

CORK QUALITY ASSESSMENT TRAINING

Coordinator



Partners



Forestas

Agencia Forestal Regional per a l'Àrea de la
Baixada i de l'interior de les Illes Balears
Agencia Forestal Regional per a l'Àrea de la
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SardegnaForeste



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 774652

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CORK INET
SCIENCE TO PRACTICE EVENT
OCTOBER, 2020

CORK QUALITY ASSESSMENT TRAINING

Module 4: Cork quality commercial classification

Conceição Santos Silva, UNAC

Coordinator



Partners



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CORK INET
SCIENCE TO PRACTICE EVENT
OCTOBER, 2020

2nd day – Training session

Date, 9th October, 2020

Online

9h30 – 10h00

Register of participants

10h – 13h

Module 3. Cork Quality Commercial Classification & Laboratorial procedures
(UNAC – Conceição Santos Silva)

13:00 – 14:00

Lunch break

14h – 15h30

Module 4. Cork Classification exercise and Report
(UNAC)

15h30 – 16h30

Questions & Answers

Session Evaluation

Wrap up session

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CORK CLASSIFICATION EXERCISES

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OBJECTIVES

A. Participants will become familiar with:

- Cork sampling field protocols used in Portugal and Spain;
- Cork quality commercial classification protocols;
- Cork defects, pests and diseases with impact in the market value;



9/10/2020



9/10/2020

EXERCISE

Set of 14 samples videos
to characterize and classify

VIDEOS

Receive a link to a shared
folder where the 14 videos
are stored, identified with:

11_1_sample 1

11_2_sample 2

...

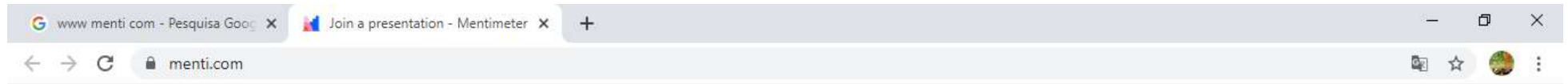
11_14_sample 14

TABLE

- Cork classification table (print?)
- Sample table (print?)

QUIZ

Mentimeter platform to access at
www.menti.com



Please enter the code

Submit

The code is found on the screen in front of you

Insert code





All the participants can access this tools?



All the participants are able to run this tools?



INTRODUCTION

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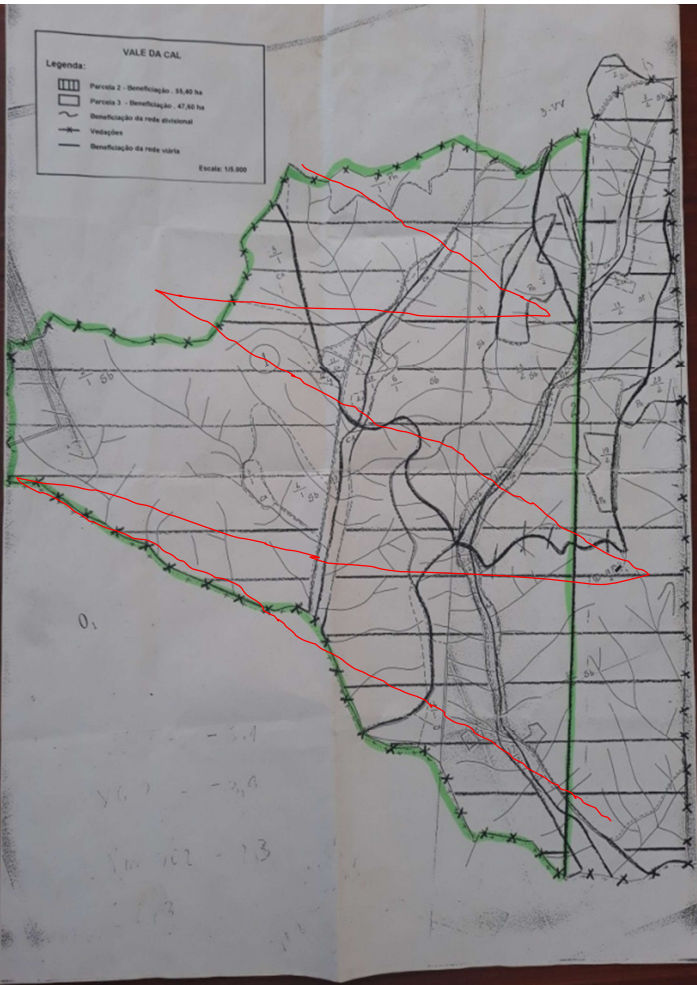
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UNAC affiliates

- **1991** was the first year that Cork Sampling was performed in Portugal by AFLOSOR, using the IPROCOR methodology
- Since 1992 until today, 5 of the UNAC affiliates actively promote cork quality assessment as an indispensable tool to use previously to the cork commercialization
- Only these **5 Private Forest Owners Associations and the Industry** realize this kind of sampling
- DGRF (National Forestry Authority) has a specific standard for cork sampling since the nineties that has never been updated



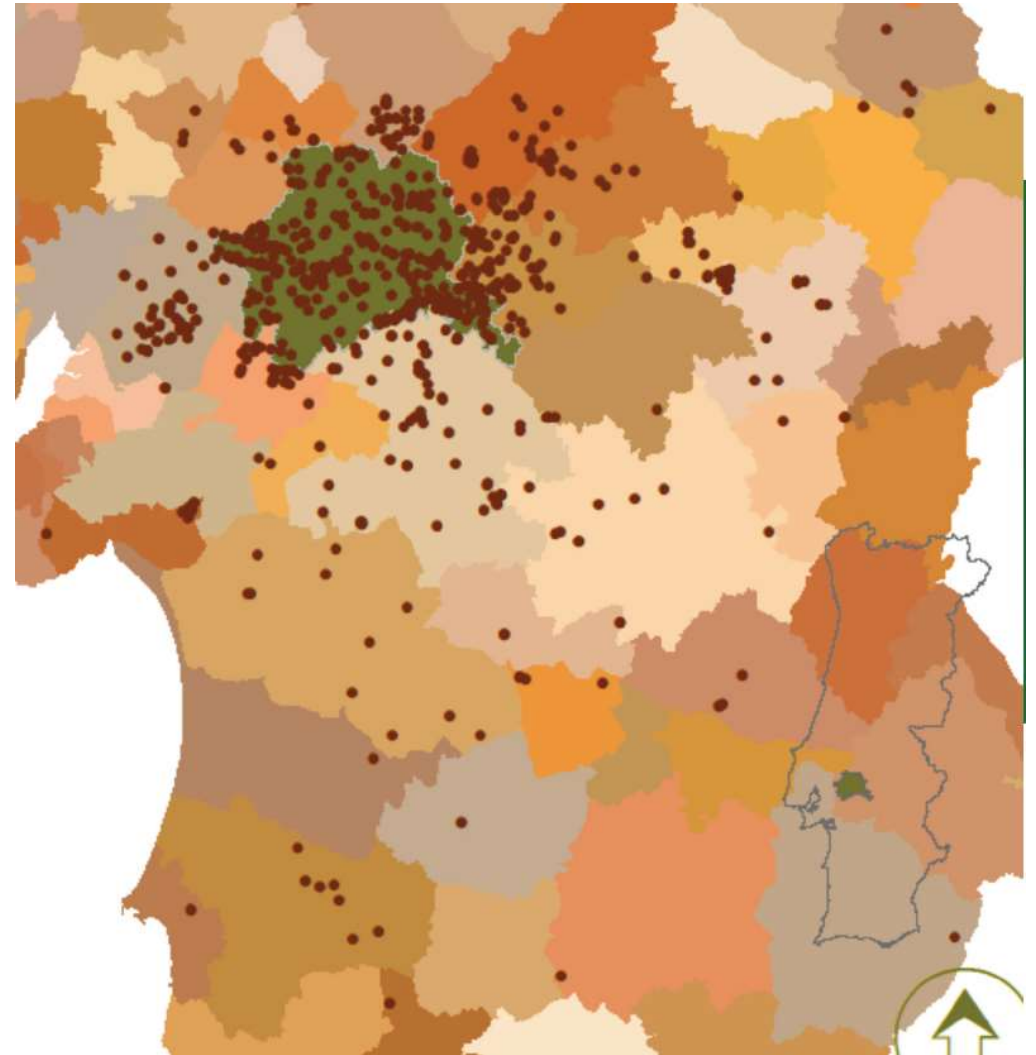
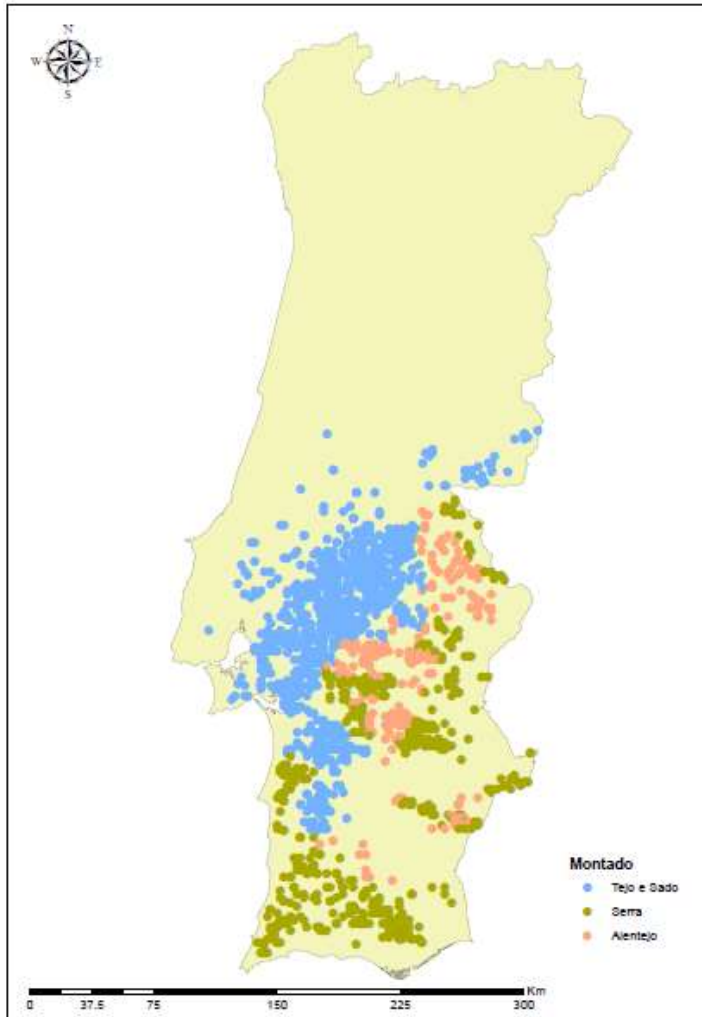
- From a paper based cartography...
- Where a zig-zag transect was defined in the field...
- Cork samples were collected in the corks trees that overlap the transect
- Data about the cork characteristics (% by quality and caliper classes) and the market price was given to the producer



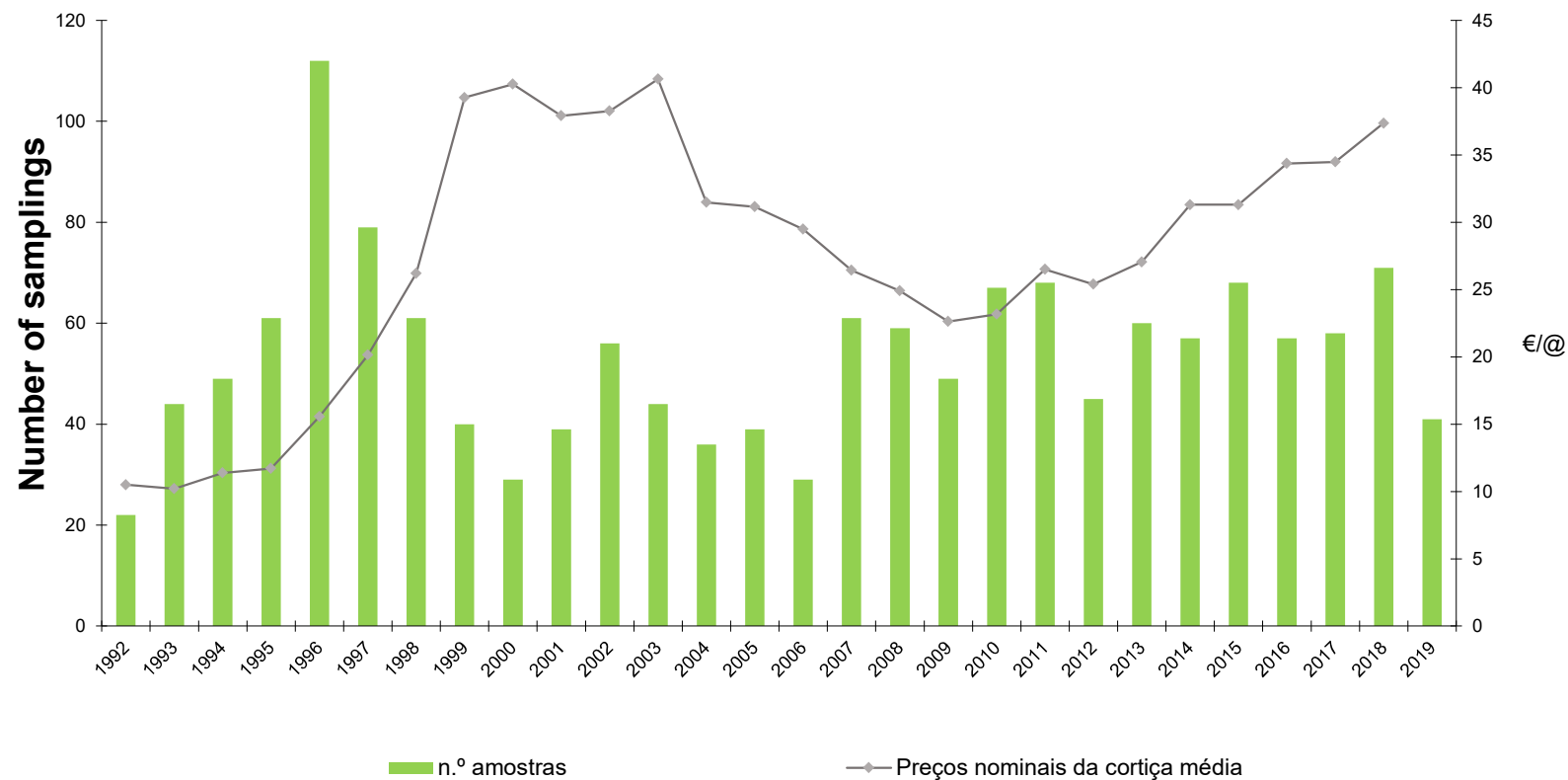
...2020

- GIS and GPS are fundamental tools
- Sampling procedures with a systematic grid
- Cork samples are collected in the grid points (5 trees/point)
- Besides the data about the cork characteristics and the market price, a forest inventory and a sample plot characterization is done; cork defects are registered; cork oak vitality is assessed
- Two reports are sent to the producers: market report and a forest management report applied to the cork extraction area

Cork Quality Assessment | Location



Cork Quality Assessment | Trends



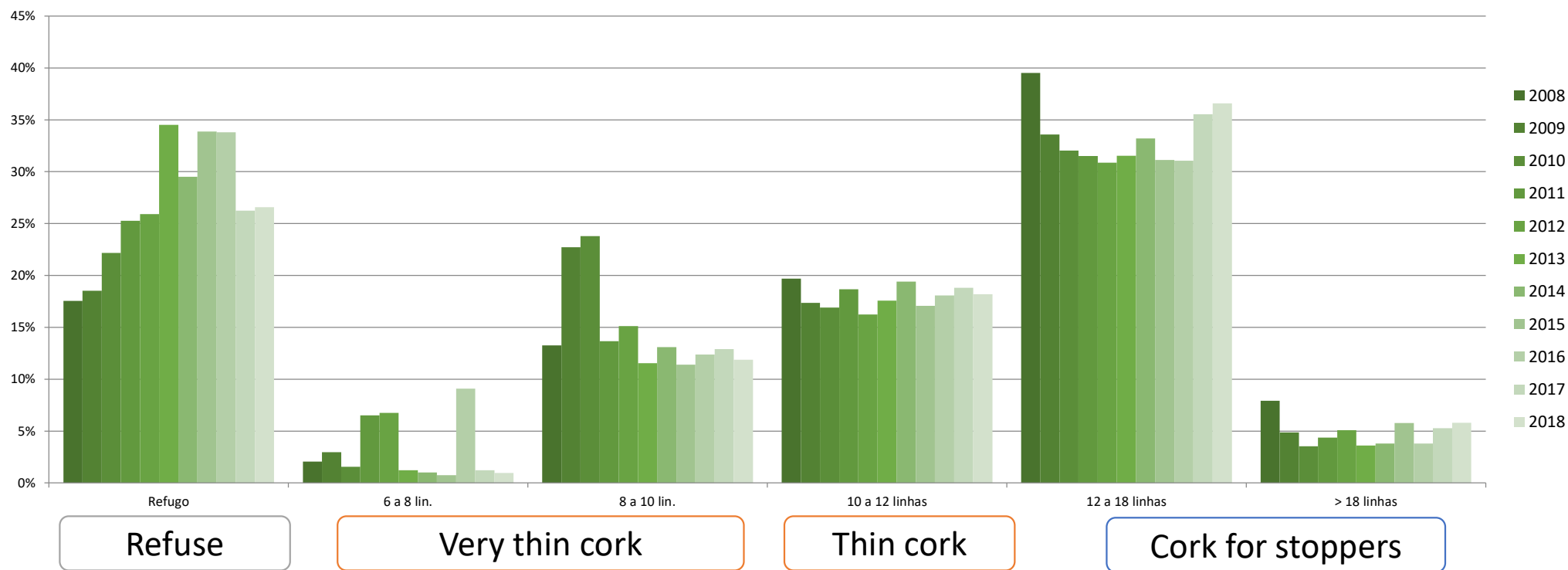
Source: APFC; ACHAR

28 years of
data

1.710 cork
samplings

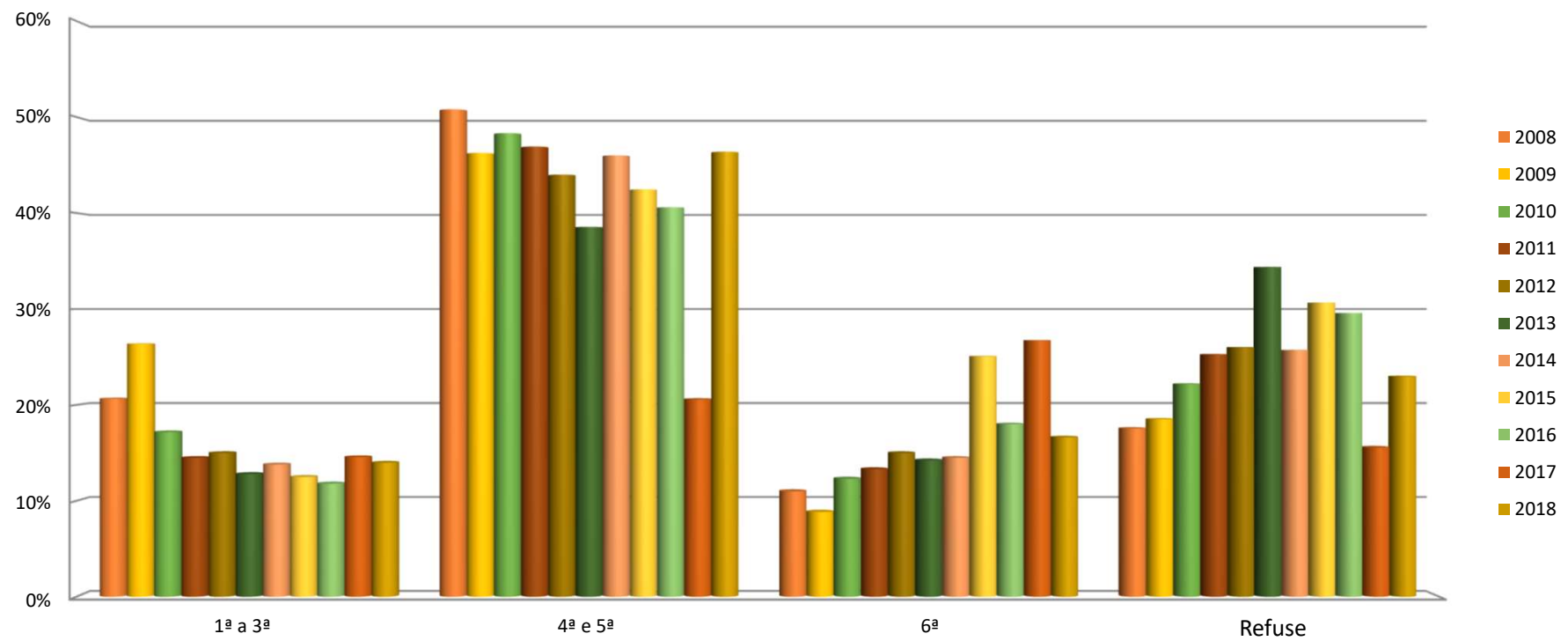
123.300 cork
samples

Cork Quality Assessment | Trends



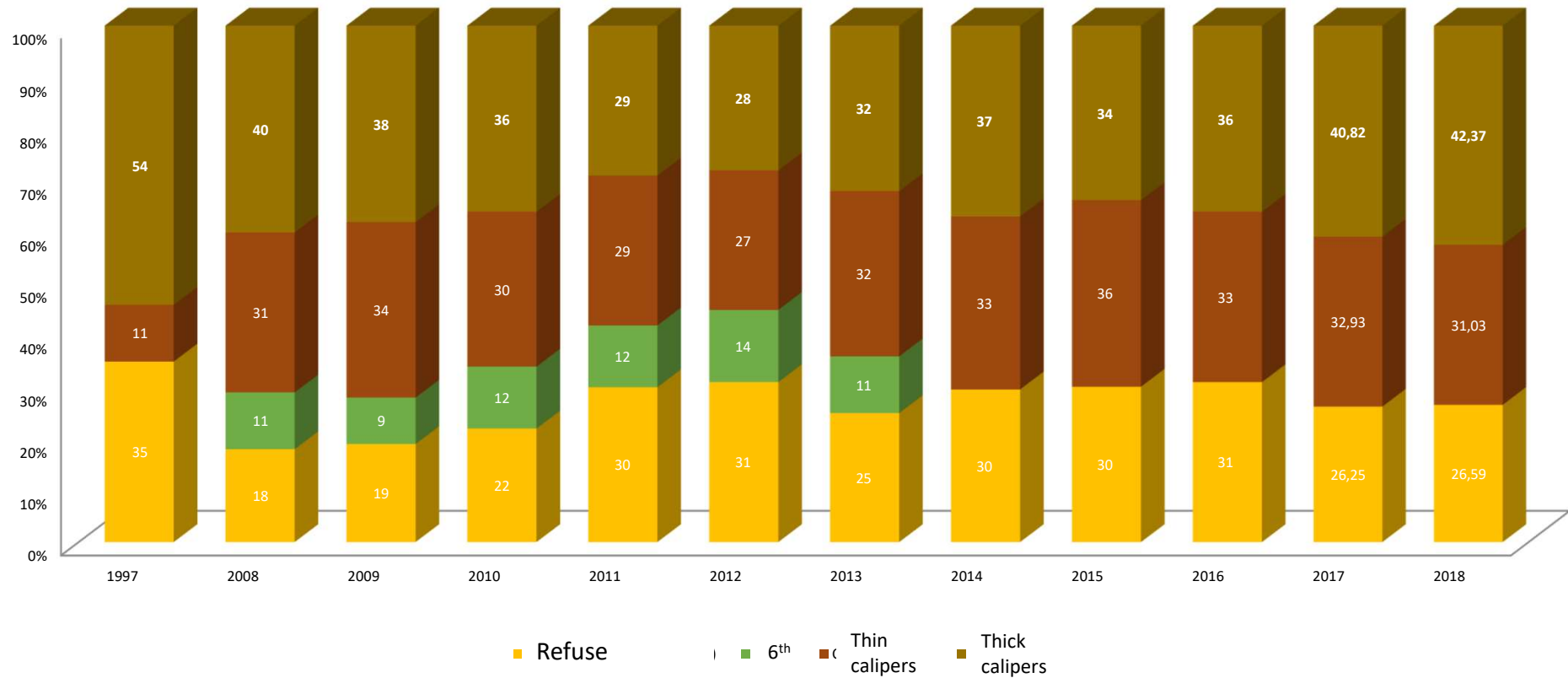
Source: APFC

Cork Quality Assessment | Trends



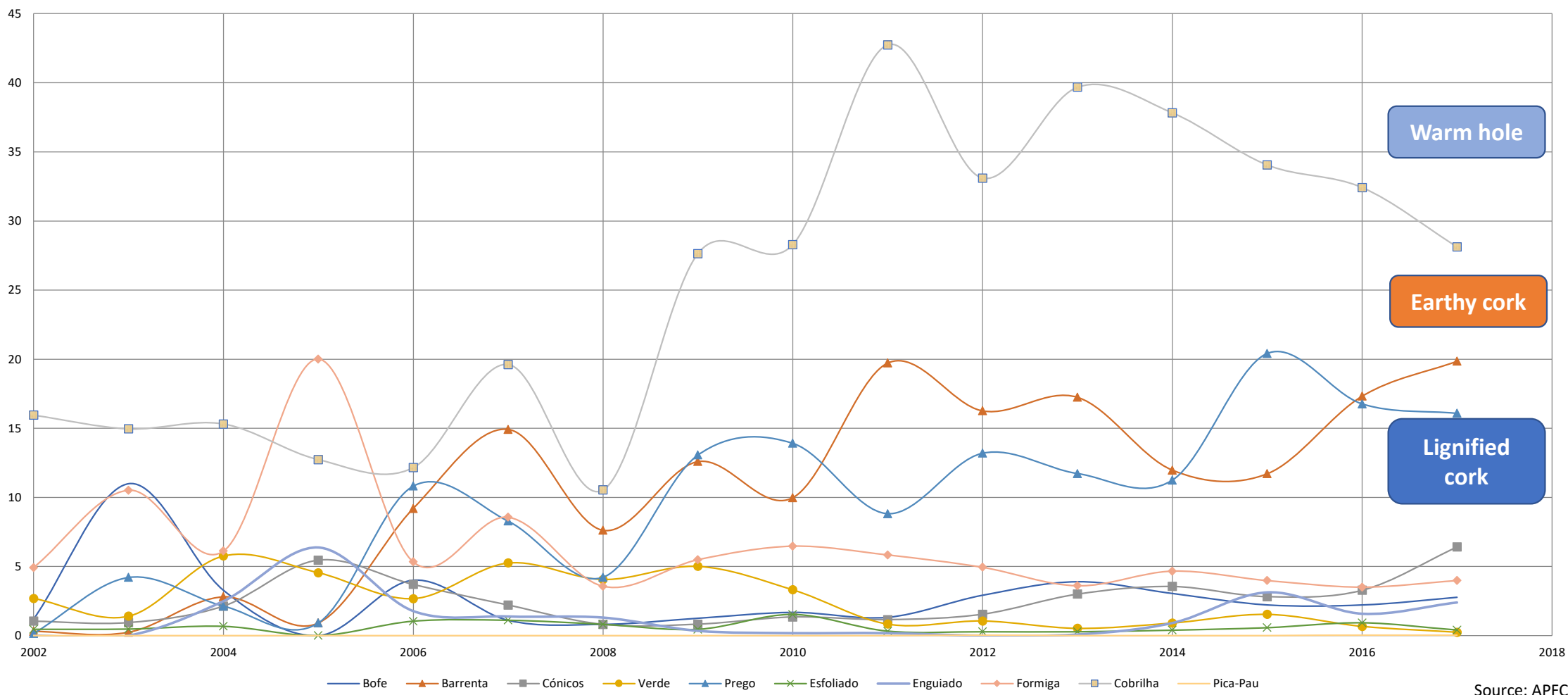
Source: APFC

Cork Quality Assessment | Trends



Source: APFC

Cork Quality Assessment | Trends



Source: APFC



Cork Commercialization Platform



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GLOSSARY

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Lenticel

radial canals which
allow essential gaseous
exchanges between the
tree tissues and the
atmosphere

Pores

Opening of the lenticels
in the cross section
(porosity)



Back

outer side of the
suberous tissue, in
relation to the tree

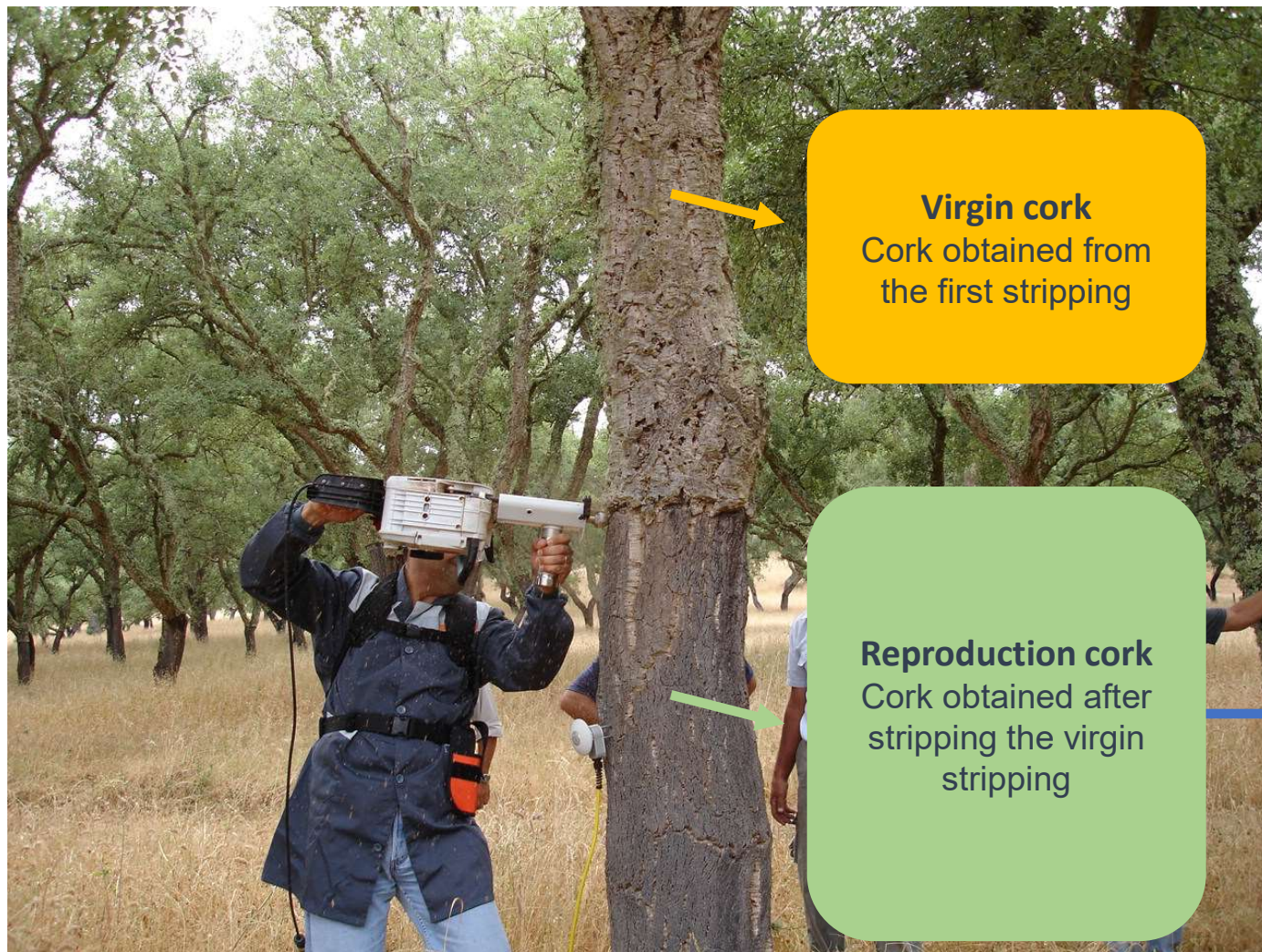


Cork thickness

Measure between
the belly and the
back (without the
crust)

Belly

inner side of the
suberous tissue, in
relation to the tree



Virgin cork
Cork obtained from
the first stripping

Reproduction cork
Cork obtained after
stripping the virgin
stripping

First Reproduction Cork
Cork obtained from the
first stripping of reproduction
cork and formed after the
stripping of the virgin cork not
useable by the cork industry for
transformation by shaping

Second Reproduction cork
Reproduction cork stripped
after first reproduction cork
fit to be used by the cork
industry for transformation
by shaping or granulation



Reproduction cork
Cork obtained after
stripping the virgin
stripping

Virgin cork
Cork obtained from
the first stripping



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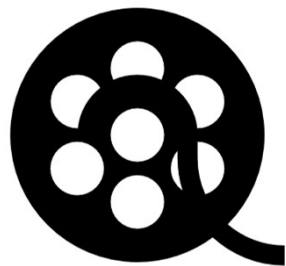


FIELD PROCEDURE

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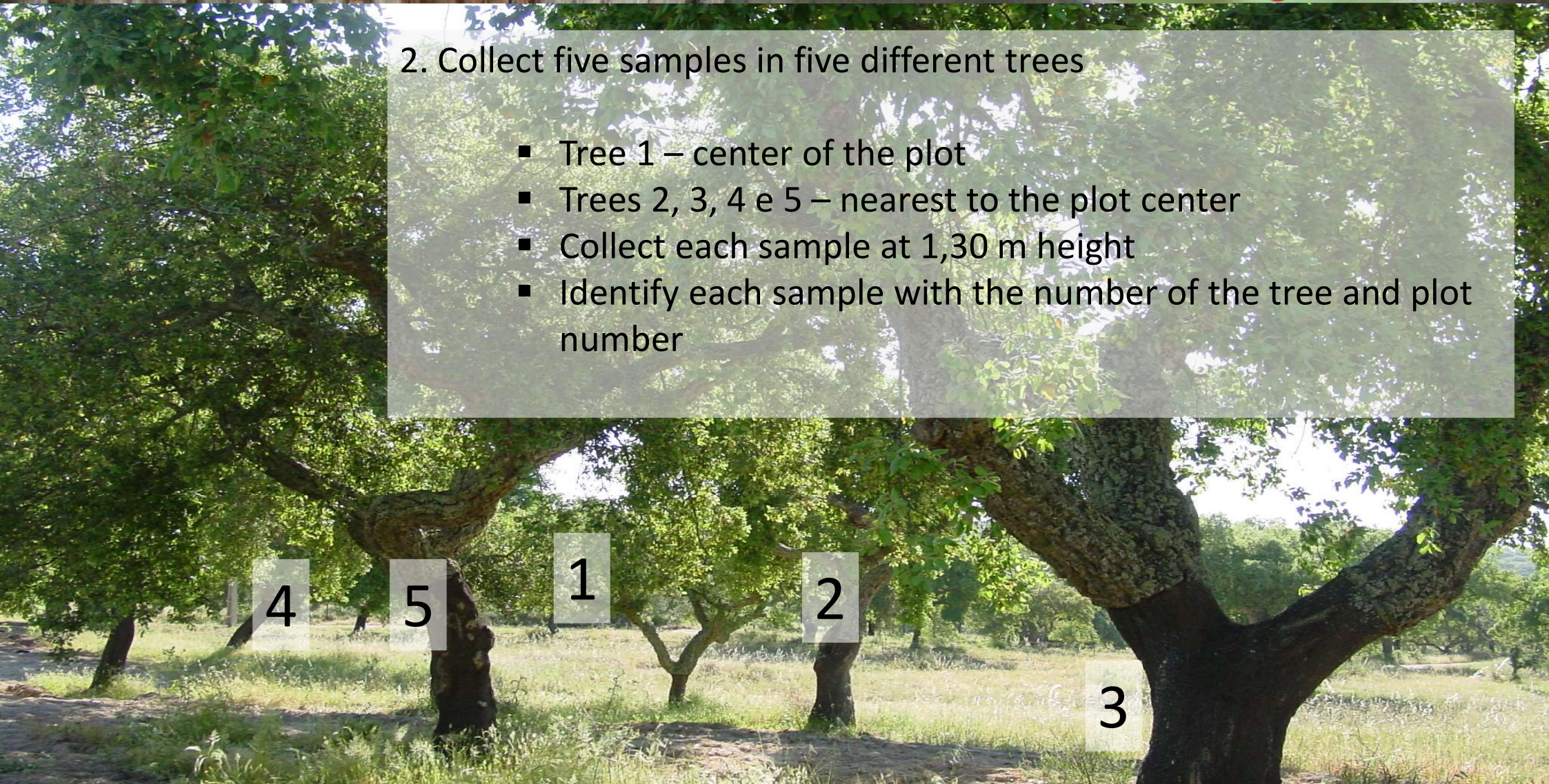


1. With GPS navigation move to the center of the selected plot
2. Collect five samples in the nearest five trees to the center plot
3. Register the data from the trees
4. Deslocation with GPS to the center of the area from two to twenty, and repeating each phase of the work



2. Collect five samples in five different trees

- Tree 1 – center of the plot
- Trees 2, 3, 4 e 5 – nearest to the plot center
- Collect each sample at 1,30 m height
- Identify each sample with the number of the tree and plot number





SAMPLE REMOVAL



PLOT CHARACTERIZATION

LABORATORIAL PROCEDURES

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Cutting & Identification



Thickness measurement – Raw cork & Boiled cork



Cork samples boiling – 1 hour – 90 to 100°C



Cork samples boiling – 1 hour – 90 to 100°C





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CORK CLASSIFICATION

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Cork Quality Assessment | Classification

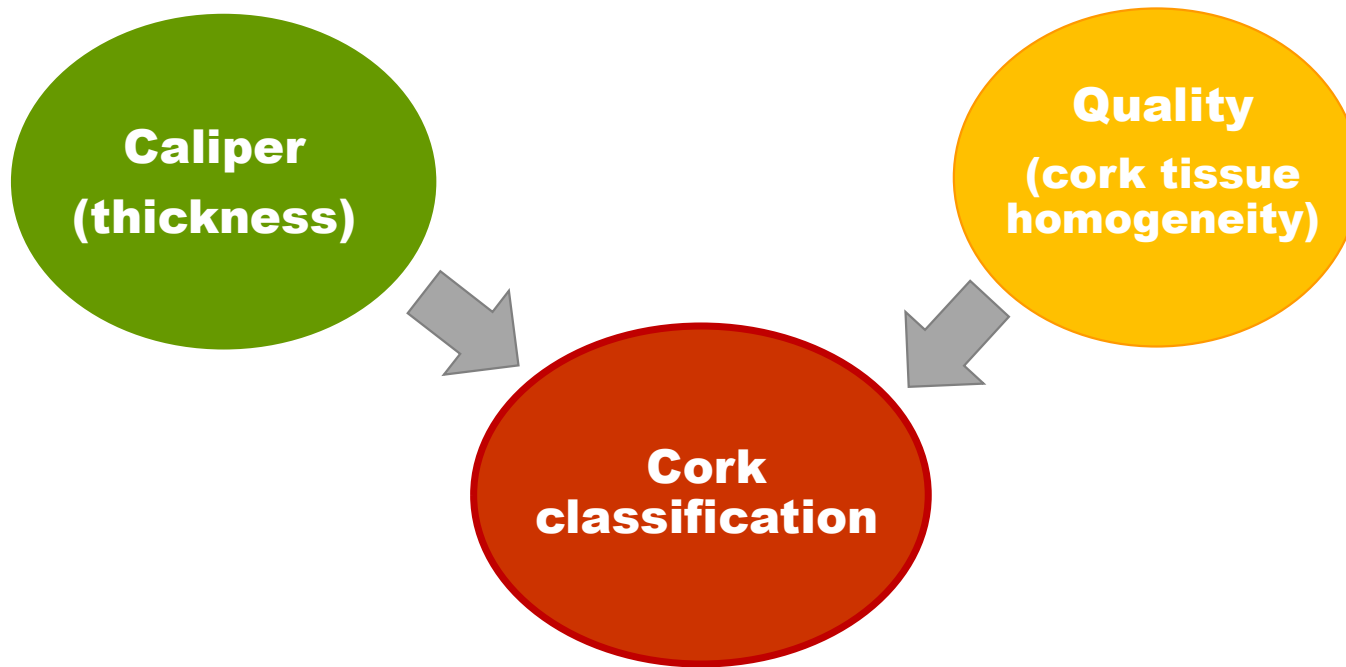


Microsoft Excel screenshot showing a cork classification table. The table has columns for various measurements and classification criteria. The data is as follows:

	C	D	E	F	G	H	I	J	K	L	M
1											
2		25,42	28,70	29,18	28,94	31,67	11%	14,04	5	5	Cobrinha Sem defeito
3		18,69	22,49	19,37	20,93	22,91	18%	10,15	4	4	Prego Sem defeito
4		23,14	24,95	27,46	26,21	28,68	7%	12,71	4	4	Barrenta Sem defeito
5		15,60	17,95	17,03	17,49	19,14	13%	8,48	7	7	Prego Sem defeito
6		22,07	22,83	20,82	21,83	23,89	3%	10,59	5	5	Barrenta Formiga
7		30,60	34,41	33,64	34,03	37,24	11%	16,51	7	7	Prego Enguiado
8		27,64	30,72	40,27	35,50	38,85	9%	17,22	4	4	Barrenta Sem defeito
9		28,18	31,31	26,07	28,69	31,40	11%	13,92	4	4	Sem defeito Sem defeito
10		35,58	39,87	37,63	38,75	42,41	11%	38,80	4	4	Barrenta Sem defeito
11		21,58	22,77	21,65	22,21	24,31	5%	10,77	5	5	Barrenta Sem defeito
12		35,38	40,64	43,14	41,89	45,84	13%	20,32	7	7	Cónicos Barrenta
13		13,05	14,79	17,34	16,07	17,58	11%	7,79	7	7	Cobrinha Sem defeito
14		19,22	19,73	22,61	21,17	23,17	2%	10,27	5	5	Prego Sem defeito
15		30,90	33,68	31,94	32,81	35,91	8%	15,92	3	1	Enguiado Sem defeito
16		24,80	26,38	28,14	27,26	29,83	6%	13,22	6	6	Prego Sem defeito
17		31,46	35,38	35,17	35,28	38,61	11%	17,11	3	1	Sem defeito Sem defeito
18		35,99	41,74	46,16	42,95	46,10	13%	21,32	5	5	Cónicos Sem defeito
19		20,27	23,01	20,22	21,62	23,66	13%	10,49	7	7	Prego Sem defeito

CORK CLASSIFICATION

Cork Quality depends:



The quality of the raw material is defined according to the final product!



CORK PRODUCTS



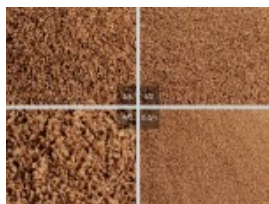
Natural cork stoppers

% **thick cork**



Discs

% **thin cork**



Granulates

% **poor quality cork**

70 % market
value
Cork stoppers

30 % market value
All the other
products



Commercial classes in Portugal

Class name	Thickness (lines)	Thickness (mm)
Very thin	6-8	14 a 18
Very thin	8-10	18 a 22
Thin cork	10-12	22 a 27
Enough thickness to produce natural cork stoppers	12-18	27 a 40
Thicker	>18	>40

Commercial classes in Portugal

CALIPER		
Enough thickness to produce natural cork stoppers	Thin cork	Very thin cork
>27mm	22 a 27 mm	14 a 22 mm
> 12 lines	10-12 lines	6-10 lines

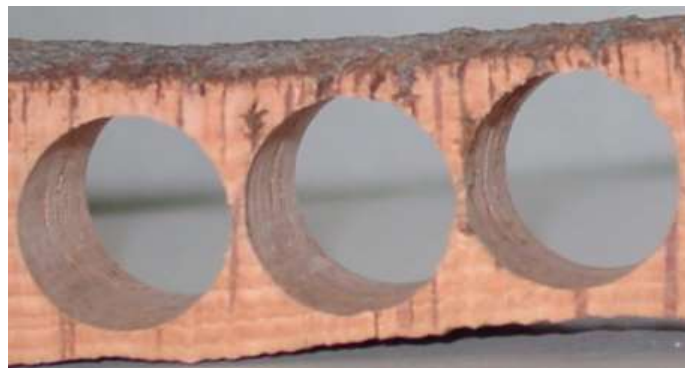
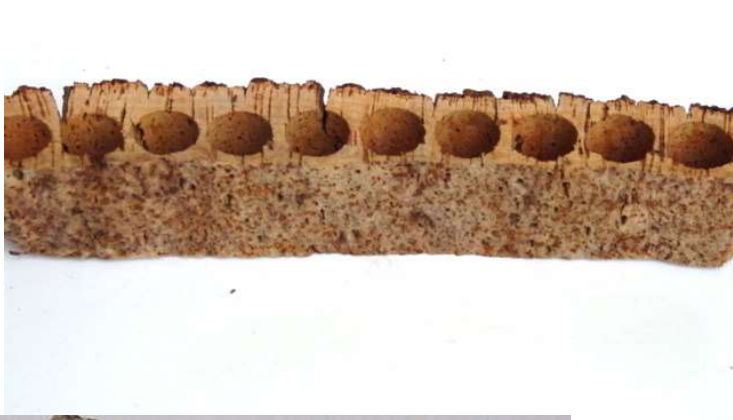
>27 mm

22-27 mm

14-22mm

9 YEARS FORMATION CORK SAMPLES WITH DIFFERENT CALIPER

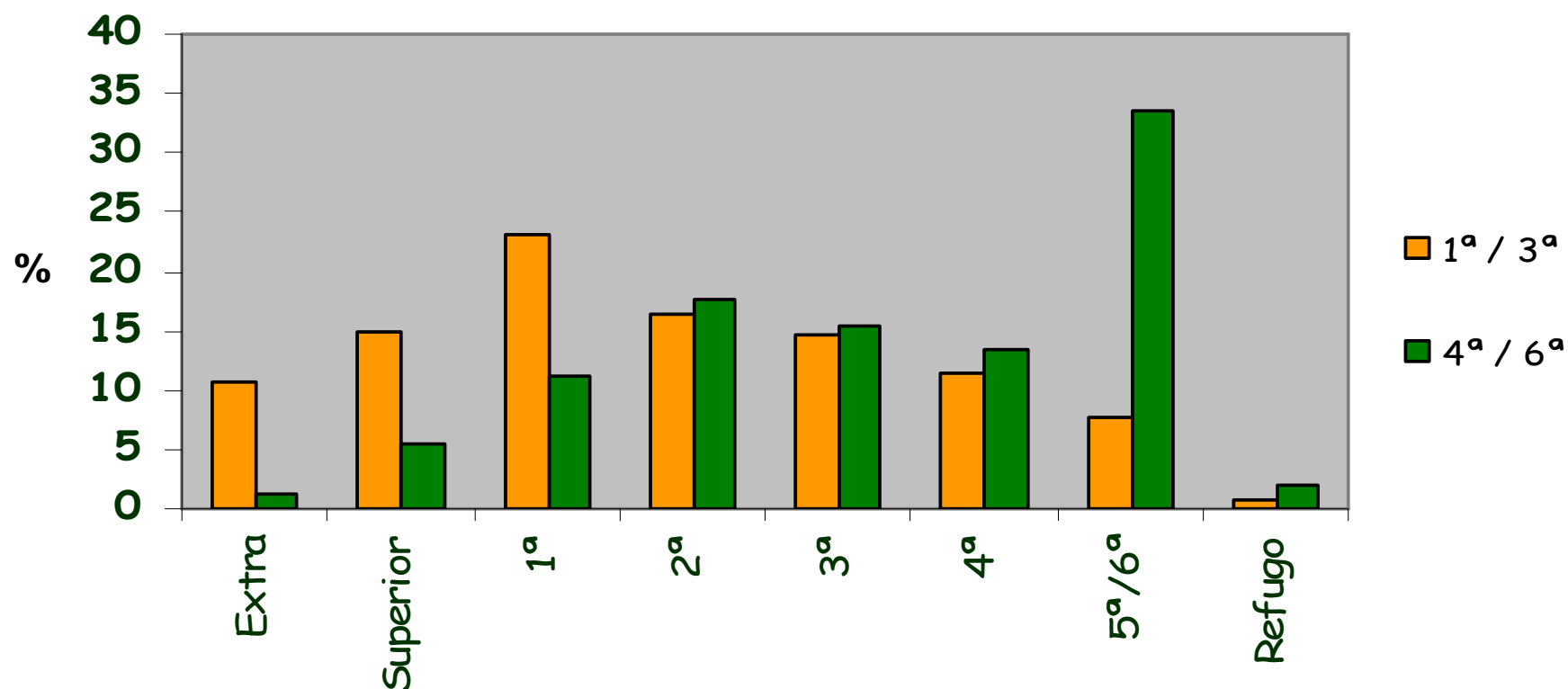
Cork suitable for cork natural cork stoppers



Cork suitable for discs



NATURAL CORK STOPPERS QUALITY



CORK PLANK
QUALITY

CORK STOPPERS QUALITIES

Quality evaluation

Suberous tissue
homogeneity

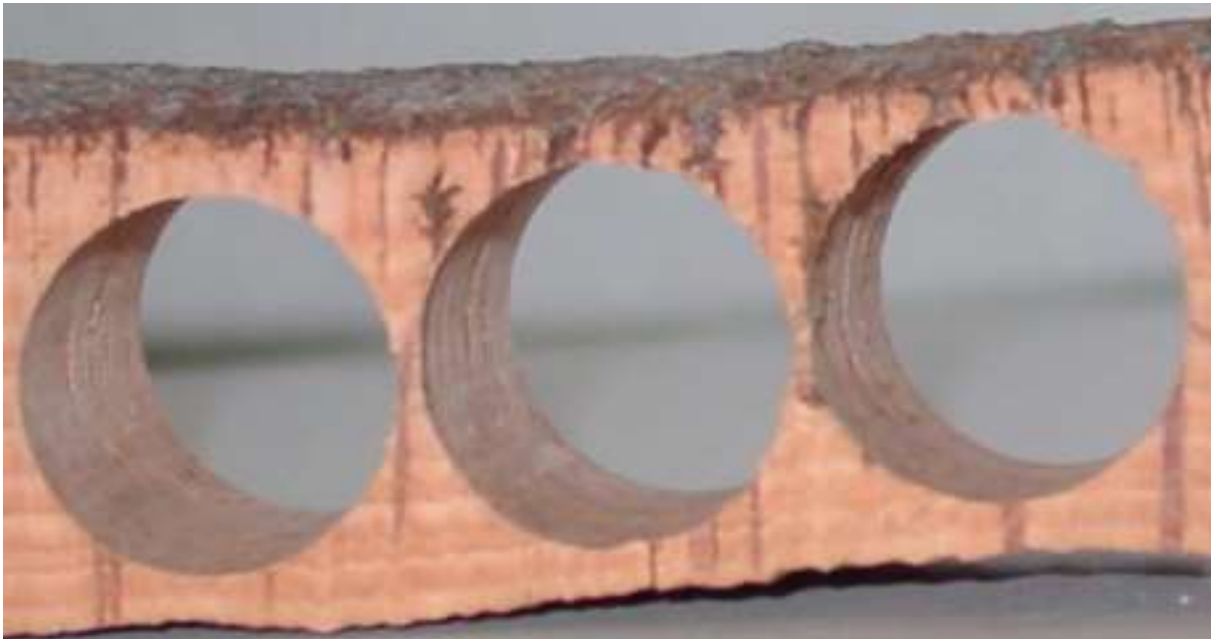


Belly visual aspect



Back visual aspect





Keep this image in mind
for the cork samples
classification!

- Perfect caliper (just enough to produce the cork stoppers with few waste)
- Perfect back – thin & straight
- Perfect belly – smooth & straight
- Lenticels – few, small & rectilinear



Cork samples with homogenous suberous tissue



Cork samples with heterogenous suberous tissue



Cork samples with different porosity



Cork belly with small porosity –
Good characteristic



Cork belly with high porosity – Bad
characteristic

POROSITY:

Valuable cork



 Few pores

 Small

 Linear

Weak cork

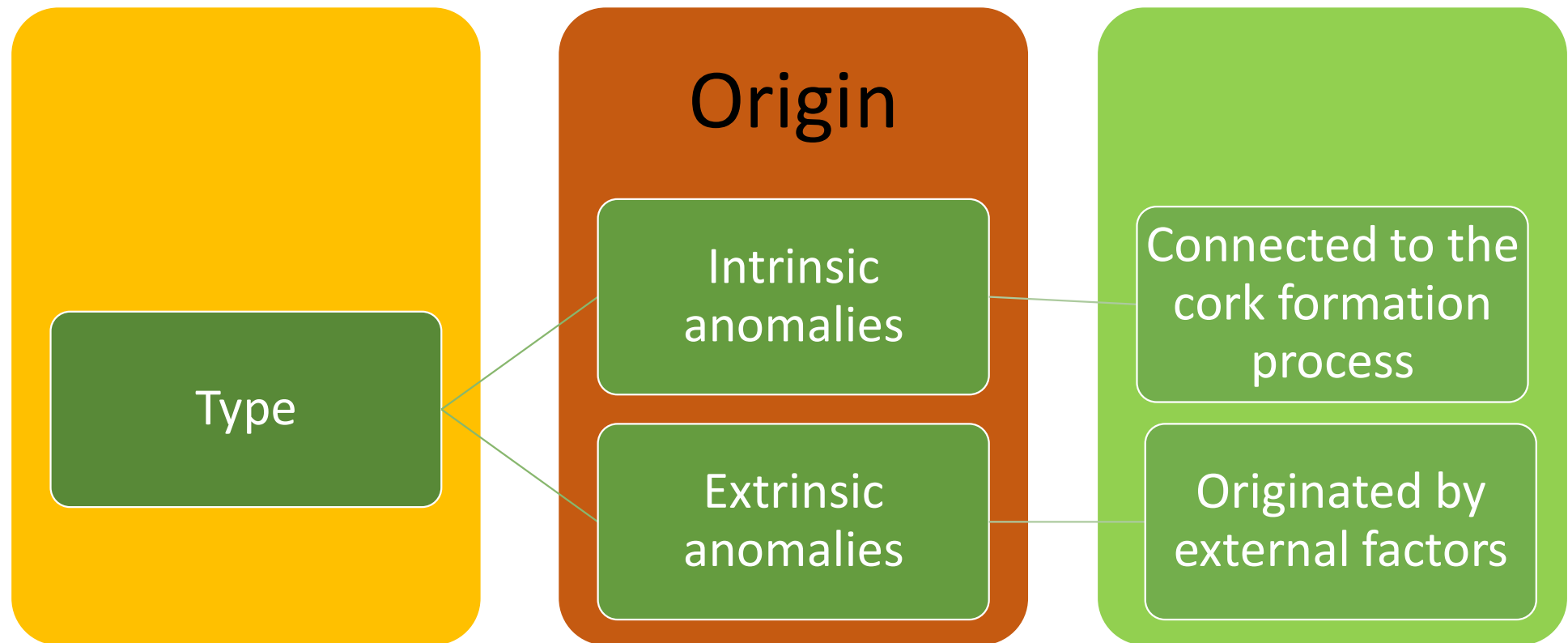


 A lot of pores

 Big

 Irregular

CORK ANOMALIES



CORK ANOMALIES

Connected to the
cork formation
process

Originated by
external factors

Porosity

Bird holes



ANOMALIES INTENSITY

Primary anomalies

- Warm holes
- Ant holes
- Lignified cork
- Cracks

Other anomalies

- Green cork
- Folded cork
- Bird holes

Intrinsic
anomalies



Narrow & linear pores



Conic & large linear pores

EARTHY CORK

(pores filled with a material similar to earth)



Intrinsic
anomalies

Intrinsic
anomalies



Very large pores
(disaggregated cork cels)

Green cork
(cork cels with high water content)

Coroebus undatus

Extrinsic
anomalies



- In the larvae phase this insect feeds on cork
- Can live for 2 years inside the cork
- Defect that highly decreases the cork value in thin corks or when located in the middle section of the cork for all calipers

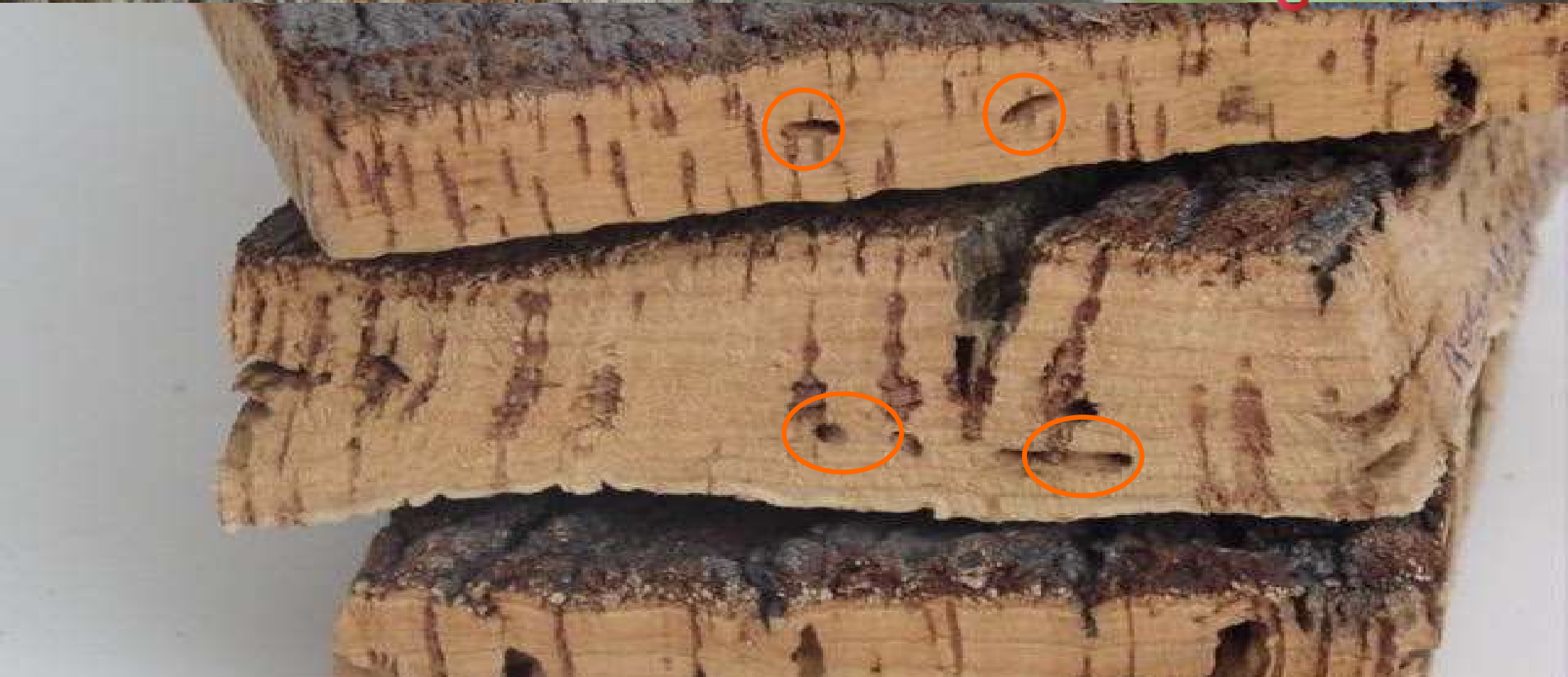


Cork samples with worm holes (*Coroebus undatus*) – flattened galleries and filled with material (larvae droppings)

Cork ant – *Crematogaster scutellaris*



- Defect very devaluing in terms of cork value



Cork samples with ant holes (*Crematogaster scutellaris*) – rounded galleries and completely empty



Cork samples with lignified cork – woody inlays present in the suberous tissue



**Lignified cork – abrasive belly
and visible dark and hard areas
in the sample laterals**

Lacks elasticity

Final product - granulates

Cracks

TO CONSIDER:

Quantity of cracks

Depth

- **CORK VALUE DEVALUATION**
- **INCREASE THE AMOUNT OF WASTE AFTER INDUSTRIAL PROCESSING**
- **DECREASES THE INDUSTRIAL YIELD IN TERMS OF CORK STOPPERS**

Cracks



DEEP CRACKS

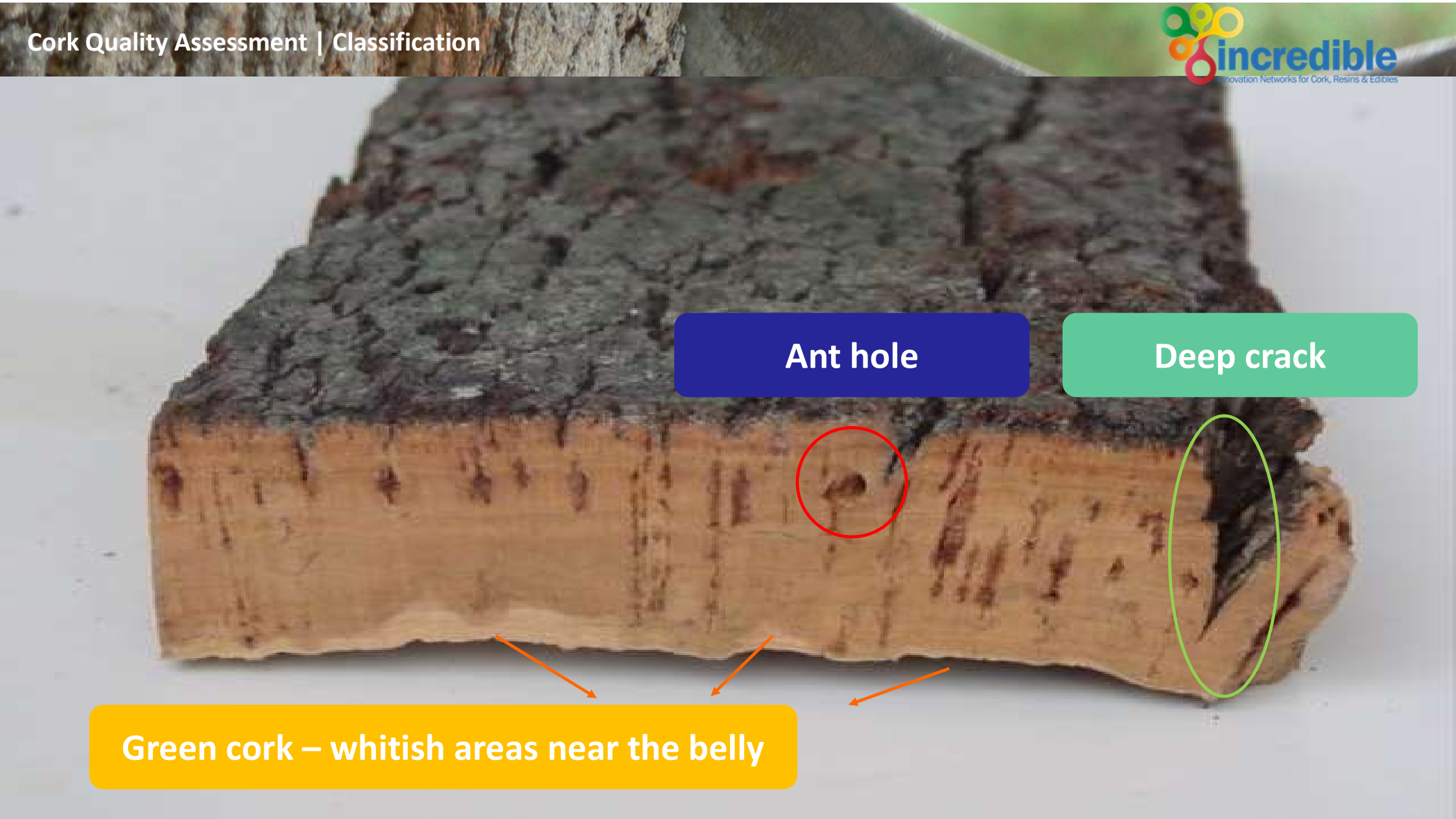


SUPERFICIAL CRACKS

Ant hole

Deep crack

Green cork – whitish areas near the belly





Earthy cork

Green cork shrunk areas

FOLDED CORK / DRY YEARS



- Abrupt stop in the cork growth
- Highly devaluating defect
- Low intensity

FOLDED CORK / DRY YEARS



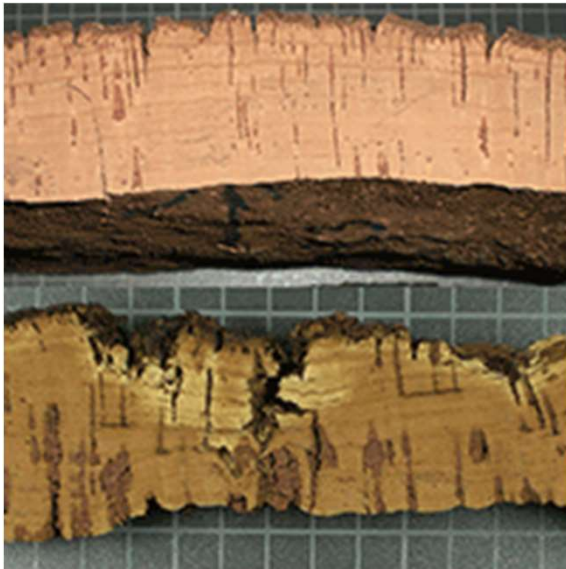
BIRD HOLES



 Highly devaluating defect

 Low intensity

YELLOW STAIN



- Associated with TCA
- Difficult to identify in the samples just by visual analysis
- TCA analysis needed?

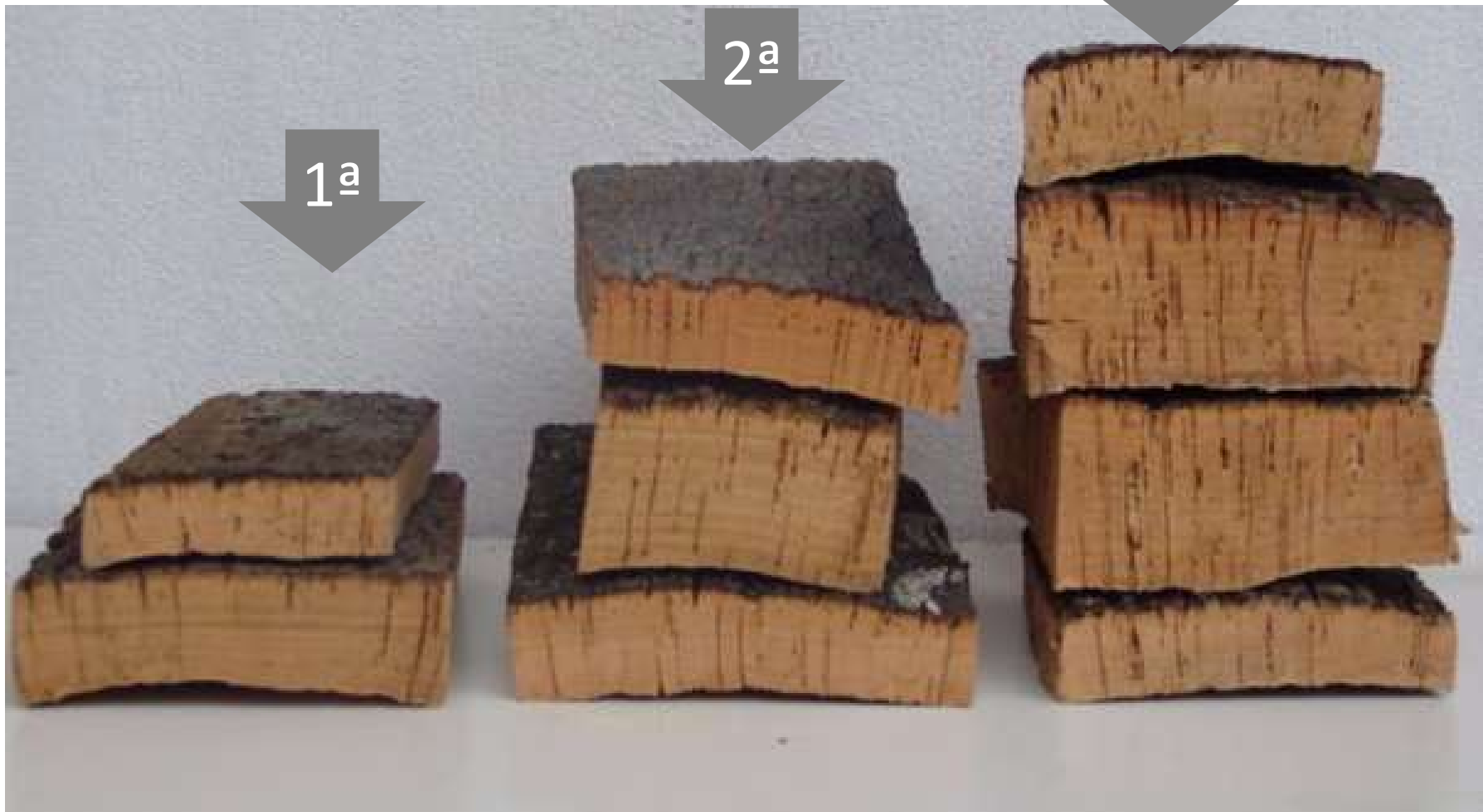
doi: <https://doi.org/10.3832/ifor2563-010>



COMERCIAL CORK CLASSIFICATION GRID

Quality		1 ^a	2 ^a	3 ^a	4 ^a	5 ^a	6 ^a	Refuse
Caliper								
Very thin	6 to 8 lines	CORK DISCS FOR “1+1” STOPPERS & CHAMPAGNE			GRANULATES			
Very thin	8 to 10 lines	CORK DISCS FOR “1+1” STOPPERS & CHAMPAGNE						
Thin	10 to 12 lines							
Thick	12 to 14 lines	NATURAL CORK STOPPERS						
Thick	14 to 18 lines							
Thicker	> 18 lines							

GOOD QUALITIES



Medium Quality Cork



Weak Quality Cork



Acknowledgment

Coruche Private Landowners Association



Guia de Comercialização de Cortiça no Campo



Cork Commercialization Guide

Guide du commercialisation du liège

Guía de comercialización de corcho

Guia de comercialització del suro

Guida al commercializzazione del
sughero

دليل تسويق الفلين

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