TIMBER CLASSIFICATION, PROPERTIES AND USE - MANUAL

Carpentry 4

THE SCHOOL OF TRADES, ENGINEERING AND CONSTRUCTION

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Te Kuratini o Waikato

Contents

Introduction

Timber must be fit and suitable for construction purposes. Think about these questions:

What are the common properties of timber like this? Do these properties make this type pf timber suitable for your building project?

What does SG 8 mean? Is timber marked SG 8 suitable for your building project?

What type of tree would a timber like this be manufactured from? Where is this tree grown?

To answer these questions and select the best timber for your construction purpose, you need to know a lot about the types of trees timber comes from and the different ways timber is classified. But first let's take a closer look at wood and trees – the source of all timber.

Trees and wood

Before timber is delivered to a construction site, it is in the following forms:

From trees to timber

Wood, lumber and timber

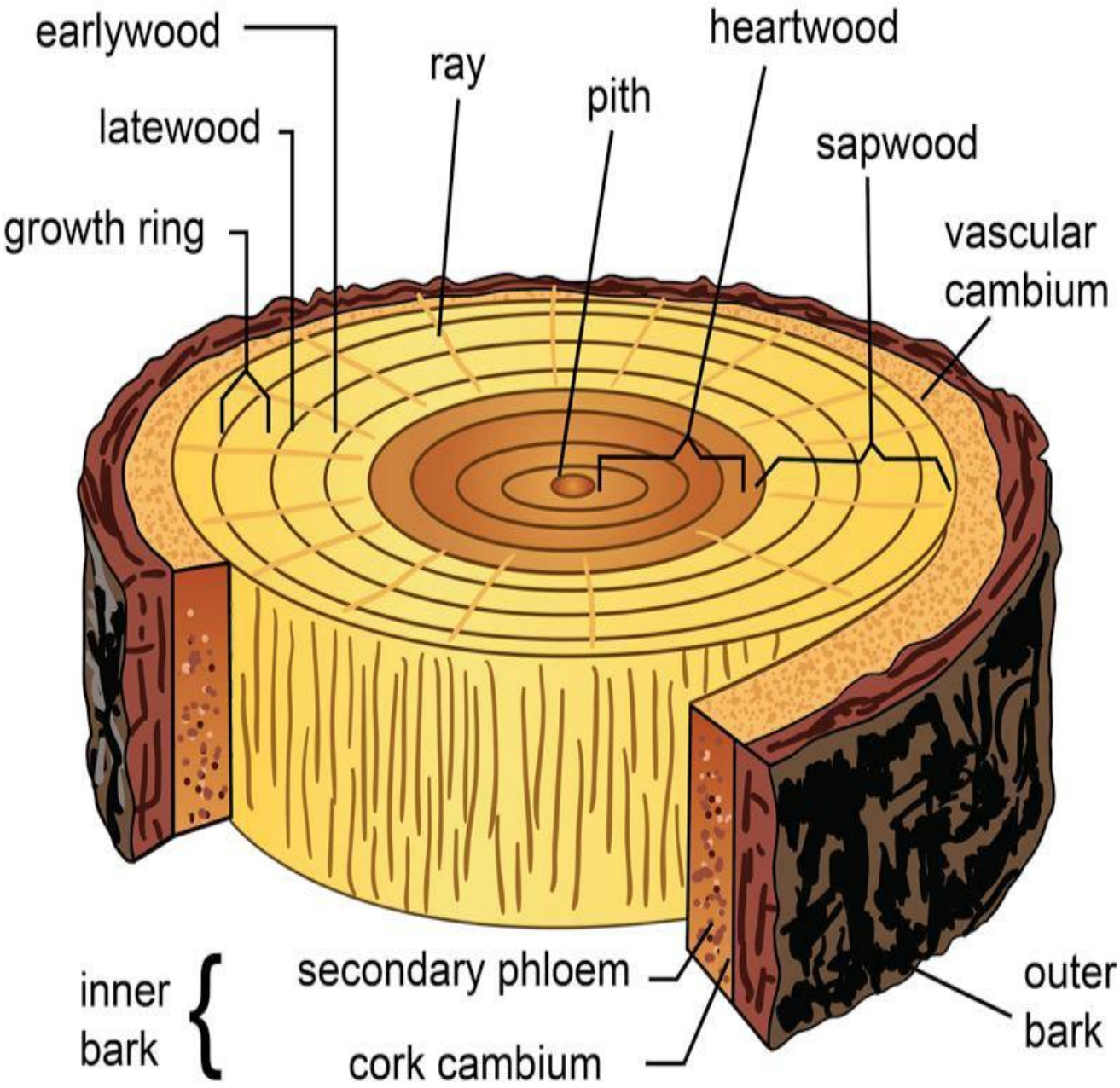
Wood
The hard and unprocessed organic structure of a tree trunk.

Lumber
Sawn and processed wood obtained from a tree trunk. Lumber is usually in the form of large boards.

Timber
Processed lumber that is suitable and fit for construction purposes.

Builders mostly work with timber – not wood or lumber.

The structure of wood



Parts of a tree trunk

Parts of a tree trunk
Match the parts of the trunk to a correct description.

Parts of trunk	Description
1. Bark	Carries food from the leaves to the cambium
2. Inner bark (ploem)	Active growing layer where new cell are produced
3. Cambium layer	Inner portion of trunk; these are sapwood cells that have become inactive and have filled with resin and gum; gives support to the trunk
4. Sapwood (xylem)	Soft dry centre; decayed first year's growth
5. Heartwood	Cells that radiate out from the centre of the tree; they store and transfer sap laterally to various layers
6. Pith	Dry dead tissue that gives protection
7. Rays (a.k.a Medulary rays)	Main active cells in the trunk that conduct sap to the leaves

Wood is a cellular material mainly made up of long tube like cells or fibres. These cells are mainly cellulose and are bonded together with lignin.

Trees take in water and minerals from the soil, plus carbon dioxide from the air through the leaves and, with the presence of sunlight, form carbohydrates (sugars or growing compounds) through a process known as photosynthesis.

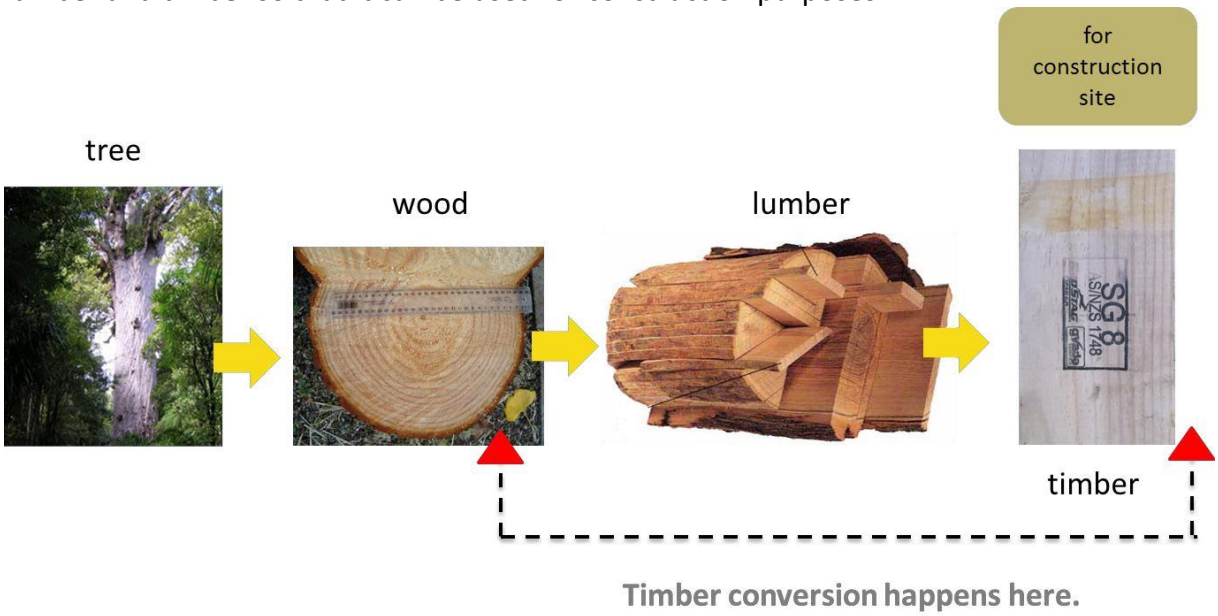
Photosynthesis

Each year, new layers of cells are added to the cambium. Larger lighter-coloured cells known as early wood are formed in spring, while smaller darker-coloured cells are formed during summer. The visual difference between these cells gives the tree what are known as growth rings and indicate how old the tree is.

Growth rings indicate how old the tree is

Timber conversion

Timber conversion is the process of changing the form of raw wood from trees into lumber and timber so that it can be used for construction purposes.



Timber conversion

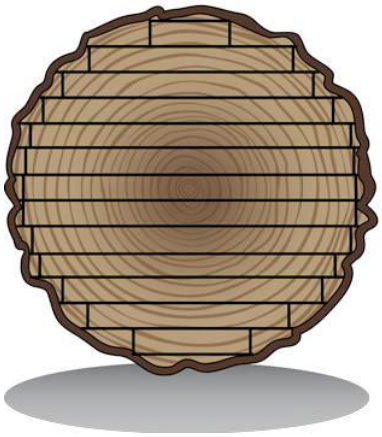
Wood is sawn using a horizontal band saw.

Methods of sawing

A horizontal band saw can process wood to create the following types of lumber boards:

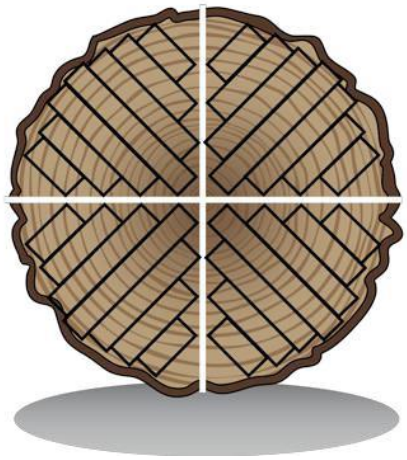
- Flat sawn
- Quarter sawn
- Rift sawn

Flat sawn



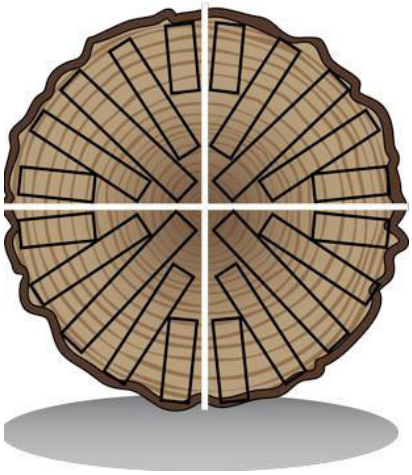
Flat sawing produces boards that are **tangential** to the growth rings and are therefore more affected by differential shrinkage. These boards are called flat sawn boards.

Quarter sawn



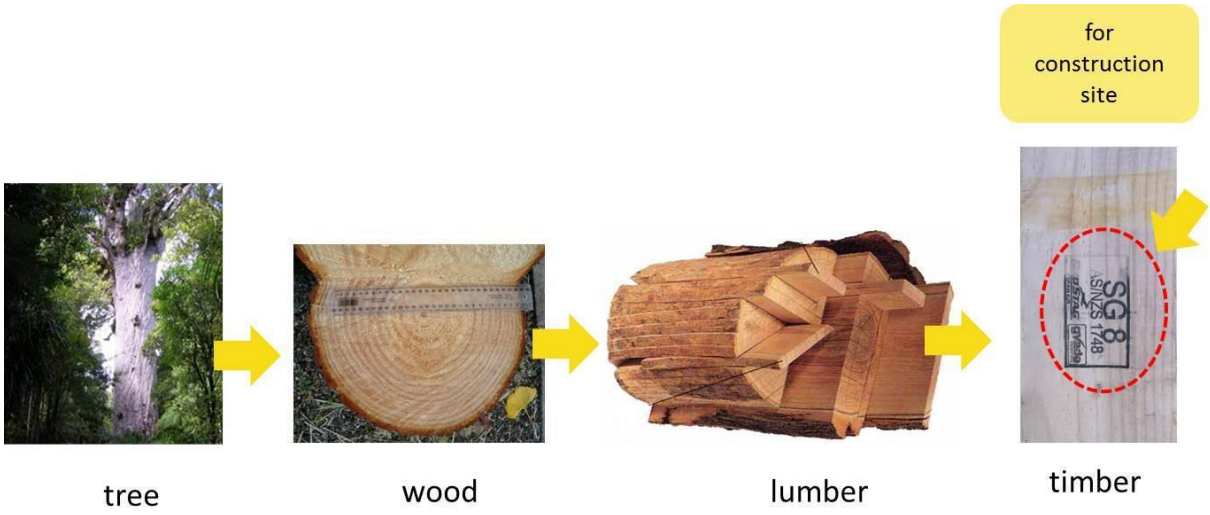
Quarter sawing produces most boards that are **perpendicular** to the growth rings and are therefore less affected by differential shrinkage. These boards are called quarter sawn boards.

Rift sawn



Rift sawing produces boards that are between $30^{o} – 60^{o}$ angle to the growth rings. The boards are narrow boards with accentuated vertical grain pattern. Rift-sawn boards are often favoured for fine furniture and other applications where matching grain is important.

The classification of timber



Trees to timber: classification

Timber that is delivered to a construction site has been **classified** and **graded** for specific use. As a builder, you need to know how timber is classified and graded so you can select the most suitable timber for your building project.

To classify timber

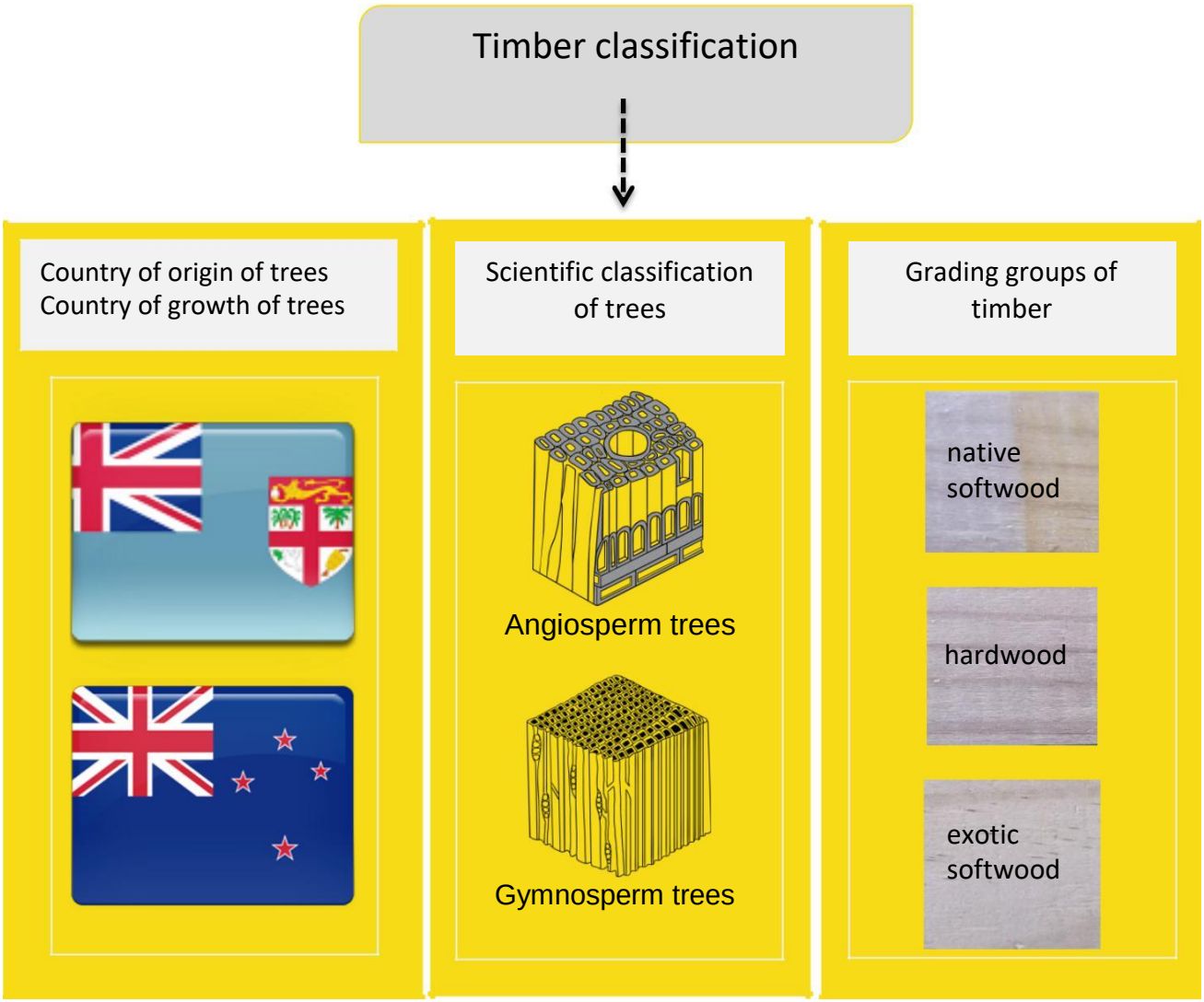
To classify an object like timber is to place it in a group of timber that has similar or identical **features** or **properties**.

To grade timber

Grading timber is a way of classifying timber. In this type of classification, timber is placed in a group that has similar or identical suitable **uses** that have been determined by **the property of the tree and wood** it comes from.

How timber is classified

There are three common ways of classifying timber.



Classification 1: Country of growth and origin of trees

Timber is divided into **three** groups, based on the country of origin of the trees and which country the trees have been grown in.

1. **Native** timber
   What is native timber?
   List at least TWO examples of native timber.

_____

_____

_____

_____

Examples*:* _____

2. **Exotic** timber
   What is exotic timber?
   List at least TWO examples of exotic timber.

_____

_____

_____

_____

_____

Examples*:*

_____

Country of origin: California (USA)

3. **Imported** timber
   What is imported timber?
   List at least TWO examples of imported timber.

_____

_____

_____

_____

_____

Examples*:* _____

(Papua New Guinea)

Botanical Classification

Tree species are classified into two main classes.

The classification is based on cell formation and structure and the make-up of the tree. The naming of the classes has no relevance to the hardness of the timber.

It can be very hard to determine the difference between samples of timber from the two different classes with the naked eye. Therefore having a broader understanding of the type of timber that you are dealing with is important.

Hardwood

The hardwood tree has broad leaves and seeds that are contained in a fruit.
An example of this would be an Apple, or an Oak tree.

Softwood

The softwood tree has needle like tree that have cones that carry the seeds. An example of this would be a Pine tree.

Timber properties

The properties of each timber must be considered, to assess the timber's suitability for a particular job. Some of the properties looked at are:

- appearance
- workability
- durability
- weight
- strength
- density
- stability
- compatibility
- resilience

The property of timber will depend on the wood and tree it comes from and will often decide its suitable use. For example:

name and classification of tree:
Matai – native softwood
properties of wood:
weight: heavy wood
durability: high, hard wearing
suitable use:
floor boards and strip flooring

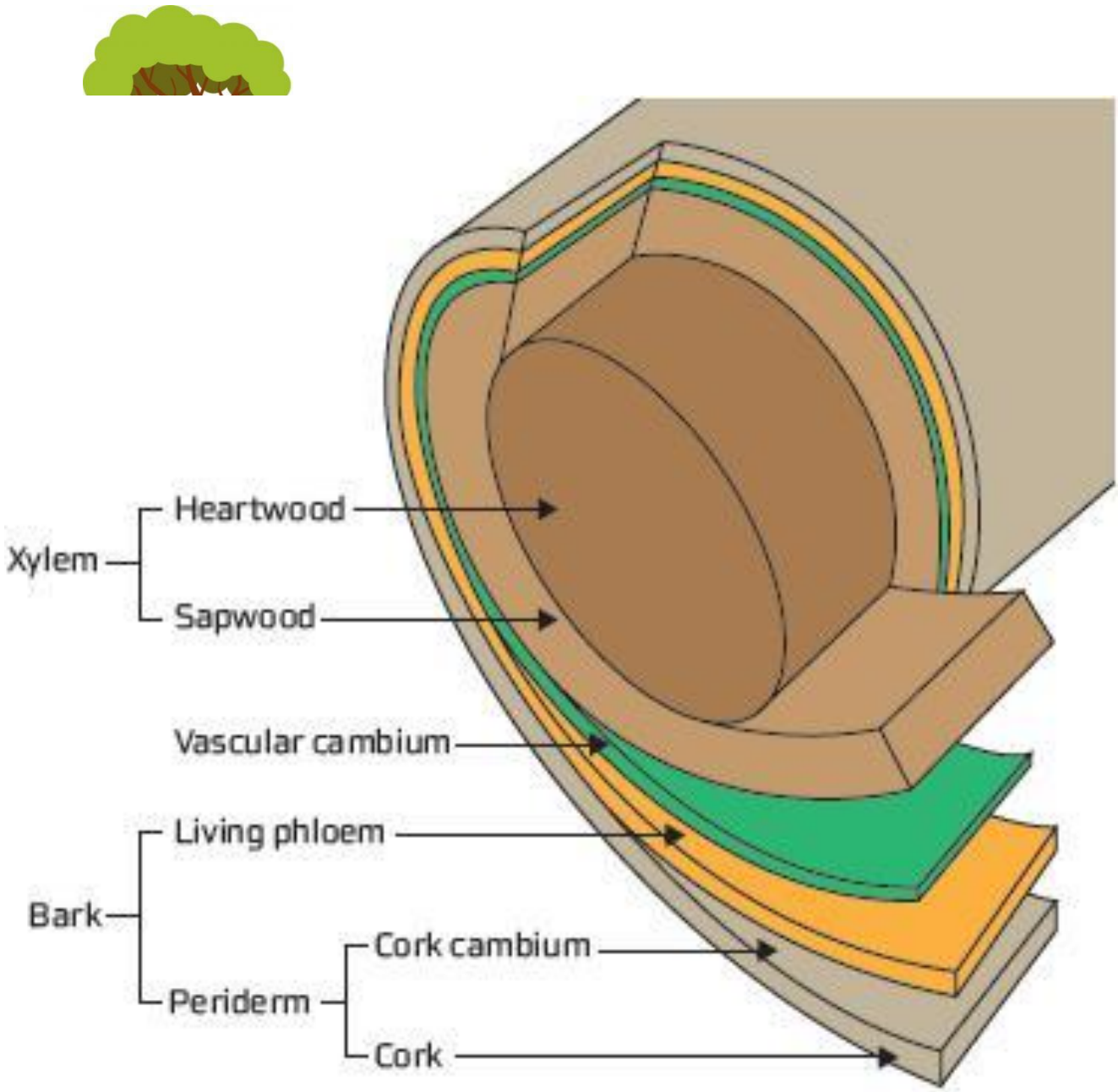
Property and use of Matai timber

Sapwood and heartwood properties

The **durability** of a piece of wood doesn't just depend on which tree it comes from, but also which part of the tree it comes from.

Sapwood This tends to be more susceptible to insect and fungal attack, but it is normally receptive to treatment.

Heartwood This can have natural resistance to insect and fungal attack, but is typically not so receptive to treatment.



Sapwood and heartwood wooden structure