Microscopy Training session

E.F.P.G. – 1st year

Raphaël PASSAS - E.F.P.G. Bureau B03

Session schedule: 8h30 à 11h30

MI 1 : Paper Analysis

MI 2 : Printing analysis

Half group

MI 3 :

MI 4 :

MI 5 :

MI 6 :

Fibrous Composition of Papers and Boards

MI 7 : Exam session

MI 3 : Paper study (1)

Reminder:

- Boards and Papers raw materials (fibres, fillers, others chemicals aids)
- Element separation (Paper and boards layers, water disintegration, standard disintegration)
- Qualitative and quantitative analysis (components, wood species, calculation)

MI 3 : Paper study (2)

Documents:

- Object identification table
- Fibre identification key
- Weight factor table

MI 3 : Paper study (3)

Experimental work:

- Which paper contains filler (paper #1 or paper #2) ?
- What kind of fibre (hardwood /softwood) are contained in both paper (#1 & #2)?
- Determine the amount of each components for the paper#2. All fibres come from bleached pulp

MI 4 : Multi layers board analysis (1)

Reminder:

- Characteristics of mechanical and chemical pulps

Documents:

- Pulp identification key

Experimental work:

- Quantitative analysis of the multi-layers boards

MI 5 : Species identification

Reminder:

- Used word in the identification key

Documents:

- Softwood and hardwood identification keys

Experimental work:

- Known species analysis (Douglas Fir, Spruce, Scots Pine, Poplar, Birch, Eucalyptus, Acacia)
- Analysis of two unknown pulps "mélange 2 constituants" and "mélange de pâte"

MI 6 : Fibres damages

Reminder:

- Mechanical and chemical damages

Practical works:

- Refining study
- Cooking and bleaching effects

MI 7 : Exam session

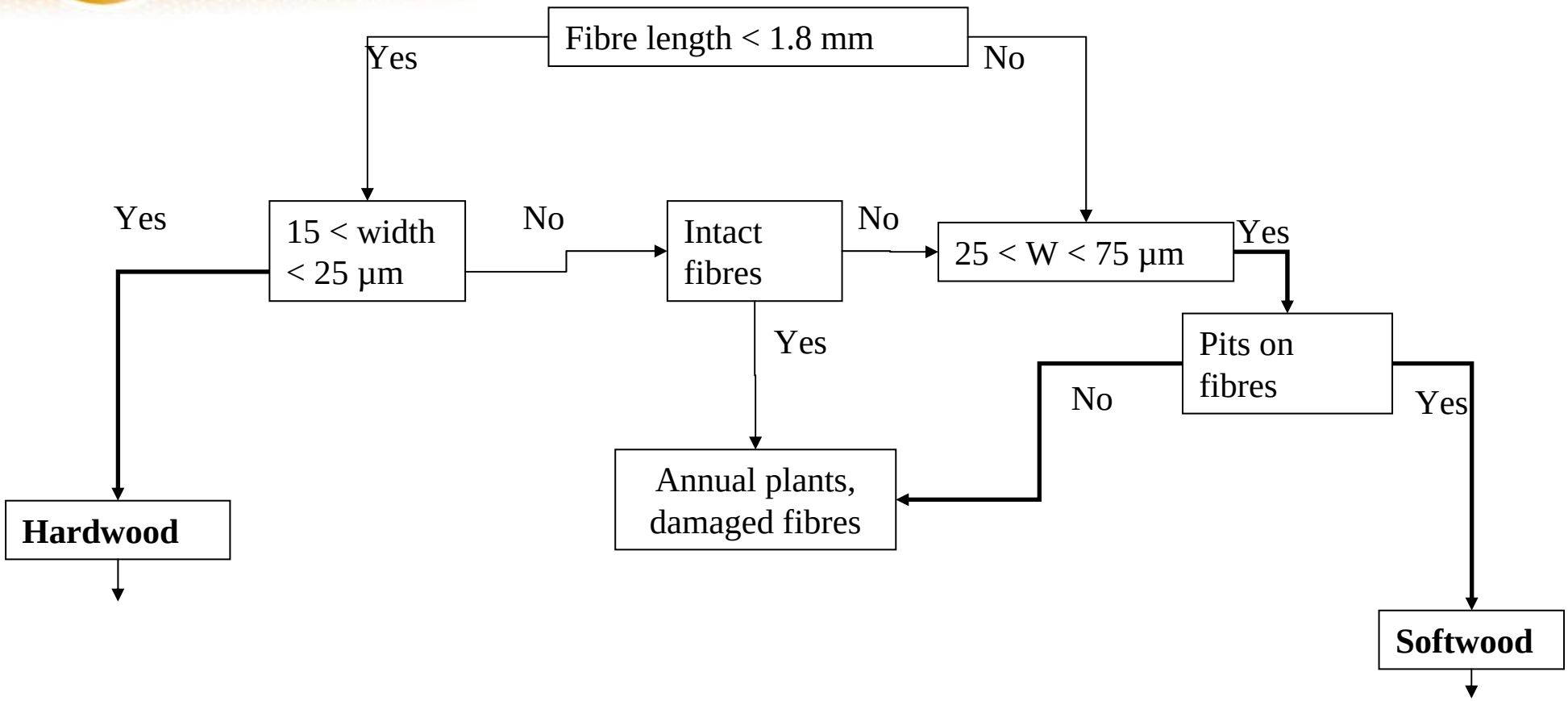
Comments:

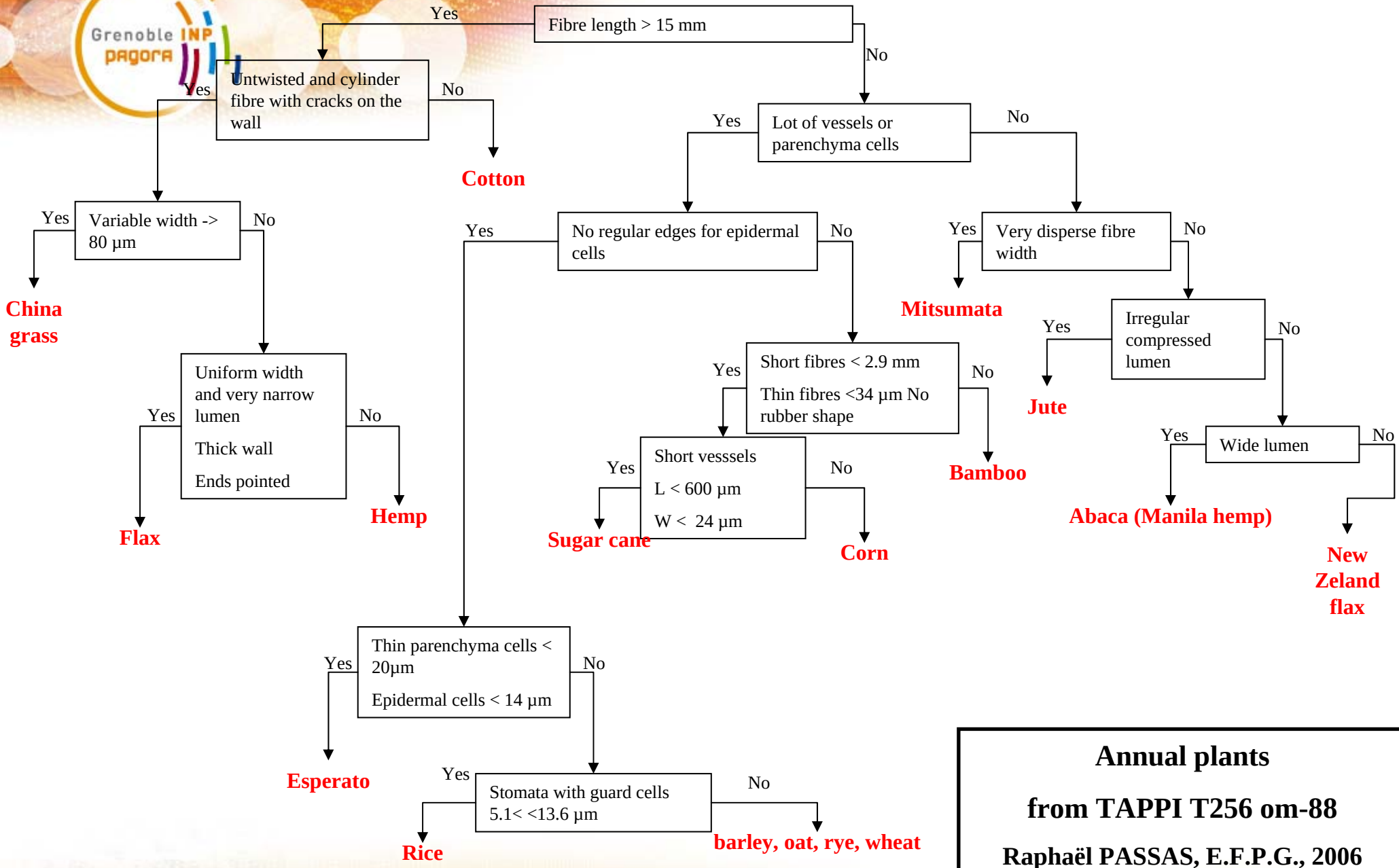
- group of 2 or 3 persons
- duration : 3h00
- all your knowledge are tested

Experimental work:

- Work base on industrial problem

Available documents

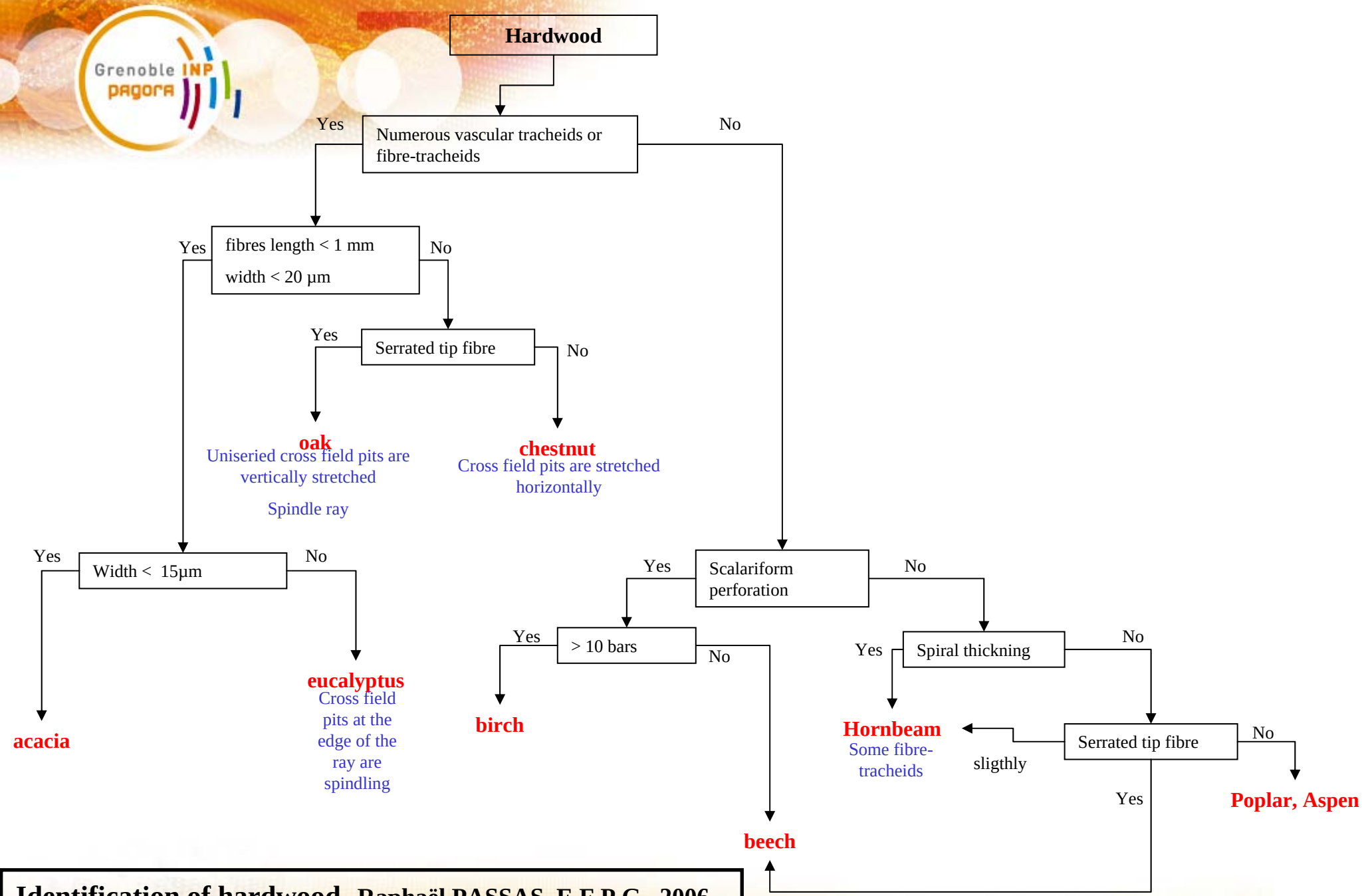

Fibre length < 1.8 mm
Yes
No
Yes
15 < width < 25 µm
No
Intact fibres
No
25 < W < 75 µm
Yes
Yes
Pits on fibres
No
Yes
Annual plants, damaged fibres
Hardwood
Softwood



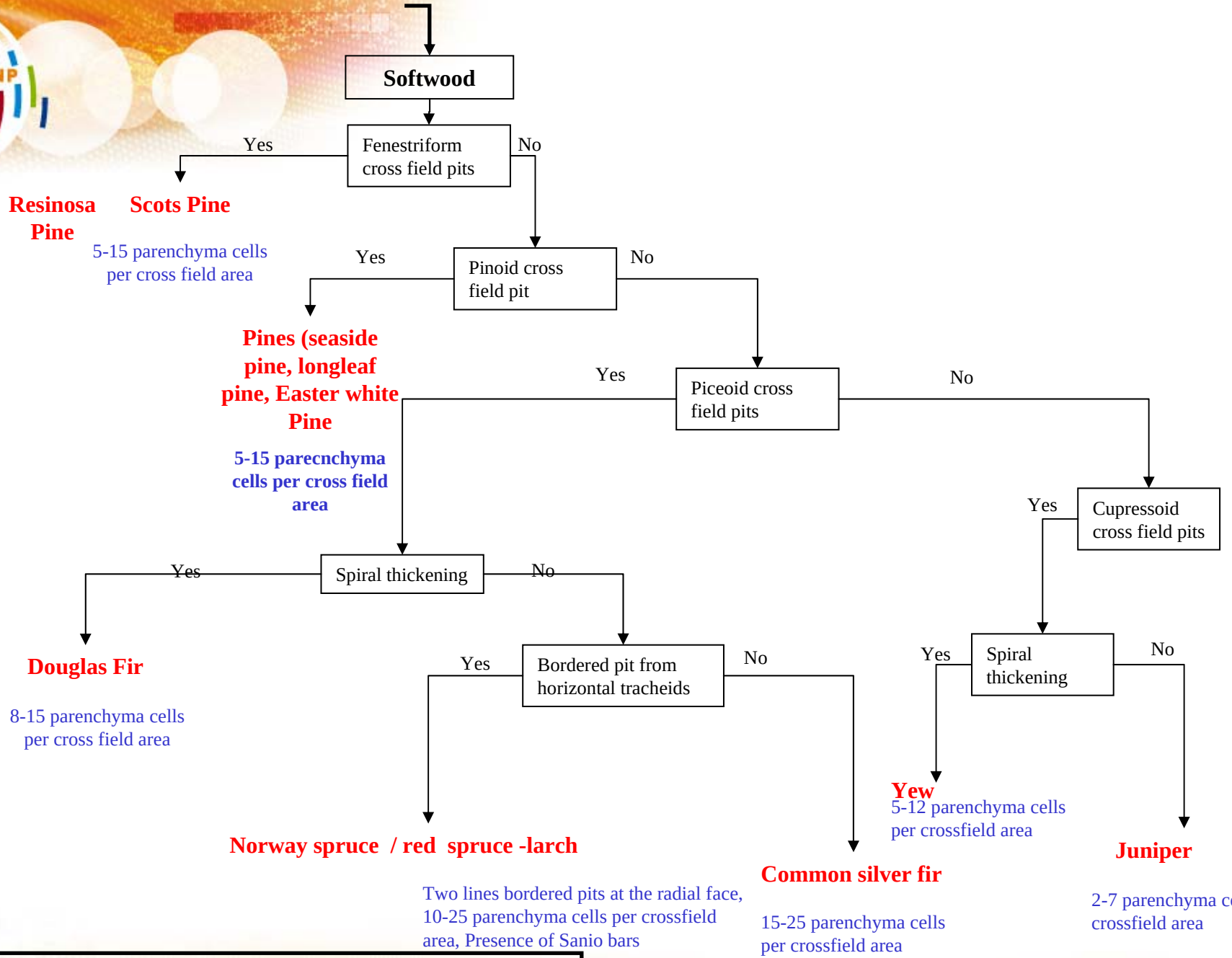
Annual plants

from TAPPI T256 om-88

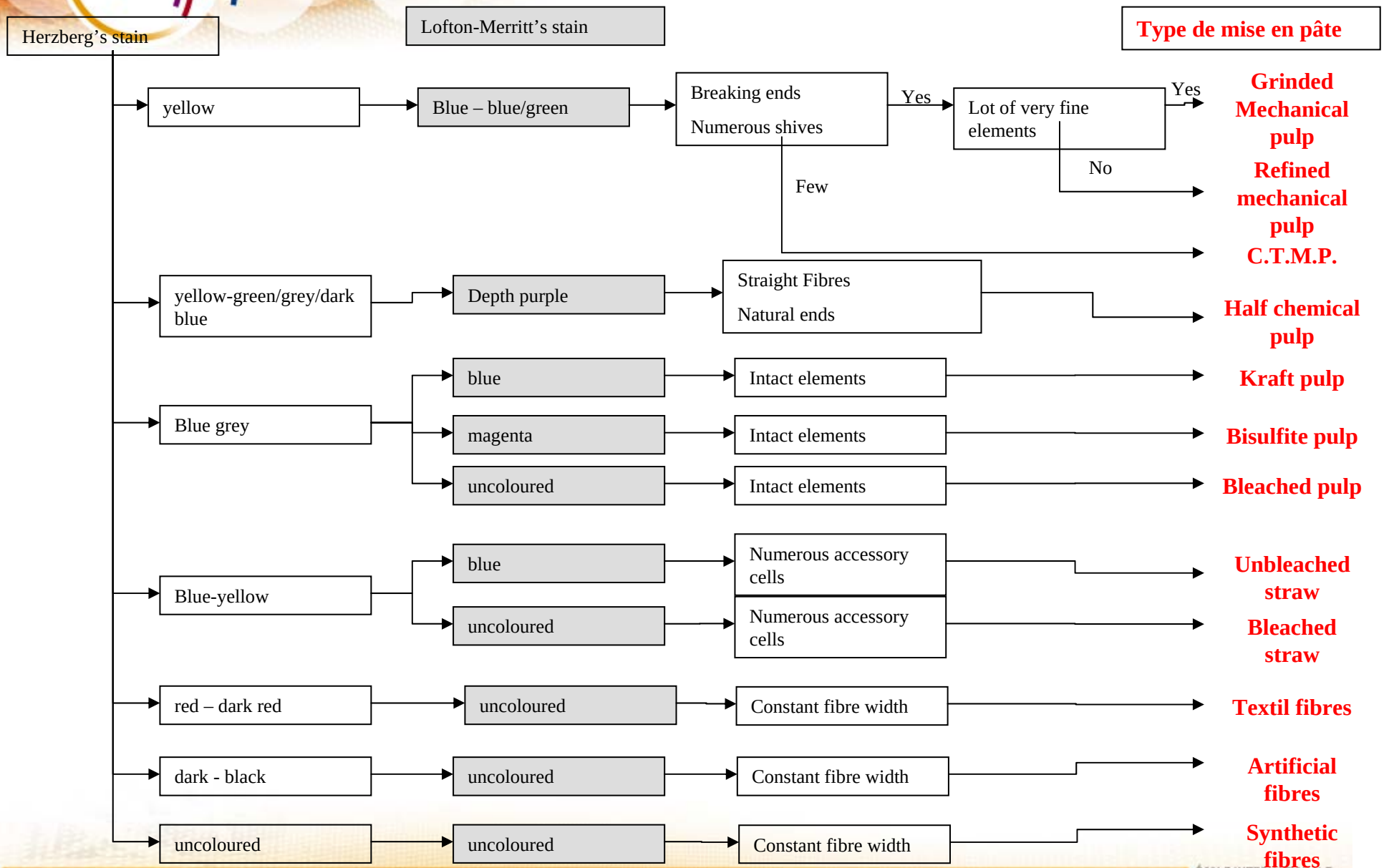
Raphaël PASSAS, E.F.P.G., 2006



Identification of hardwood- Raphaël PASSAS, E.F.P.G., 2006


Softwood
Fenestriform cross field pits
Yes
No
Resinosa Pine
Scots Pine
5-15 parenchyma cells per cross field area
Pinoid cross field pit
Yes
No
Pines (seaside pine, longleaf pine, Easter white Pine
5-15 parecnchyma cells per cross field area
Piceoid cross field pits
Yes
No
Spiral thickening
Yes
No
Douglas Fir
8-15 parenchyma cells per cross field area
Bordered pit from horizontal tracheids
Yes
No
Norway spruce / red spruce -larch
Two lines bordered pits at the radial face, 10-25 parenchyma cells per crossfield area, Presence of Sanio bars
Cupressoid cross field pits
Yes
Spiral thickening
Yes
No
Yew
5-12 parenchyma cells per crossfield area
Common silver fir
15-25 parenchyma cells per crossfield area
Juniper
2-7 parenchyma cells per crossfield area

Identification of softwood- Raphaël PASSAS, E.F.P.G., 2006



Softwood

Douglas	Douglas Fir
Epicéa commun	Norway spruce
Epinette rouge	Red spruce
Pin sylvestre	Scots Pine
Pin maritime	Seaside Pine
Pin des marais	Longleaf Pine
Pin résinosa	Resinosa Pine
Pin Weymouth	Eastern white Pine
Sapin commun	common silver fir
Mélèze d'Europe	European larch
If	Yew
Genevrier	Juniper

Hardwood

Acacia	Acacia
Bouleau	Birch
Chêne	Oak
Charme	Hornbeam
Châtaignier	Chestnut
Erable	Maple
Eucalyptus	Eucalyptus (blue gum)
Frêne blanc	white ash
Hêtre	Beech
Liquidanbar	Sweet gum
Orme blanc	white elm
Peuplier	Poplar
Tremble	Aspen

Other fibres

Coton	Cotton
Ramie	China grass
Lin	Flax
Chanvre	Hemp
Esperato	
Riz	Rice
Orge	Barley
Avoine	Oat
Seigle	Rye
Blé	Wheat
Edgeworthia - Mitsumata	Mitsumata
Jute	Jute
Bambou	Bamboo
Maïs	Corn
Canne à sucre	Sugar cane
Abaca (chanvre de Manille)	Abaca (Manilia hemp)
Lin de Nelle Zélande	New zealand flax

Weight factors

Pulp	Softwood	Hardwood
Grinding pulp	2	0,6
CTMP	1,8	0,6
Kraft	1	0,3
Bisulfite	1	0,3
Bleached	0,9	0,3

Softwood : number of field diameters

Hardwood : number of fibres

Object name	Length (mm)	Width (µm)	L/W ratio	Shape	End shape	Other
Springwood tracheids	2 - 5	30 - 70	~100	Stretched	round	- bordered pits - cross field pits - spiral thickening
Summerwood tracheids	2 - 5	20 - 35	~150	stretched – filiform	Little sharpe	- bordered pits - cross field pits - spiral thickening
Fibres	0,8 – 1,6	15 - 20	~150	Very tapering	sharpe	- no pits at the surface
Tracheid-Fibres	0,6 - 1,6	15 - 25	~100	Tapering - scrubby	Little round	- pits
Vessels	0,6 – 1,5	40 - 150	1 - 30		More or lessVisible appendix Scalariform or simple perforation	Intervascular pits Cross field pits Spiral thickening
Parenchyma cells	0,08 – 0,15	10 - 15	8 - 10	rectangular		Cross field pits Simple pits

Object name	Length (mm)	Width (µm)	L/W ratio	Shape	End shape	Other
Mineral fillers	0,001 - 0,005	1 - 5	1 - 4	Small plate		
Ink particles						Colored particles
Shives	0,4 - 5	60 - 400	1 - 50	Straight as piece of wood	Breaking end (grinding) or tapering (CTMP)	- more than 1 fibre
Fines	< 0,1	<100	1 - 10	No specific shape	jagged	