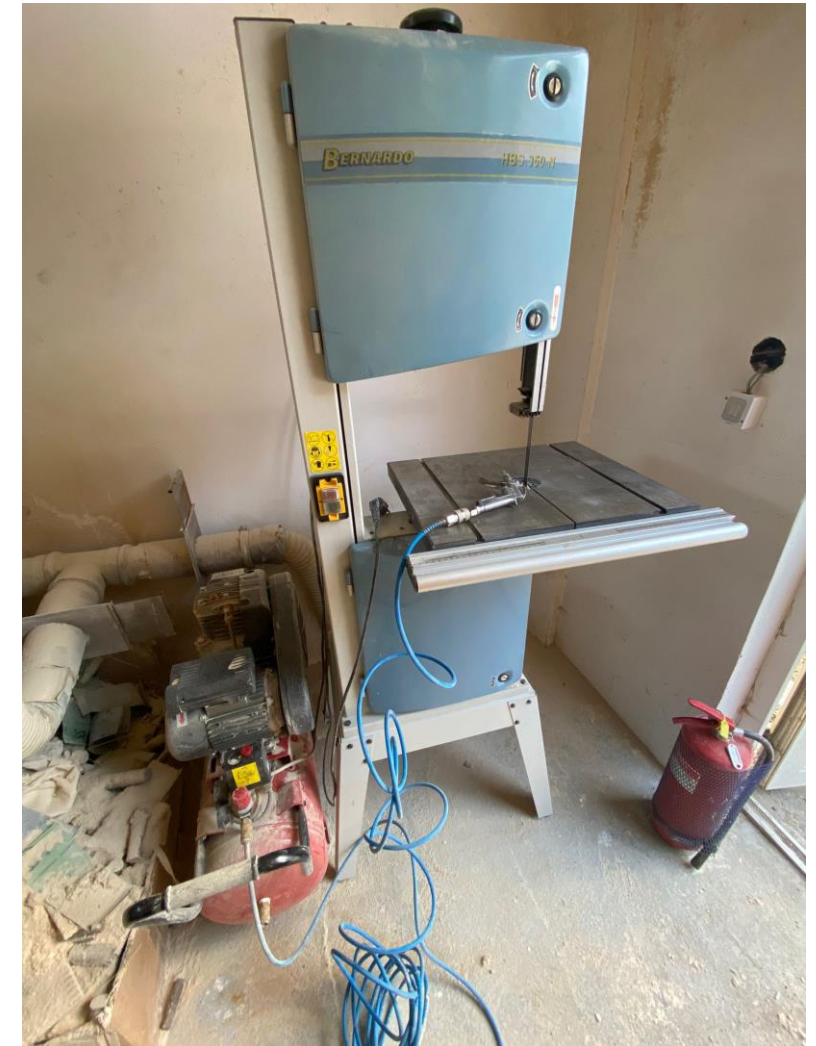
3.2 Sanding of the sample cores

- using a sanding machine
- three phases: coarse sanding, with a sandpaper grit of 80, fine sanding, with a sandpaper grit of 240, and extra-fine sanding with a sandpaper grit of 400
- coarse sanding stops when the support wooden board is reached by the sanding paper
- fine sanding prepare the core for extra-fine sanding, which reveals the cellular anatomic level details.



3.2 Sanding of the sample cores

After the final sanding, the wooden board is cleaned by blowing air from an air-compressor



3.3. Measurement of the ring width

- A graphical procedure (Lebourgeois and Merian, 2012), based on high resolution scanning of incremental cores
- Checking the sanded sample cores for possible defects
 - knots
 - missing part of the core etc.

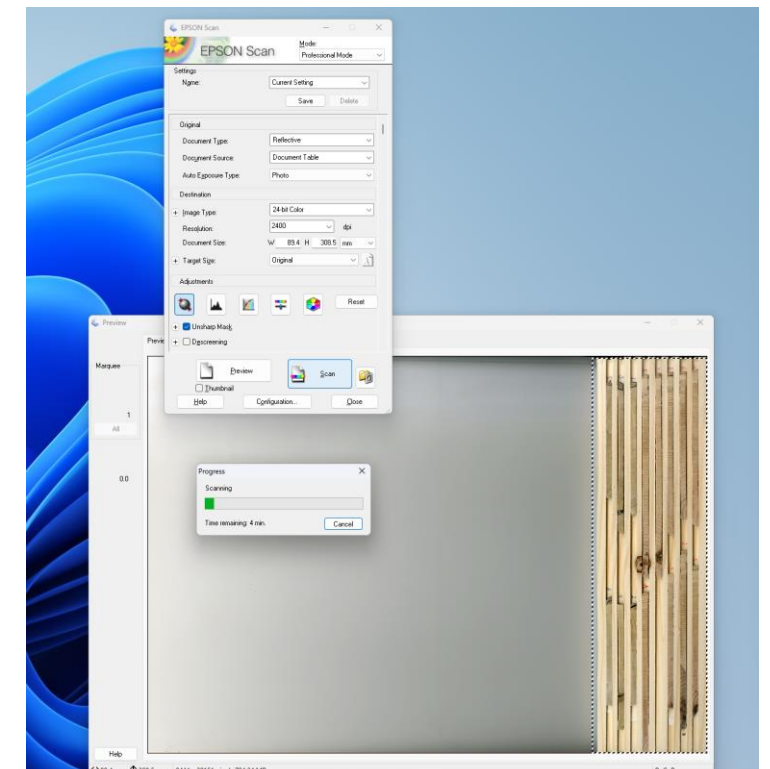


1	Data	Echipsa	Nr. Unic Sondaj	SP Nr. Carota	Specia	d1	d2	H	d maduva	sp deter	Placa	Localitate	Nr. Rupturi	Defecte	Seria de slefuire	Observatii
11075	19.10.2023	17 FOCSANI	14032153	4	2 Frasin comun	185	191	158			31	POIANA CRISTEI				2
11076	19.10.2023	17 FOCSANI	14032153	2	3 Fag	266	256	165			31	POIANA CRISTEI				1
11077	19.10.2023	17 FOCSANI	14032153	2	4 Fag	276	278	174			31	POIANA CRISTEI				2
11078	19.10.2023	17 FOCSANI	14032153	1	5 Fag	196	191	208			31	POIANA CRISTEI				0
11079	19.10.2023	17 FOCSANI	14032153	1	6 Fag	191	196	188			31	POIANA CRISTEI				2
11080	23.10.2023	17 FOCSANI	14048247	3	1 Salcie plesnitoare	186	176	107			5	GALATI				1
11081	23.10.2023	17 FOCSANI	14048247	3	2 Salcie plesnitoare	186	195	111			5	GALATI				0
11082	23.10.2023	17 FOCSANI	14048247	3	3 Salcie plesnitoare	152	161	98			5	GALATI				0
11083	23.10.2023	17 FOCSANI	14048247	4	4 Salcie plesnitoare	207	221	145			5	GALATI				1
11084	23.10.2023	17 FOCSANI	14048247	4	5 Salcie plesnitoare	195	211	143			5	GALATI				2
11085	23.10.2023	17 FOCSANI	14048247	4	6 Salcie plesnitoare	171	180	138			5	GALATI				2
11086	27.10.2023	17 FOCSANI	14036147	4	1 Gorun	211	221	121			1	GURA CALITEI				0
11087	27.10.2023	17 FOCSANI	14036147	4	2 Gorun	187	192	111			1	GURA CALITEI				1
11088	27.10.2023	17 FOCSANI	14036147	4	3 Gorun	261	257	127			1	GURA CALITEI				0
11089	27.10.2023	17 FOCSANI	14036147	3	4 Tei cu frunza mare	251	266	314			1	GURA CALITEI				5
11090	27.10.2023	17 FOCSANI	14036147	3	5 Tei cu frunza mare	355	367	318			1	GURA CALITEI				3
11091	27.10.2023	17 FOCSANI	14036147	3	6 Fag	256	246	317			1	GURA CALITEI				2
11092	27.10.2023	17 FOCSANI	14036147	3	7 Fag	310	295	322			1	GURA CALITEI				1
11093	31.10.2023	17 FOCSANI	14036147	1	8 Tei cu frunza mare	245	227	141			1	GURA CALITEI				1
11094	31.10.2023	17 FOCSANI	14036147	1	9 Tei cu frunza mare	182	186	137			1	GURA CALITEI				2
11095	31.10.2023	17 FOCSANI	14036147	1	10 Paltin de camp	161	147	146			1	GURA CALITEI				2
11096	31.10.2023	17 FOCSANI	14036147	1	11 Paltin de camp	146	147	143			1	GURA CALITEI				5
11097	31.10.2023	17 FOCSANI	14036147	2	12 Gorun	224	210	219			1	GURA CALITEI				0
11098	31.10.2023	17 FOCSANI	14036147	2	13 Gorun	229	241	224			1	GURA CALITEI				1
11099	30.10.2023	17 FOCSANI	12013219	2	1 Salcam	151	156	120			20	RADESTI				2
11100	30.10.2023	17 FOCSANI	12013219	2	2 Salcam	181	170	135			20	RADESTI				2
11101	30.10.2023	17 FOCSANI	12013219	2	3 Salcam	160	167	128			20	RADESTI				3
11102	01.11.2023	16 ROMAN	12101159	3	1 Carpen	167	183	172			8	SACALENI		liposa	liposa	37 carota nu era in placa
11103	01.11.2023	16 ROMAN	12101159	3	2 Carpen	192	196	165			8	SACALENI		1 b		37
11104	01.11.2023	16 ROMAN	12101159	3	3 Carpen	216	186	182			8	SACALENI		0 fm		37
11105	01.11.2023	16 ROMAN	12101159	3	4 Carpen	193	188	177			8	SACALENI		1 fm		37
11106	01.11.2023	16 ROMAN	12101159	1	5 Plop tremurator	329	306	264			8	SACALENI		1 fm		37
11107	01.11.2023	16 ROMAN	12101159	1	6 Plop tremurator	327	323	260			8	SACALENI		2 fm		37
11108	01.11.2023	16 ROMAN	12101159	1	7 Fag	334	314	237			8	SACALENI		1 b		37
11109	01.11.2023	16 ROMAN	12101159	1	8 Fag	321	308	242			8	SACALENI		0 fm		37
11110	02.11.2023	16 ROMAN	12093147	3	1 Salcie alba (samanta)	165	160	143			43	ICUSESTI		0 b		35
11111	02.11.2023	16 ROMAN	12093147	3	2 Salcie alba (samanta)	165	158	145			43	ICUSESTI		0 b		35
11112	02.11.2023	16 ROMAN	12093147	3	3 Salcie alba (samanta)	170	156	157			43	ICUSESTI		0 b		35
11113	02.11.2023	16 ROMAN	12093147	3	4 Salcie alba (samanta)	169	165	141			43	ICUSESTI		0 fm		35
11114	06.11.2023	16 ROMAN	12125211	1	1 Carpen	218	231	146			11	COMARNA		0 b		42
11115	06.11.2023	16 ROMAN	12125211	1	2 Carpen	227	216	130			11	COMARNA		0 b		42
11116	06.11.2023	16 ROMAN	12125211	1	3 Jugastru	300	298	148			11	COMARNA		2 fm		42
11117	06.11.2023	16 ROMAN	12125211	1	4 Jugastru	321	302	147			11	COMARNA		0 fm		42
11118	06.11.2023	16 ROMAN	12125211	3	5 Plop tremurator	193	189	108			11	COMARNA		3 b		42
11119	06.11.2023	16 ROMAN	12125211	3	6 Plop tremurator	161	168	118			11	COMARNA		1 fm		42
11120	06.11.2023	16 ROMAN	12125211	3	7 Plop tremurator	193	182	115			11	COMARNA		3 fm		42
11121	07.11.2023	16 ROMAN	12133213	3	1 Plop negru	377	357	212			14	TUTORA		0 fm		44
11122	07.11.2023	16 ROMAN	12133213	3	2 Plop negru	404	391	218			14	TUTORA		3 fm		44
11123	07.11.2023	16 ROMAN	12133213	3	3 Plop negru	293	295	216			14	TUTORA		0 fm		44
11124	07.11.2023	16 ROMAN	12133213	3	4 Plop negru	338	340	214			14	TUTORA		4 fm		44
11125	07.11.2023	16 ROMAN	12123224	1	1 Plop alb	268	260	154			17	MACARESTI		4 fm		35

3.3. Measurement of the ring width

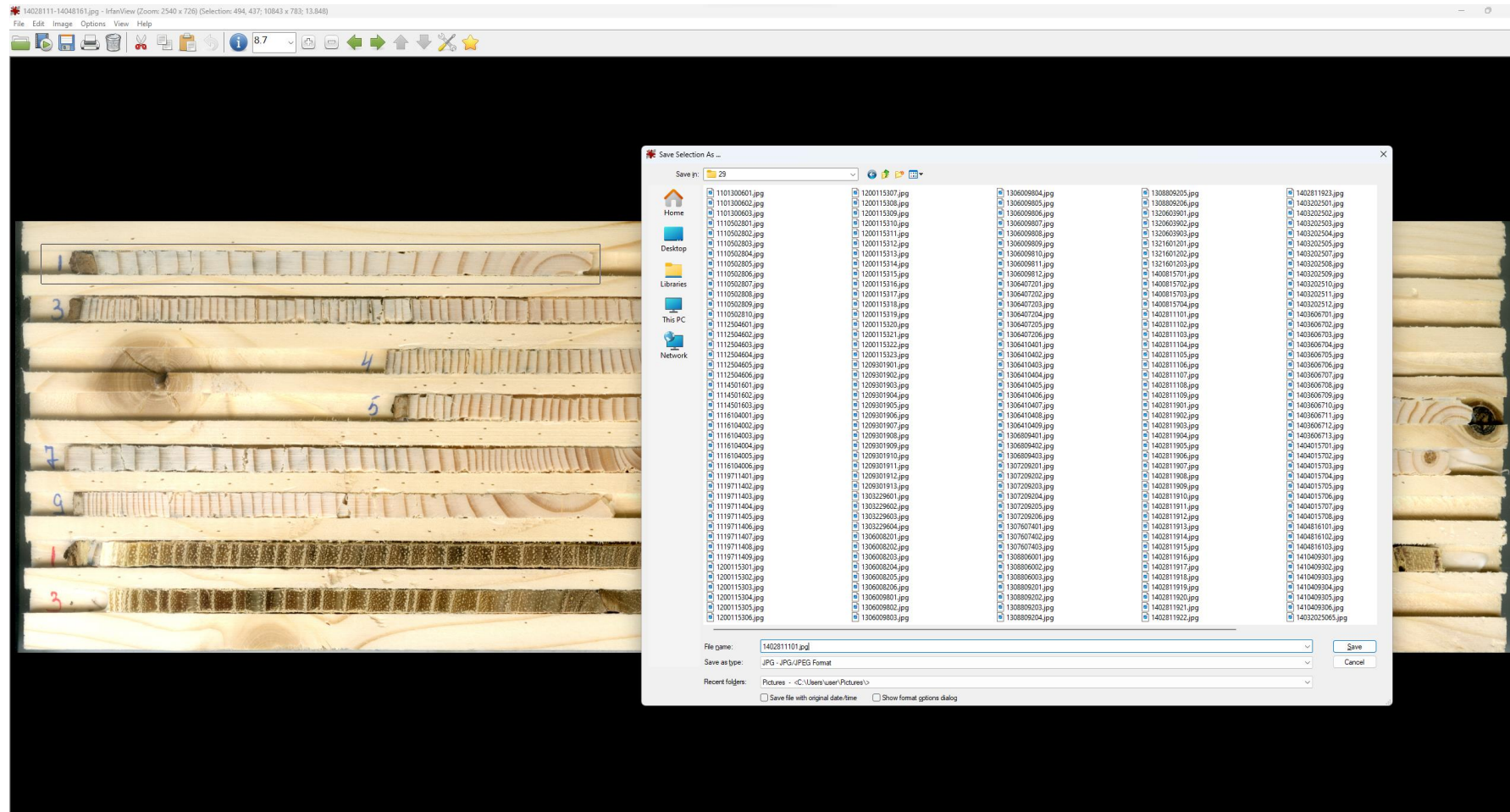
- Scanning of sample cores
- Each wooden plate was scanned with the flatbed professional scanner EPSON at 2400 dpi resolution

- image type = 24-bit Color;
- time for scanning: 3 minutes;
- one image: 25 MB;



3.3. Measurement of the ring width

- Cropping scanned wooden board
- IRFAN VIEW Programme



3.3. Measurement of the ring width

- Individual increment cores is selected and cropped from scanned wooden board

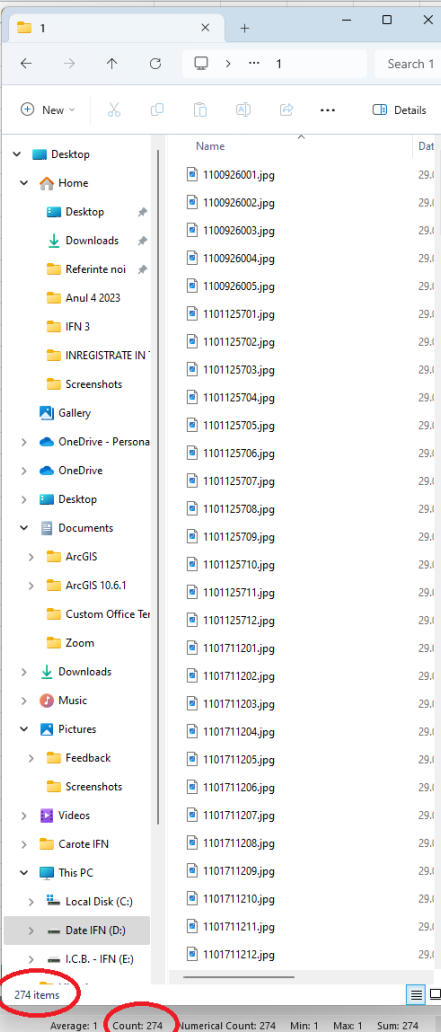


- Database with each image of individual sample core

3.3. Measurement of the ring width

- Checking the Database after the sample core image cropping

1	Data	Echipa	Nr. Unic	Sondaj	SP	Nr. Carota	Specia	d1	d2	H	d maduva	sp deter	Placa	Localitate	Nr. Rupturi	Defecte	Seria de slefuire
232	03.05.2023	14 BRASOV		12029059	4	2	Molid	285	294	225			8	SANTIMBRU		1 fm	1
233	09.05.2023	20 BISTRITA		12093011	1	1	Larice	215	222	138			48	LUNCA BRADULUI		0 fm	1
234	09.05.2023	20 BISTRITA		12093011	1	2	Larice	215	213	150			48	LUNCA BRADULUI		0 b	1
235	09.05.2023	20 BISTRITA		12093011	1	3	Molid	175	179	137			48	LUNCA BRADULUI		3 b	1
236	09.05.2023	20 BISTRITA		12093011	1	4	Molid	194	195	133			48	LUNCA BRADULUI		1 b	1
237	15.05.2023	20 BISTRITA		12089021	2	1	Molid	306	292	249			88	IBANESTI		0 fm	1
238	15.05.2023	20 BISTRITA		12089021	2	2	Molid	313	302	259			88	IBANESTI		1 fm	1
239	15.05.2023	20 BISTRITA		12089021	2	3	Molid	300	302	248			88	IBANESTI		0 b	1
240	15.05.2023	20 BISTRITA		12089021	1	4	Molid	355	362	320			88	IBANESTI		1 fm	1
241	15.05.2023	20 BISTRITA		12089021	1	5	Molid	324	327	300			88	IBANESTI		2 fm	1
242	15.05.2023	20 BISTRITA		12089021	1	6	Molid	312	320	294			88	IBANESTI		0 fm	1
243	16.05.2023	20 BISTRITA		12089021	4	7	Molid	325	317	264			88	IBANESTI		5 b	1
244	16.05.2023	20 BISTRITA		12089021	4	8	Molid	345	355	253			88	IBANESTI		0 fm	1
245	16.05.2023	20 BISTRITA		12089021	4	9	Molid	332	328	271			88	IBANESTI		1 fm	1
246	16.05.2023	20 BISTRITA		12089021	3	10	Molid	285	278	247			88	IBANESTI		3 fm	1
247	16.05.2023	20 BISTRITA		12089021	3	11	Molid	284	296	251			88	IBANESTI		2 b	1
248	16.05.2023	20 BISTRITA		12089021	3	12	Molid	314	316	243			88	IBANESTI		3 fm	1
249	16.05.2023	10 SIMERIA		11021138	2	1	Fag	417	447	275			22	ZLATNA		1 fm	1
250	16.05.2023	10 SIMERIA		11021138	2	2	Fag	295	289	232			22	ZLATNA		0 fm	1
251	16.05.2023	10 SIMERIA		11021138	2	3	Fag	381	370	282			22	ZLATNA		0 fm	1
252	16.05.2023	10 SIMERIA		11021138	4	4	Fag	283	291	266			22	ZLATNA		0 fm	1
253	16.05.2023	10 SIMERIA		11021138	4	5	Fag	303	269	234			22	ZLATNA		0 fm	1
254	16.05.2023	10 SIMERIA		11021138	4	6	Fag	241	255	216			22	ZLATNA		0 fm	1
255	17.05.2023	10 SIMERIA		11021138	1	7	Fag	282	298	278			22	ZLATNA		0 fm	1
256	17.05.2023	10 SIMERIA		11021138	1	8	Fag	275	272	272			22	ZLATNA		0 fm	1
257	17.05.2023	10 SIMERIA		11021138	1	9	Fag	275	289	277			22	ZLATNA		0 fm	1
258	19.05.2023	10 SIMERIA		13020118	1	1	Fag	165	170	164			24	PIANU		0 fm	1
259	19.05.2023	10 SIMERIA		13020118	1	2	Fag	435	400	280			24	PIANU		1 fm	1
260	19.05.2023	10 SIMERIA		13020118	1	3	Fag	238	215	187			24	PIANU		0 fm	1
261	19.05.2023	10 SIMERIA		13020118	4	4	Fag	274	261	268			24	PIANU		0 fm	1
262	19.05.2023	10 SIMERIA		13020118	4	5	Fag	218	236	221			24	PIANU		0 fm	1
263	19.05.2023	10 SIMERIA		13020118	4	6	Fag	295	279	273			24	PIANU		0 fm	1
264	25.05.2023	10 SIMERIA		11017112	3	1	Gorun	257	258	184			28	IGHIU		0 fm	1
265	25.05.2023	10 SIMERIA		11017112	3	2	Gorun	241	238	178			28	IGHIU		1 fm	1
266	25.05.2023	10 SIMERIA		11017112	3	3	Gorun	303	267	201			28	IGHIU		1 b	1
267	25.05.2023	10 SIMERIA		11017112	4	4	Gorun	295	315	215			28	IGHIU		0 fm	1
268	25.05.2023	10 SIMERIA		11017112	4	5	Gorun	225	240	200			28	IGHIU		0 b	1
269	25.05.2023	10 SIMERIA		11017112	4	6	Gorun	279	307	189			28	IGHIU		0 fm	1
270	25.05.2023	10 SIMERIA		11017112	1	7	Gorun	335	281	221			28	IGHIU		0 b	1
271	25.05.2023	10 SIMERIA		11017112	1	8	Gorun	277	245	205			28	IGHIU		0 fm	1
272	25.05.2023	10 SIMERIA		11017112	1	9	Gorun	304	307	211			28	IGHIU		0 fm	1
273	25.05.2023	10 SIMERIA		11017112	2	10	Gorun	370	364	192			28	IGHIU		1 fm	1
274	25.05.2023	10 SIMERIA		11017112	2	11	Gorun	288	287	183			28	IGHIU		0 fm	1
275	25.05.2023	10 SIMERIA		11017112	2	12	Gorun	293	250	183			28	IGHIU		0 fm	1
276																	

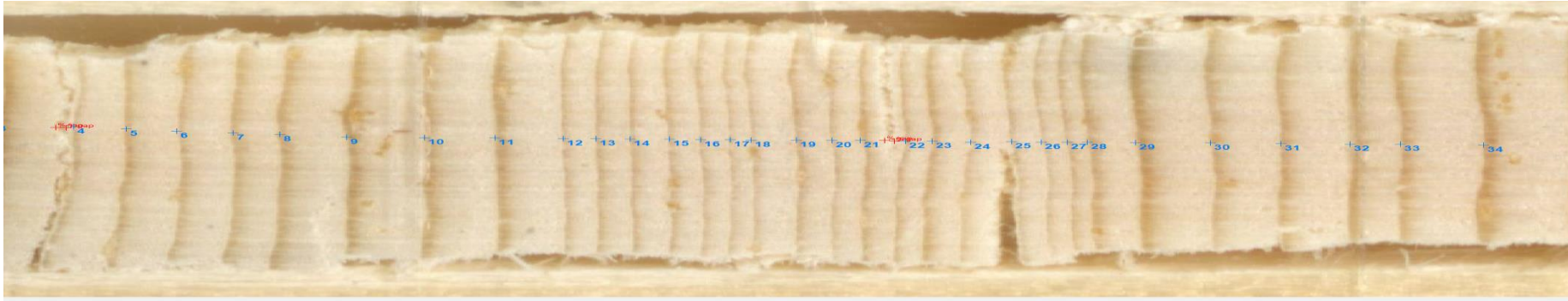


3.3. Measurement of the ring width

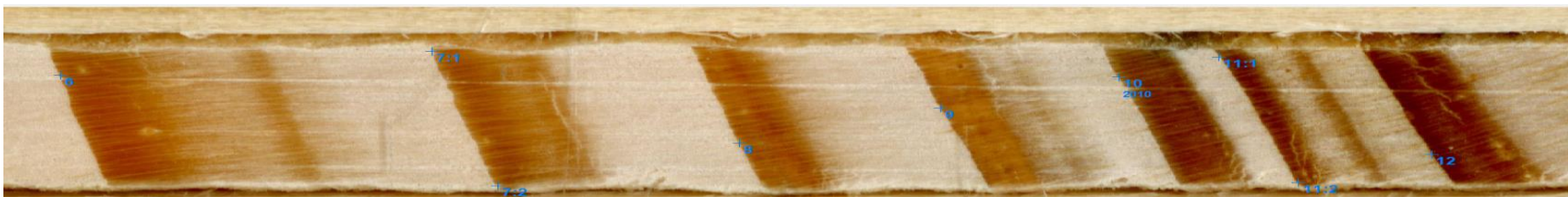
- The annual rings are identified and measured using CooRecorder Programme



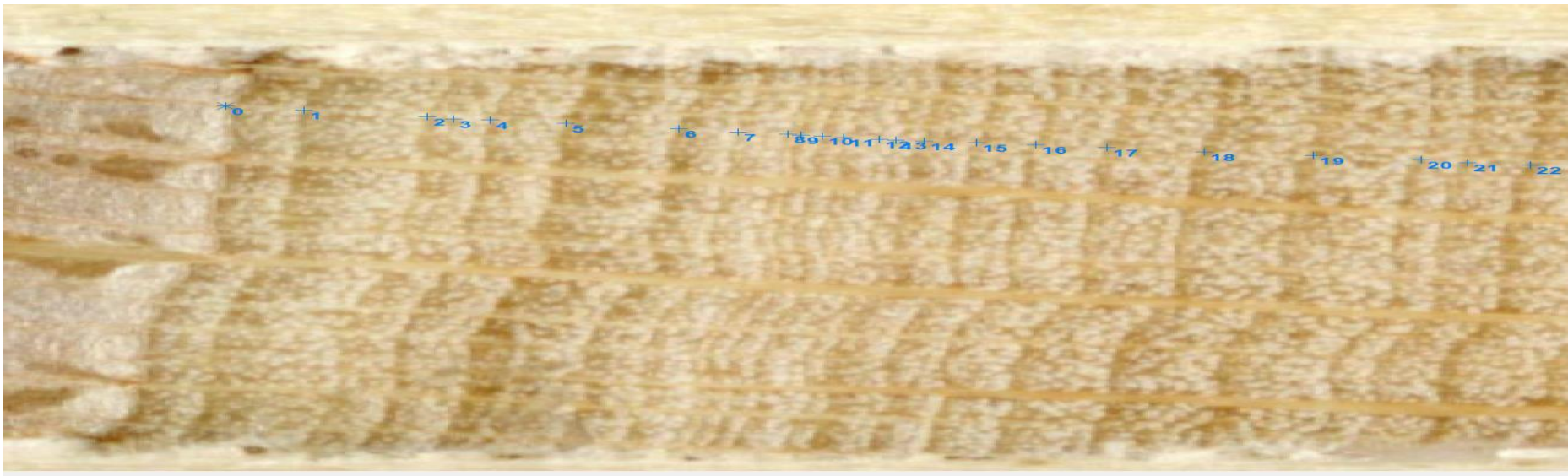
3.3. Measurement of the ring width



Picea abies



Larix decidua



Fagus sylvatica

3.3. Measurement of the ring width

- By measurement of the ring widths results a .POS file for each sample core

- Each .POS file is introduced in Cdendro Programme, which runs some tests and results the age of the tree

```

1311211601.pos
File Edit View
#DENDRO (Cybis Dendro program compatible format) Coordinate file written as D:\IFN 3\Anul 1 2020
\carote de masurat (3)\1311211601.pos 2023-12-14 13:53:56
#Imagefile 1311211601.jpg
#DPI 2400,0
#All coordinates in millimeters (mm)
SCALE 1
#C fara maduva
#C PithCoordinates=136.229,-2.995; DistanceToPith=9,4; YearsToPith=3;
#C CalcRadius=Yes; Radius=121,147; Written=2023-12-14 13:53:56;
#C CoorRecorder=9.8.1 March 23 2022;
#C licensedTo=ROXANA Hutopila, icascampulung@gmail.com;
15.166,1.619
15.335,1.630
17.844,1.894
20.807,2.212
23.781,2.487
26.014,2.625
28.522,2.752
30.385,2.794
32.988,2.953
34.533,3.090
36.354,3.217
38.746,3.577
40.534,3.969
41.582,4.159
42.884,4.466
43.635,4.625
45.170,4.942
46.292,5.133
47.942,5.461 48.821,1.334
50.133,1.672
50.461,1.767
51.033,1.894
51.752,2.085
52.768,2.339
53.732,2.561
54.621,2.794
55.266,2.953
55.711,3.090
56.198,3.196
56.907,3.355
57.711,3.524
58.399,3.662
59.182,3.810
59.912,3.990
60.420,4.096
61.193,4.265
62.473,4.530
63.511,4.731
64.997 5.069 65.786 1.164
Ln 1, Col 1 1,400 characters 100% Windows (CRLF) UTF-8
    
```

Cdendro 9.8.1 March 23 2022 - Cybis dendro dating program 64Bit

Samples Collections Settings Window Help WindowsList

Target: Untitled1 (collection) (D:\IFN 3\Anul 1 2020\carote de masurat (3)\) Dated to 2020

Select as target collection Create Mean value sample Delete selected members Offset 0 dated to 2020 Edit Show Cross correlations Test towards ref. Test towards rest of collection Add best members to target collection Uncheck members Time lines diagram

Plot all members Open selected members

De Trending for ring width curve

No NegExp Polynom

Heavy (div by mean of frame) Div by individual mean Sum by stem Click to edit .rwl file header!

Select best matching members

With condensed report Only summary report Tell bad dating

Right-click on column-header for sort option! Double-click on a member to open it in a separate window! Right-click to Edit!

An unchecked box means that the member does not part in calculations or in any other operation. X indicates a SameStem as above Id when members are sorted by first column.

Check all Uncheck all Invert check 83 members, all checked. More info

MemberID	X	Offset	StartYear	EndYear	Length	Filename	ZeroV.	CC	TT	OVL	DTP	RTP	Comment	Path
1311609002		0 - 60	1960	2020	61	1311609002.pos	0.65	6.6	60	10.3	7	fara maduva	D:\IFN 3	
1311610603		0 - 54	1966	2020	55	1311610603.pos	0.61	5.6	54	0.0	0	maduva	D:\IFN 3	
1312011203		0 - 101	1919	2020	102	1312011203.pos	0.61	7.7	101	0.0	0	maduva	D:\IFN 3	
1312407004		0 - 49	1971	2020	50	1312407004.pos	0.59	5.1	49	9.4	3	fara maduva	D:\IFN 3	
1312016004		0 - 27	1993	2020	28	1312016004.pos	0.55	3.3	27	23.5	6	fara maduva	D:\IFN 3	
1311211602		0 - 59	1961	2020	60	1311211602.pos	0.53	4.7	59	0.0	0	maduva	D:\IFN 3	
1311617003		0 - 80	1940	2020	81	1311617003.pos	0.52	5.3	80	10.0	4	fara maduva	D:\IFN 3	
1311211603		0 - 57	1963	2020	58	1311211603.pos	0.51	4.4	57	20.5	5	fara maduva	D:\IFN 3	
1312011205		0 - 71	1949	2020	72	1312011205.pos	0.51	4.9	71	0.0	0	maduva	D:\IFN 3	
1311617002		0 - 81	1939	2020	82	1311617002.pos	0.50	5.1	81	9.6	6	fara maduva	D:\IFN 3	
1312011202		0 - 97	1923	2020	98	1312011202.pos	0.50	5.6	97	6.8	4	fara maduva	D:\IFN 3	
1312407002		0 - 57	1963	2020	58	1312407002.pos	0.50	4.3	57	7.6	3	fara maduva	D:\IFN 3	
1311617005		0 - 62	1958	2020	63	1311617005.pos	0.49	4.4	62	0.0	0	maduva	D:\IFN 3	
1312011209		0 - 58	1962	2020	59	1312011209.pos	0.49	4.2	58	5.0	2	fara maduva	D:\IFN 3	
1312011212		0 - 94	1926	2020	95	1312011212.pos	0.49	5.4	94	8.5	7	fara maduva	D:\IFN 3	
1312016006		0 - 31	1989	2020	32	1312016006.pos	0.49	3.0	31	8.8	3	fara maduva	D:\IFN 3	
1311211608		0 - 53	1967	2020	54	1311211608.pos	0.48	3.9	53	7.9	4	fara maduva	D:\IFN 3	
1311211606		0 - 62	1958	2020	63	1311211606.pos	0.47	4.1	62	4.7	2	fara maduva	D:\IFN 3	
1311610604		0 - 50	1970	2020	51	1311610604.pos	0.46	3.6	50	21.0	5	fara maduva	D:\IFN 3	
1311612203		0 - 62	1958	2020	63	1311612203.pos	0.46	4.0	62	0.0	0	maduva	D:\IFN 3	
1312407001		0 - 61	1959	2020	62	1312407001.pos	0.46	4.0	61	0.0	0	maduva	D:\IFN 3	
1312011207		0 - 58	1962	2020	59	1312011207.pos	0.45	3.8	58	5.6	3	fara maduva	D:\IFN 3	

Jump to End-of-report

23.01.2024 15:15:26 Cybis Cdendro (March 23 2022), Algorithm: P2YrsL: Proportion of last two years growth LIMITED (2,0,T,NoLog,1,2,6)

Correlations between each of 83 checked members (=all members) of the collection Untitled1.rwl and the rest of the checked members of that collection (excluding samples of the same stem).

Minimum overlap used when finding best match: 50

Member	Years	Member offset to ref	BaPi	C84F	BesIE	MeansF	GLK	Skel	P2YrsL	
Off	Over	P2Yrs	CorrC	TTest	CorrC	TTest	CorrC	TTest	CorrC	TTest
1311211601	60	0 34	2,4	0,63	4,7	0,62	5,9	0,48	2,5	0,30
1311211602	60	0 59	0,52	4,6	0,51	4,5	0,54	4,9	0,56	5,0
1311211603	58	0 57	0,59	5,4	0,82	10,4	0,80	10,0	0,59	5,3
1311211604	60	0 59	0,32	2,5	0,28	2,2	0,37	3,0	0,36	2,8
1311211605	58	0 57	0,39	2,6	0,64	5,2	0,63	6,0	0,36	2,9
1311211606	63	0 62	0,48	4,2	0,44	3,8	0,45	3,9	0,42	3,5
1311211607	54	0 53	0,19	1,4	0,35	2,6	0,28	2,1	-0,11	-0,8
1311211608	54	0 53	0,48	3,9	0,55	4,7	0,54	4,6	0,41	3,2
1311609001	52	0 51	0,45	3,5	0,56	4,7	0,56	4,7	0,63	5,5
1311609002	61	0 60	0,65	6,6	0,65	6,5	0,67	6,9	0,62	5,9
1311609003	92	0 91	0,09	0,8	0,42	4,4	0,33	3,3	0,13	1,3
1311610601	62	0 61	0,49	3,1	0,65	5,9	0,63	5,4	0,36	2,7
1311610602	54	0 53	0,31	2,4	0,59	5,2	0,56	4,8	0,39	3,0
1311610603	55	0 54	0,59	5,2	0,57	4,9	0,59	5,3	0,64	6,0
1311610604	51	0 50	0,45	3,5	0,48	3,8	0,47	3,7	0,48	3,8
1311612201	62	0 61	0,41	3,4	0,40	2,4	0,37	3,1	0,47	4,0
1311612202	63	0 62	0,32	2,7	0,55	5,1	0,53	4,8	0,30	2,4
1311612203	63	0 62	0,49	4,3	0,66	6,8	0,65	6,7	0,59	5,5
1311612204	73	0 72	0,17	1,4	0,48	4,8	0,48	4,8	0,24	2,0
1311612205	67	0 66	0,42	3,8	0,66	6,9	0,64	6,7	0,42	3,6
1311612206	56	0 55	0,46	3,7	0,72	7,5	0,71	7,4	0,46	3,7
1311612207	40	0 39	0,22	1,4	0,29	1,8	0,30	1,9	0,39	2,5
1311612208	39	0 38	0,23	1,4	0,13	0,8	0,21	1,3	0,28	1,7

3.4. Cross-dating sample cores

- a method of ensuring that each measured ring is allocated to the correct year
- by matching the ring width pattern among trees
- reference curves are developed iteratively by pooling series of rings with high inter-correlation, for each species and region
- a reference curve is obtained from cores with clearly visible rings and a coefficient of correlation larger than 0.75
- minimum of 10 cores are used for development of a reference curve
- the cores are cross-dated while measured
- missing or false ring is shown with a poor correlation, which triggered their investigation with various statistical tests and using pointer years
- allows determination of the age of a tree

3.4. Cross-dating sample cores

- Introduce the age of the trees in the NFI Database

Data	Echipa	Nr. unic	Sondaj	SP	Nr. carota	Specia	d1	d2	H	Varsta masurata	d maduva	sp deter.	Placa	Localitate	Nr. Rupturi	Defecte	slefuire
27.04.2020	22 BACAU		12041129	2	1	Gorun	418	432	271	86			61	BARSANESTI		1 fm	1
27.04.2020	22 BACAU		12041129	2	2	Gorun	459	486	268	81			61	BARSANESTI		2 fm	1
27.04.2020	22 BACAU		12041129	2	3	Gorun	390	402	243	78			61	BARSANESTI		0 fm	1
22.04.2020	22 BACAU		12041145	1	1	Cires paduret	347	336	209	50			28	RACACIUNI		1 fm	1
22.04.2020	22 BACAU		12041145	1	2	Cires paduret	357	325	244	50			28	RACACIUNI		0 fm	1
22.04.2020	22 BACAU		12041145	1	3	Cires paduret	285	277	210	51			28	RACACIUNI		1 fm	1
22.04.2020	22 BACAU		12041145	1	4	Gorun	322	313	241	52			28	RACACIUNI		0 fm	1
22.04.2020	22 BACAU		12041145	1	5	Gorun	305	318	236	48			28	RACACIUNI		0 fm	1
22.04.2020	22 BACAU		12041145	1	6	Gorun	331	314	264	52			28	RACACIUNI		0 fm	1
27.04.2020	22 BACAU		12049125	2	1	Fag	417	427	299	130			17	BERZUNTI		1 fm	2
27.04.2020	22 BACAU		12049125	2	2	Fag	394	424	297	136			17	BERZUNTI		1 fm	2
27.04.2020	22 BACAU		12049125	2	3	Fag	514	533	298	138			17	BERZUNTI		2 fm	2
27.04.2020	22 BACAU		12049125	2	4	Fag	656	648	312	142			17	BERZUNTI		2 fm	2
28.04.2020	22 BACAU		12049125	1	5	Molid	211	219	185	24			17	BERZUNTI		1 fm	2
28.04.2020	22 BACAU		12049125	1	6	Molid	220	216	184	27			17	BERZUNTI		2 b	2
28.04.2020	22 BACAU		12049125	1	7	Molid	256	255	191	26			17	BERZUNTI		0 b	2
29.04.2020	22 BACAU		12053131	1	1	Fag	531	578	319	146			36	BERESTI-TAZLAU		1 b	1
29.04.2020	22 BACAU		12053131	1	2	Fag	624	580	318	138			36	BERESTI-TAZLAU		0 fm	1
29.04.2020	22 BACAU		12053131	1	3	Fag	527	494	313	112			36	BERESTI-TAZLAU		1 b	1
29.04.2020	22 BACAU		12053131	2	4	Gorun	360	355	220	92			36	BERESTI-TAZLAU		1 fm	1
29.04.2020	22 BACAU		12053131	2	5	Gorun	463	447	246	90			36	BERESTI-TAZLAU		0 fm	1
29.04.2020	22 BACAU		12053131	2	6	Fag	388	382	236	131			36	BERESTI-TAZLAU		1 fm	1
29.04.2020	22 BACAU		12053131	2	7	Fag	386	397	228	112			36	BERESTI-TAZLAU		1 fm	1
30.04.2020	22 BACAU		12057137	3	1	Carpen	201	202	216	44			23	STRUGARI		1 fm	2
30.04.2020	22 BACAU		12057137	3	2	Carpen	225	220	214	46			23	STRUGARI		1 b	2
30.04.2020	22 BACAU		12057137	3	3	Fag	265	258	215	54			23	STRUGARI		0 fm	2
30.04.2020	22 BACAU		12057137	3	4	Fag	274	247	217	58			23	STRUGARI		0 fm	2
23.04.2020	13 BISTRITA		11137080	1	1	Gorun	377	389	224	75			6	CICEU- MIHAIESTI		0 fm	1
23.04.2020	13 BISTRITA		11137080	1	2	Gorun	351	310	240	71			6	CICEU- MIHAIESTI		0 fm	1
23.04.2020	13 BISTRITA		11137080	1	3	Carpen	247	245	240	78			6	CICEU- MIHAIESTI		0 fm	1
23.04.2020	13 BISTRITA		11137080	1	4	Carpen	233	214	215	86			6	CICEU- MIHAIESTI		1 b	1
24.04.2020	13 BISTRITA		11137080	4	5	Carpen	130	133	142	35			6	CICEU- MIHAIESTI		0 fm	1
24.04.2020	13 BISTRITA		11137080	4	6	Carpen	133	137	143	20			6	CICEU- MIHAIESTI		0 fm	1
24.04.2020	13 BISTRITA		11137080	4	7	Plop tremurator	173	176	173	32			6	CICEU- MIHAIESTI		0 fm	1
24.04.2020	13 BISTRITA		11137080	4	8	Plop tremurator	170	170	166	32			6	CICEU- MIHAIESTI		0 fm	1
28.04.2020	13 BISTRITA		11141090	4	1	Molid	315	313	268	38			8	CASEIU		0 fm	1
28.04.2020	13 BISTRITA		11141090	4	2	Molid	316	318	258	35			8	CASEIU		0 fm	1
28.04.2020	13 BISTRITA		11141090	4	3	Molid	354	348	277	38			8	CASEIU		1 fm	1
27.04.2020	13 BISTRITA		11145084	2	1	Fag	430	445	241	76			7	CHIUIESTI		1 fm	1
27.04.2020	13 BISTRITA		11145084	2	2	Fag	444	482	238	73			7	CHIUIESTI		0 fm	1
27.04.2020	13 BISTRITA		11145084	2	3	Fag	420	441	270	119			7	CHIUIESTI		1 fm	1

4. The use of sample cores

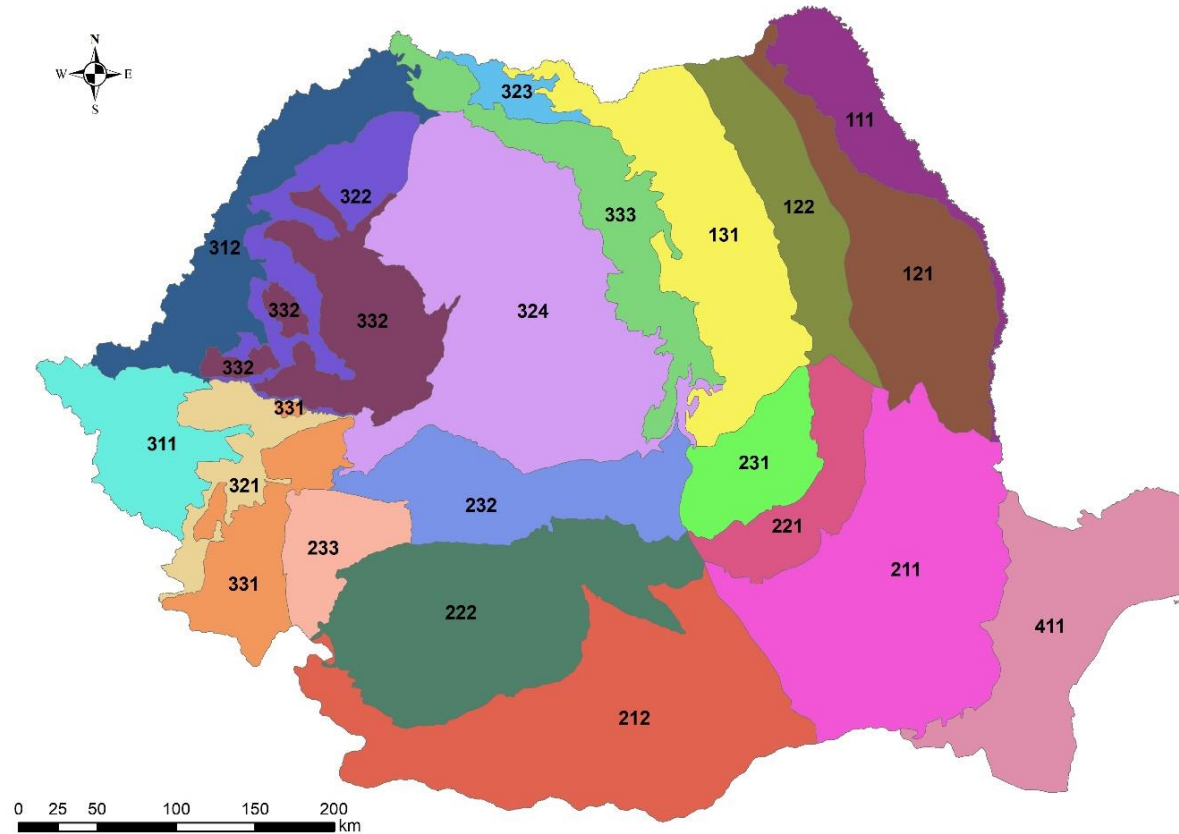
Precise determination of the age of the sample trees

Estimation of the forest increment at the end of first NFI cycle in a country

Studies on forest growth, regional variability of the tree species growth

New growth and yield tables for tree species at regional scale

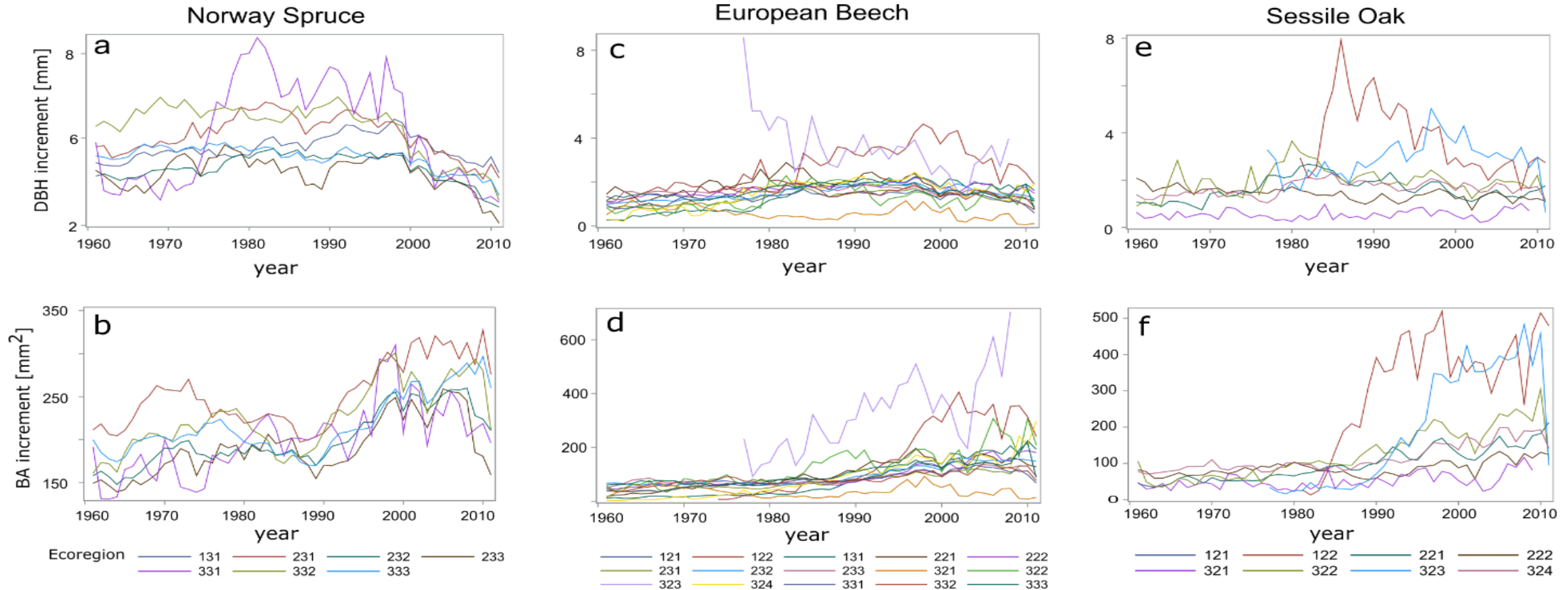
4. The use of sample cores



Romanian ecoregions according to spatial contiguity, geology, soils, and geomorphology maps of the Romanian Academy

4. The use of sample cores

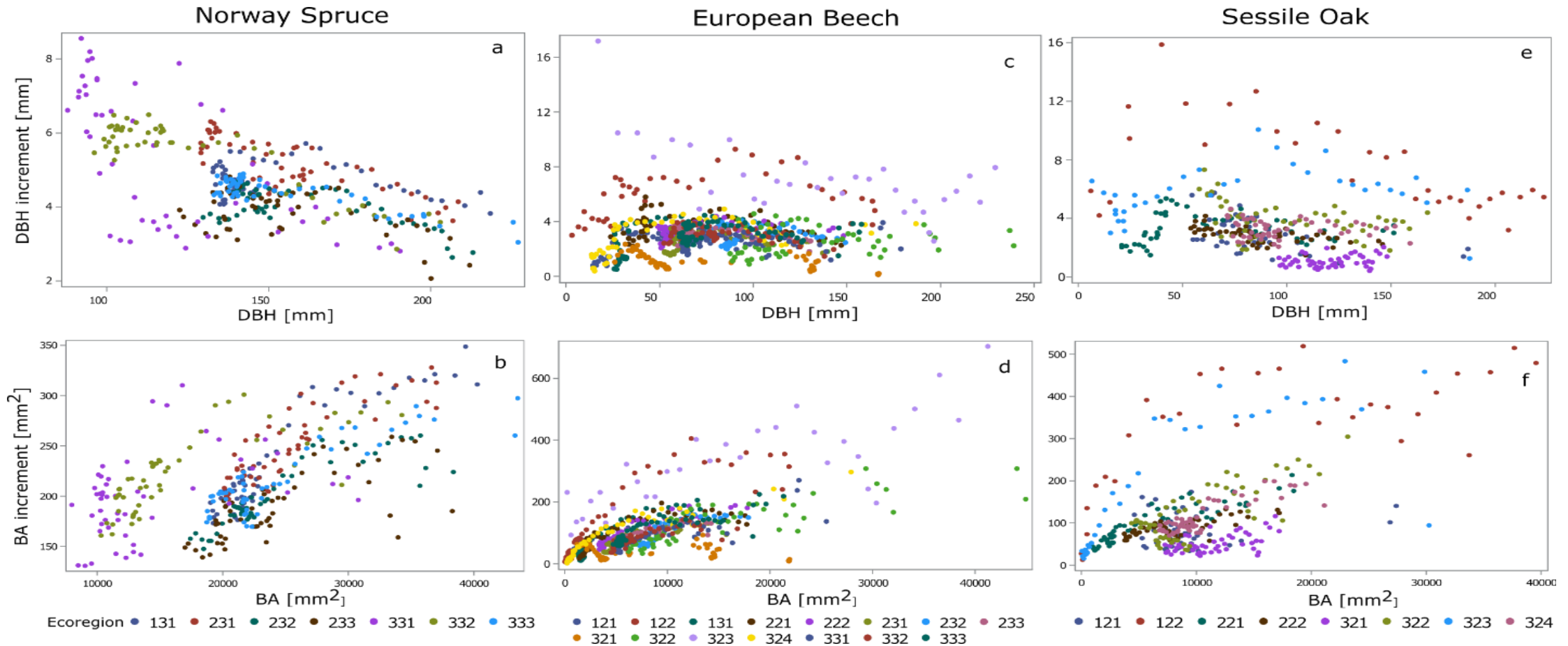
- Univariate analysis



Dynamic thru time of DBH increment and basal area increment mean by ecoregion for Norway spruce (a,b), European beech (c,d) and Sessile oak (e,f)

4. The use of sample cores

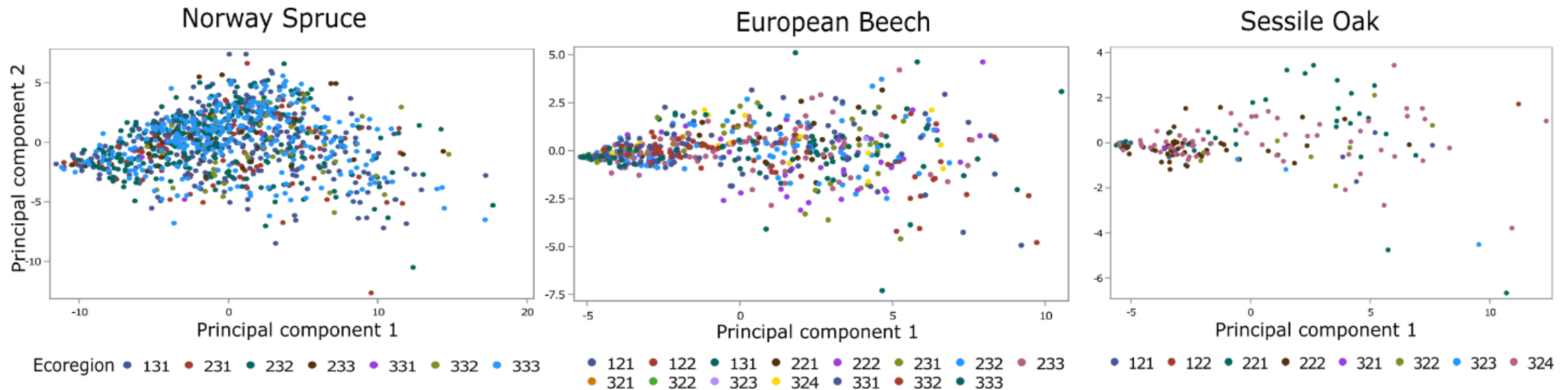
- Covariates analysis



Mean DBH increment versus mean DBH and mean basal area increment versus mean basal area by ecoregion for Norway spruce (a,b), European beech (c,d) and Sessile oak (e,f).

4. The use of sample cores

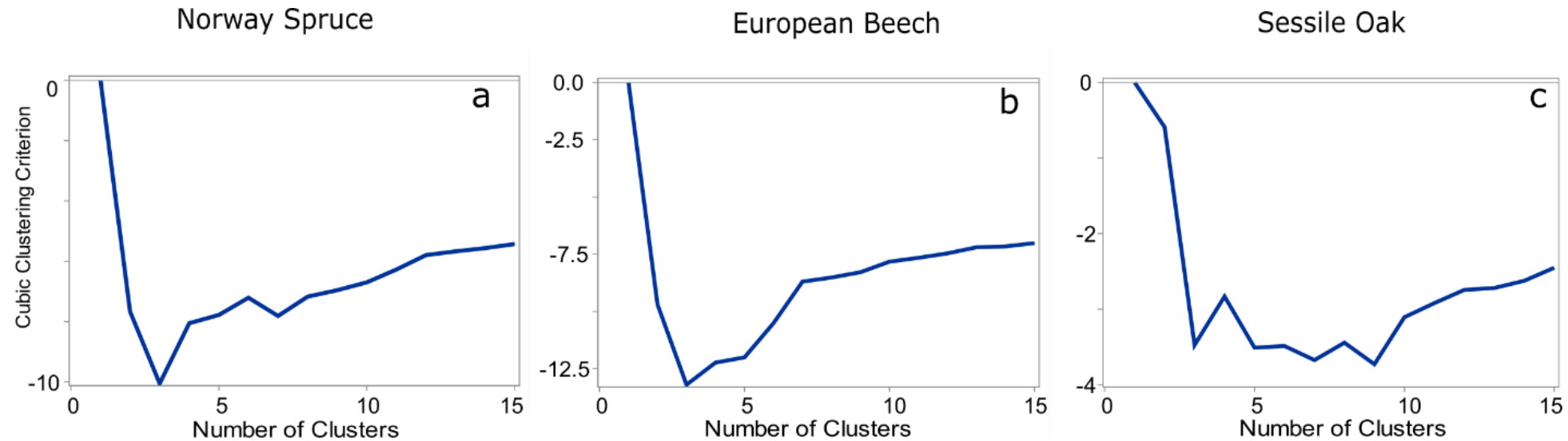
- Multivariate analysis



Grouping by ecoregions for Norway spruce, European beech, and Sessile oak with principal components 1 and 2 as axes. Because similar results were obtained for DBHi and BAi, we have represented only the results for DBHi

4. The use of sample cores

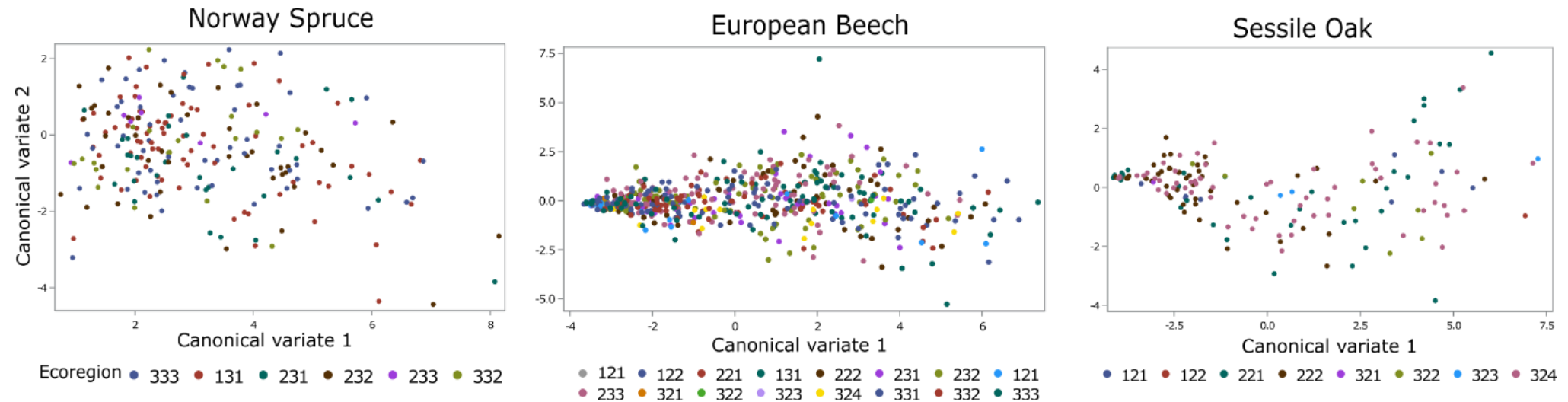
- Hierarchical cluster analysis



Identification of the number of groups of ecoregions using Ward's Minimum Variance and Cubic Clustering Criterion for Norway spruce (a), European beech (b) and Sessile oak (c). Because similar results were obtained for DBHi or BAi, we have represented only the results for DBHi.

4. The use of sample cores

- Canonical discrimination analysis



Grouping by ecoregions for Norway spruce, European beech, and Sessile oak with canonical variables as axes. Because the same conclusion is reached for DBHi and BAi only the plots for DBHi are presented

Thank you for your attention!