Understand How Trees Grow

A simple introduction to tree growth for forestry practice

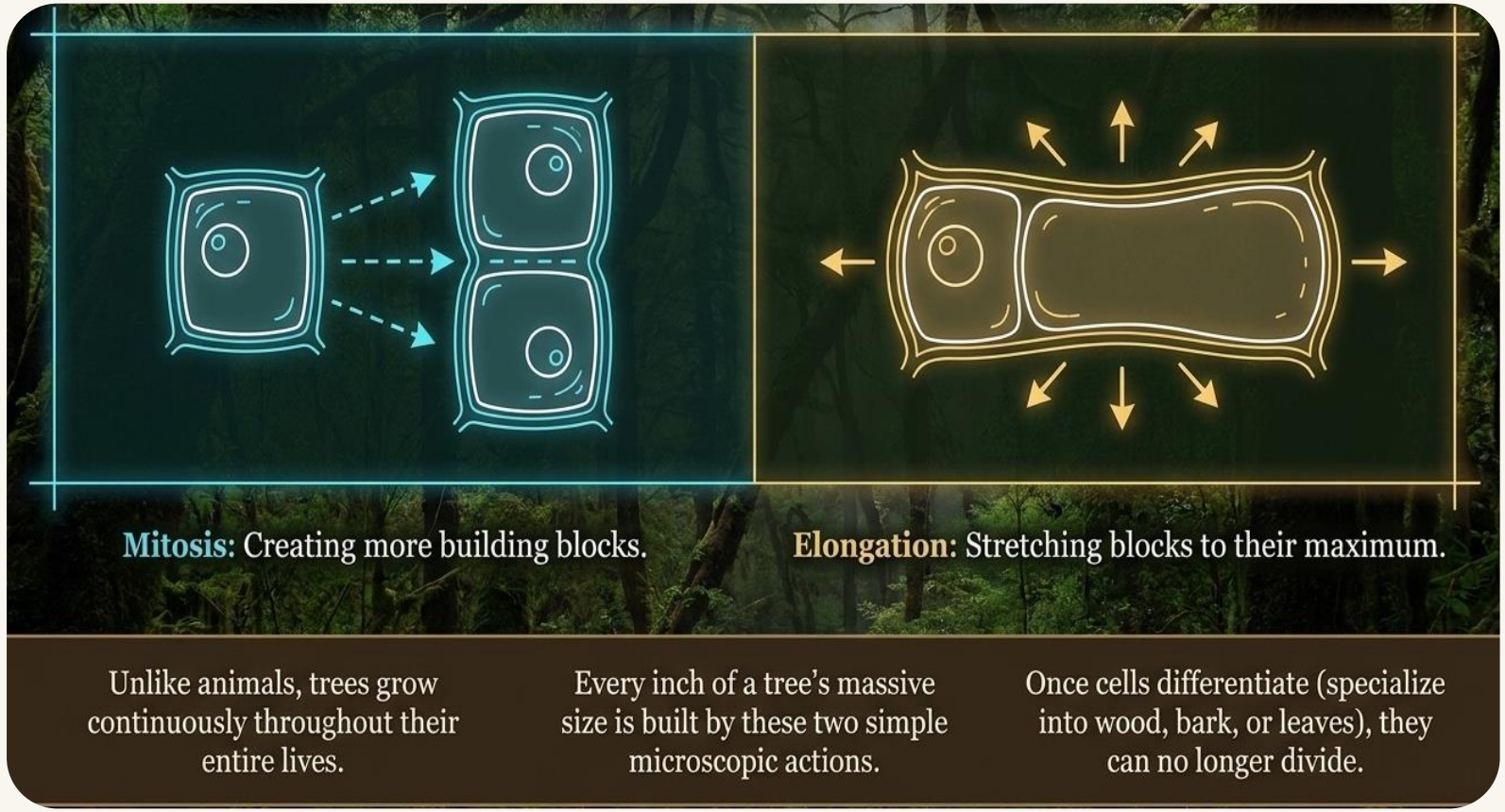
The simple idea

A tree grows by adding new parts during primary growth. It becomes longer, taller and wider.



Two simple steps of tree growth

Trees grow by making new cells and by making those cells larger.



Step 1: Make new cells

The tree produces new cells. This adds new building blocks.

Step 2: Expand

Cells increase in size. This helps the new parts develop and extend.

Remember

New cells + cell expansion = growth.

Where does tree growth happen?

Different parts of the tree have different growth jobs.

Shoot tips

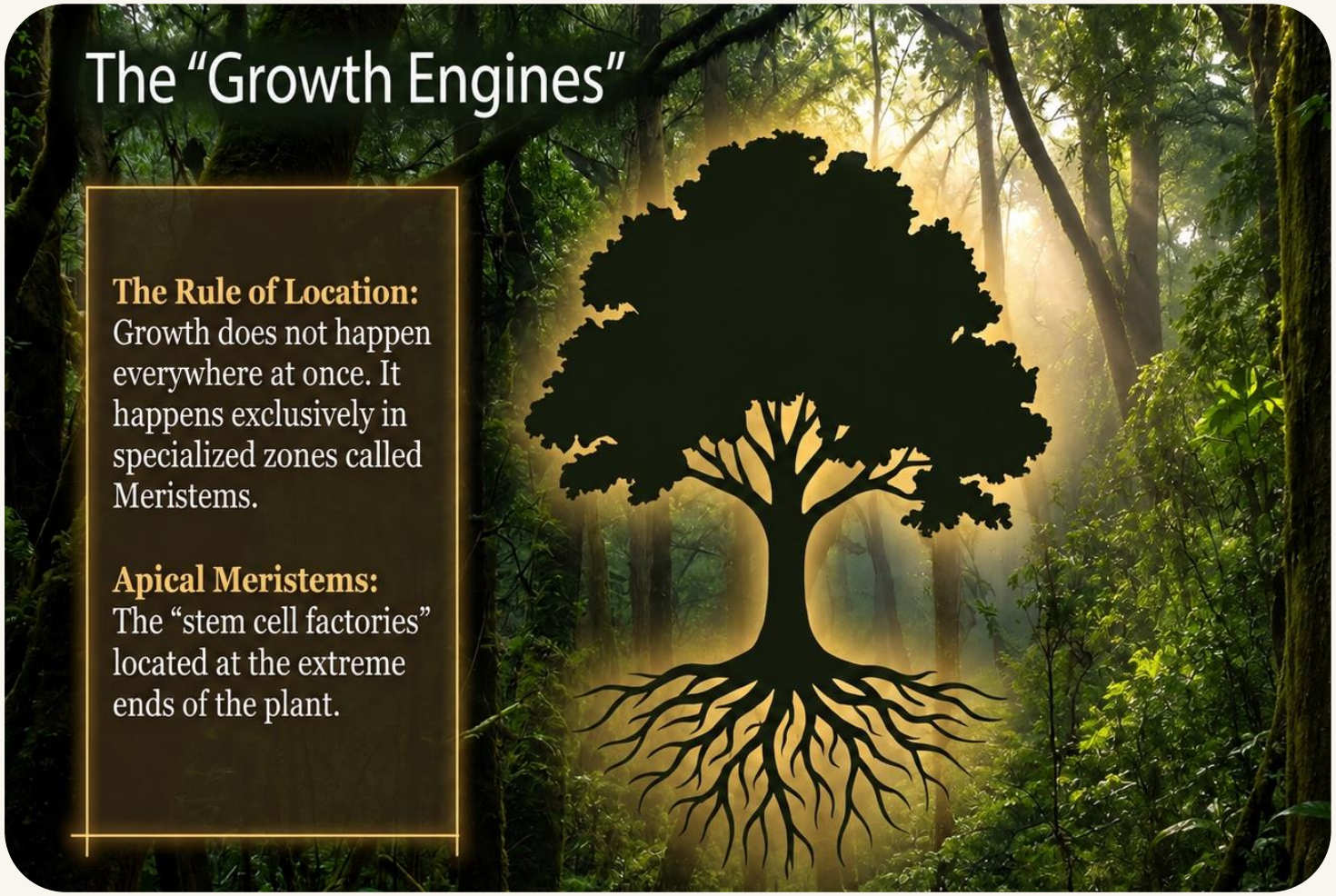
Help the tree produce new shoots, leaves and height. Its buds are reaching up into the air.

Root tips

Help roots extend into the soil and explore new space. Its probes pushing down into the earth

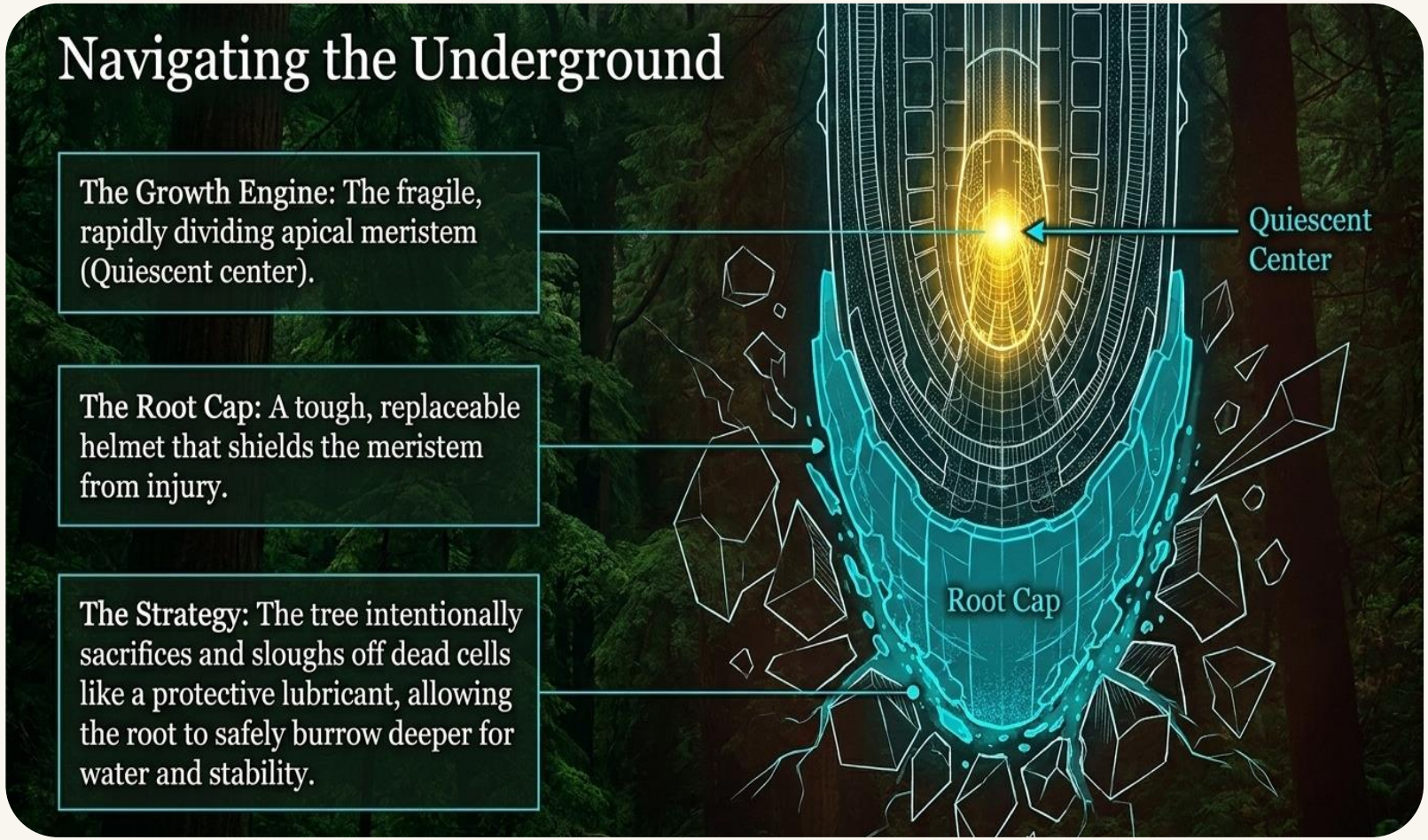
Simple takeaway

Growth happens at active growing points.



Growing tips: the tree’s active points

Growing tips help shoots and roots extend into new space.



Shoot tip

Adds new growth above ground. This helps the tree grow taller and produce new branches.

Root tip

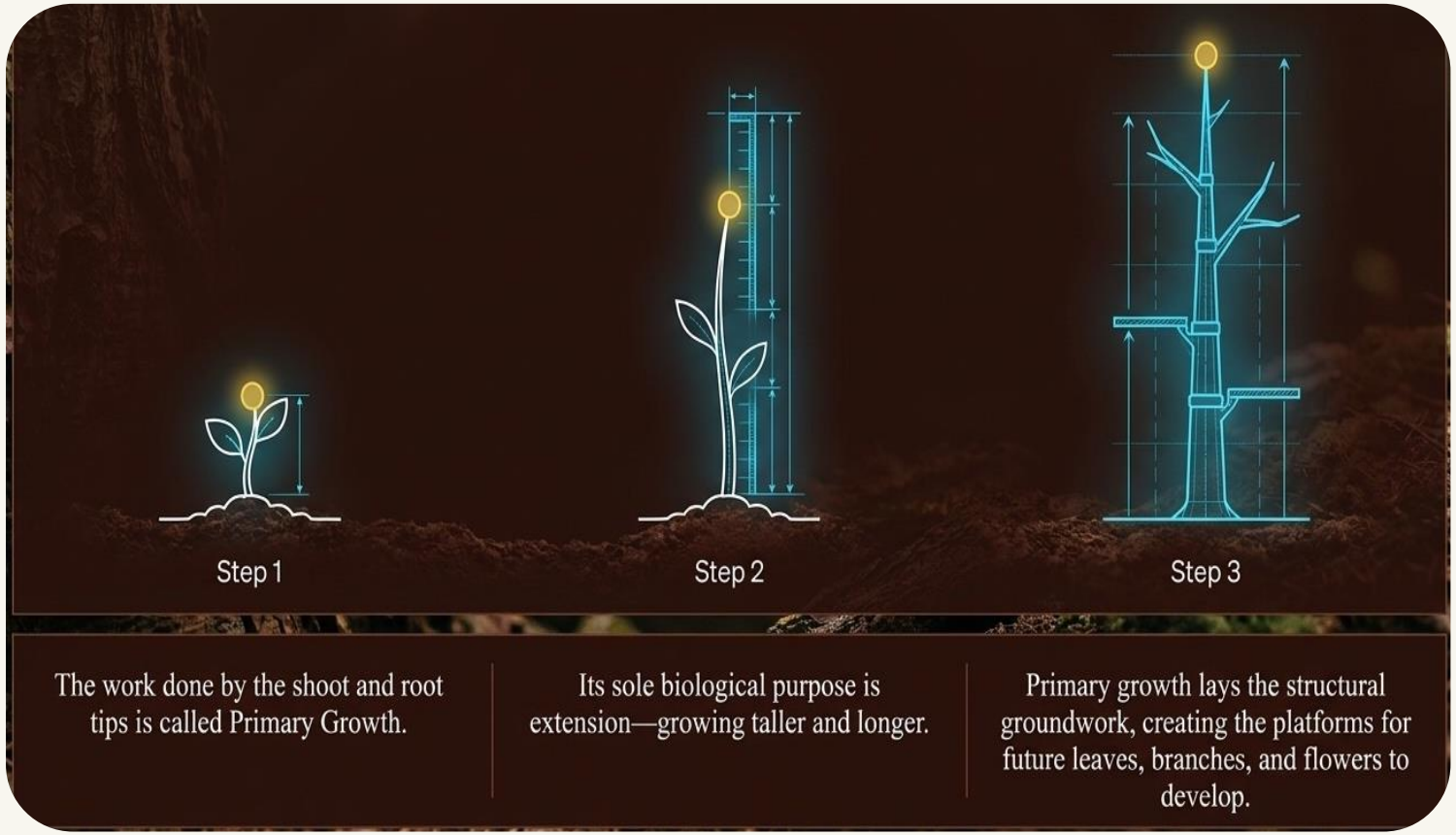
Adds new growth below ground. This helps roots move through the soil.

Field connection

Healthy growing tips support healthy tree establishment.

Primary growth: How a tree becomes taller

Primary growth increases the length of shoots and roots.



Above ground
New growth at shoot tips extends the stem and branches.

Below ground
New growth at root tips extends the root system.

Key message
Primary growth mainly makes the tree longer or taller.

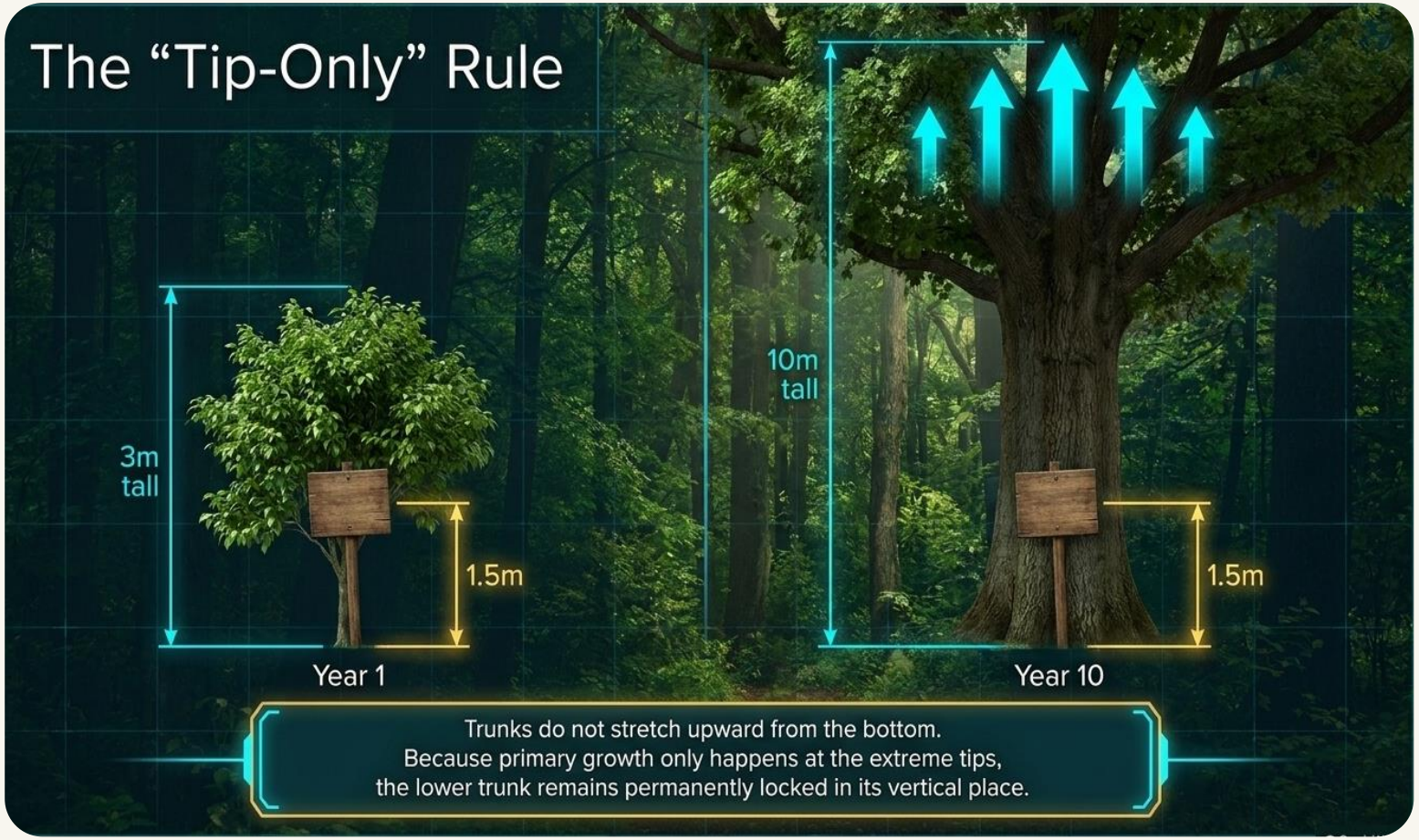
Height growth happens at the growing tips

The main stem does not become longer equally along its whole length.

Where growth is active
New length is added near the shoot tip.

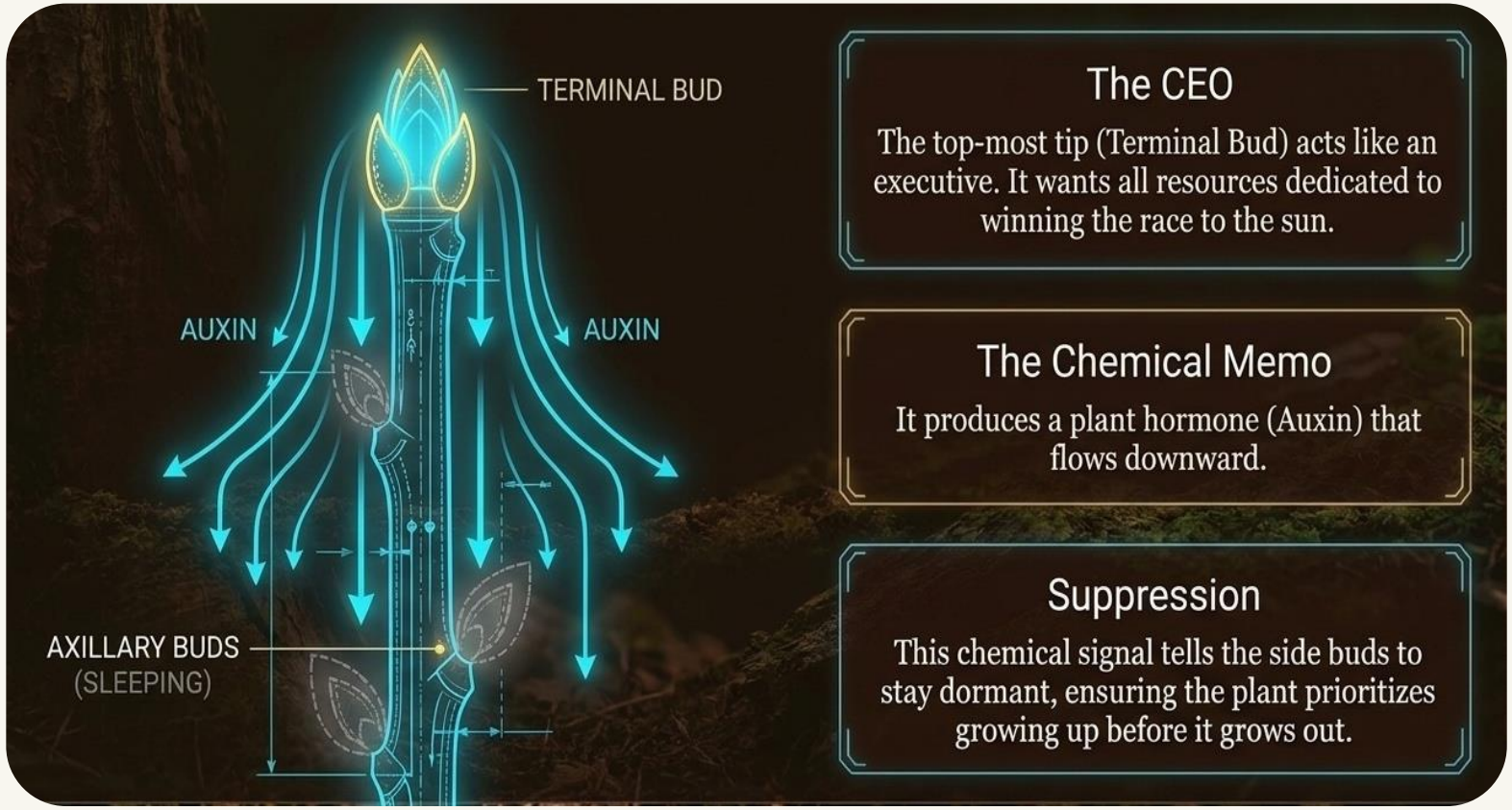
What this means
Older parts of the stem usually do not keep extending in length.

Forestry link
Protecting growing tips can support good early tree form.



Apical dominance: the top tip leads

The main shoot tip can influence how side shoots develop.



Main shoot

The top growing tip often grows strongly and leads upward growth.

Side shoots

Chemical signals from the main tip can limit side-shoot growth.

Why it matters

This helps explain why some trees grow tall and straight.

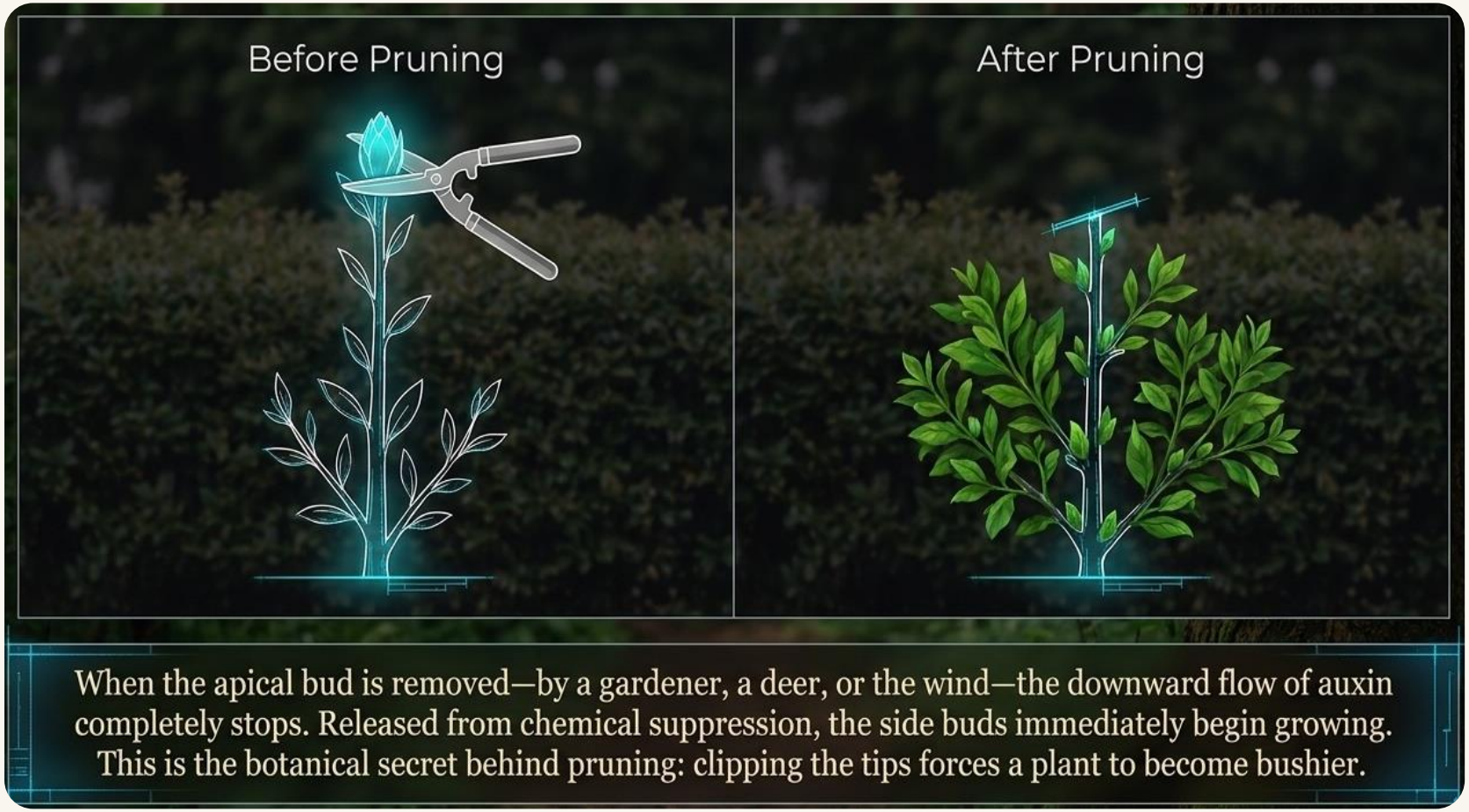
Pruning can change the growth pattern

Removing the main shoot can allow side shoots to develop more strongly.

Before pruning
The main shoot has strong control over the side shoots.

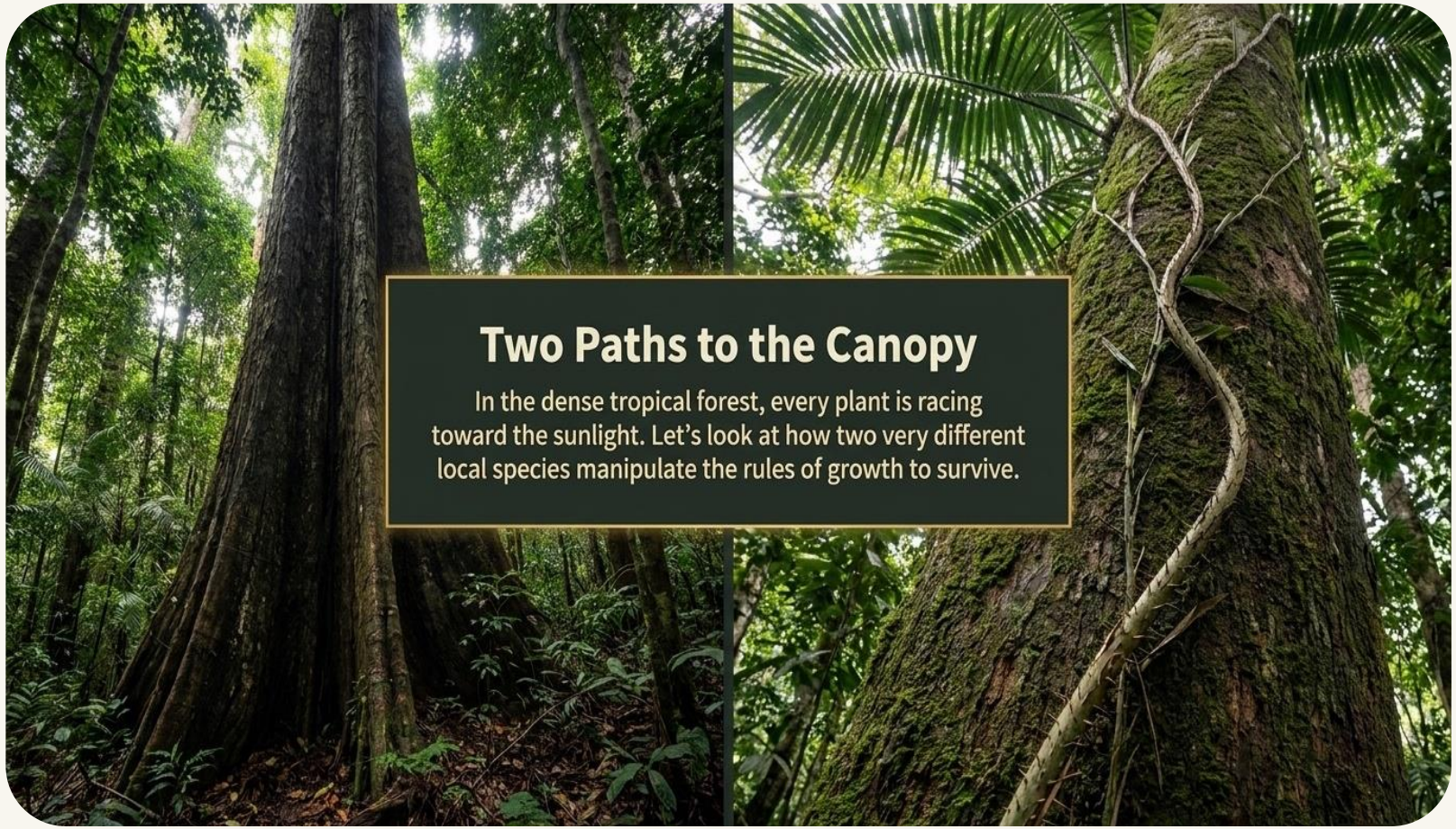
After pruning
Side shoots may grow more actively when the main tip is removed.

Management point
Pruning should have a clear purpose and use the correct technique.



Trees can follow different paths to the canopy

Species and growing conditions influence how a tree reaches the canopy.



Path 1: Grow upward

Some trees invest heavily in height to reach light above other trees.

Path 2: Use support

Some climbing plants use other trees to reach better light.

Forestry link

Growth form affects stand structure and competition.

Species use different growth strategies

Different species can use different ways to reach light and survive.

Timber tree example

A tree may invest in a strong, upright stem to reach the canopy.

Climbing plant example

A climber may use another tree for support instead of building a large stem.

Remember

Growth strategy depends on the species and its environment.

Evolutionary Strategies: Meranti vs. Rotan

Feature	Pokok Meranti (Timber Tree) 	Rotan (Climbing Palm) 
Survival Strategy	Build a massive freestanding tower	Hitch a ride on other trees
Primary Growth (Length)	Yes (up to 60m+ tall)	Yes (stretching over 100m+ long)
Secondary Growth (Width)	Yes. Uses lateral meristems (cambium) to add thick woody rings every year.	No. Lacks lateral meristems. Stays uniformly thin its entire life.
The Result	A thick, sturdy, supportive wooden trunk.	A flexible, lightweight vine.

What fuels tree growth?

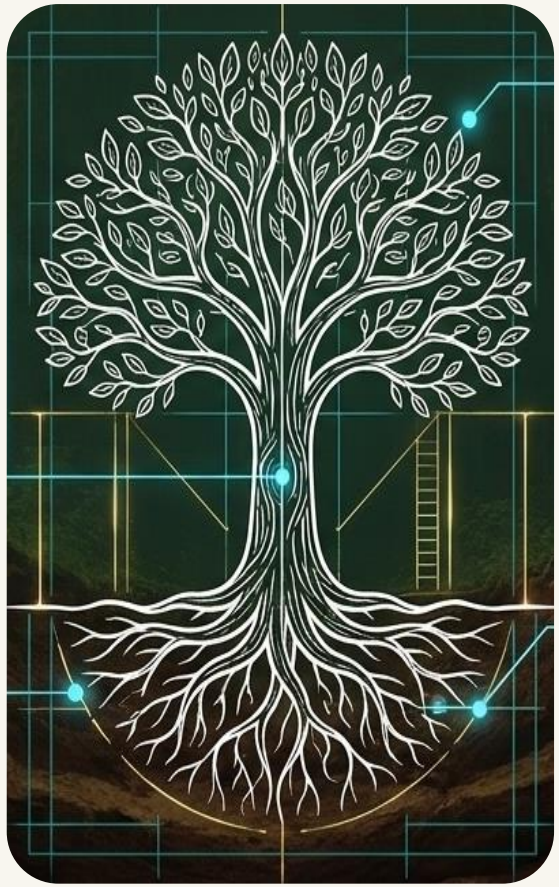
Trees need suitable conditions to keep growing.

Light

Leaves use light to produce energy. Trees in dense forests grow taller and faster to outcompete neighbours for canopy sunlight.

Water

Water supports transport, cell expansion and cell growth.



Soil quality

Roots need suitable soil, nutrients and air. Provides the essential minerals needed for the cell division phase.

Other influences

Temperature, species, genetics, and competition also matter.

Why tree growth matters in forestry

Understanding growth helps us make better management decisions.



Tree establishment
Healthy early growth improves survival and stand formation.

Tree form
The growth pattern influences stem straightness, crown shape, and quality.

Forest productivity
Growth determines how trees add biomass and develop over time.

Management link
Match species and site; monitor growth; manage competition.

Topic summary: remember these five ideas

You do not need to memorise every biological detail.

1. Growth

Trees grow by making new cells and expanding them.

2. Growing tips

Shoot tips add length above ground. Root tips add length below ground.

3. Height

Primary growth makes shoots and roots longer.

4. Form

The main shoot and side shoots influence tree shape.

5. Forestry

Species, site and management influence growth.

Big picture

Understand how a tree grows → understand how it develops in the forest.

Reflect & check your understanding

Answer in your own words. Connect the ideas to field experience.

Reflection

1. What is the difference between making new cells and cell expansion?

2. Where does primary growth occur?

3. Why can a tree grow taller without every part of the stem becoming longer?

4. How can species and site conditions affect tree growth?

Quick check

1. Primary growth mainly increases:
   A. length B. stem thickness

2. New shoot growth happens mainly at the:
   A. root base B. shoot tip

3. What can happen when the main shoot tip is removed?
   A. Side shoots may grow more strongly B. Roots stop growing

4. Name TWO conditions that support tree growth.

Key takeaway

Tree growth starts at active growing points. Understanding this helps us understand tree form, establishment and forest development.