The Calendar of Nature

PROJECT HANDBOOK

Tracking seasons through trees
with SeasonWatch

seasonwatch

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INTRODUCTION

Have you ever noticed your parents talking about how the summers have become hotter and the monsoons more unpredictable? Or whether the mangoes in the market this year have been as sweet as last year's? Do you think that, maybe, the seasons and the plant life and the changing earth are somehow connected?

SeasonWatch is here to help you answer these and many such questions yourselves. Let us now meet a friend who will show us how – **Beeju!**

Hi friends, welcome to the SeasonWatch beat! I am Beeju, your friendly neighbourhood super-seedling! I will be your guide as we go through the different sections of this book together.

On this journey, we will learn about some simple ways in which we can become more familiar with our wonderful Mother Earth and how she changes her hues and patterns over the course of a year.

By the end of this book you will be able to:

- Start to befriend the wonderful trees growing around you.
- Learn how to identify and record the many species of trees around you.
- Understand the seasonal changes in the trees and what causes these patterns.
- Begin to connect with your new-found friends in forming a deep connection with Nature.

And hey! Impressing your friends a bit with your new-found passion and knowledge never hurts, does it? Let us start by understanding what the SeasonWatch project is. Read on to find out!

What is SeasonWatch?

- SeasonWatch is an India-wide project that was created to systematically monitor the **flowering, fruiting** and **leafing** of a select set of trees.
- The 'citizen scientists' of SeasonWatch who monitor and record are you and your friends!

First of all, you need to know that there are specific changes that occur in every species through the seasons. In order to document these seasonal cycles, the National Centre for Biological Sciences (NCBS) and Wipro Applying Thought in Schools (Wipro's educational initiatives wing) have partnered to create a national programme, called the **SeasonWatch** programme. What SeasonWatch does is ask volunteers to collect information on changes in the flowering, fruiting and leafing patterns in select species of trees.

You and your friends can begin SeasonWatching today. Children in schools that participate in SeasonWatch act as 'citizen scientists', collecting information on trees with the assistance of their teacher coordinators. In this way you get to be directly involved and have fun tracking your trees with your friends.

So, what has the SeasonWatch project been designed to find out?

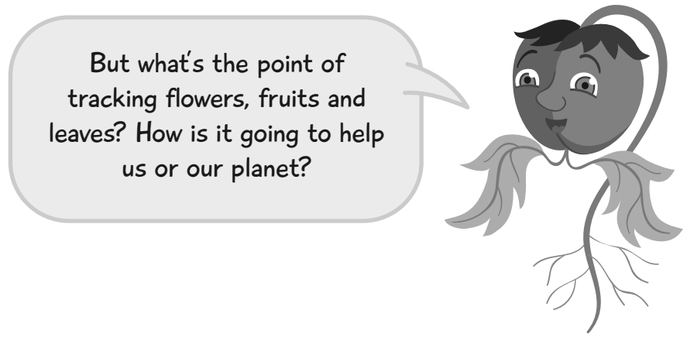
And, then what?

Here are a few examples of the questions you should be thinking about:

- How does the flowering time of Neem change across India?
- Is fruiting of Tamarind different in different parts of the country depending on rainfall in the previous year?
- Is year-to-year variation in flowering and fruiting time of Mango related to winter temperatures?

Once you and your friends have collected information over a period of time, the patterns will begin to appear. It will be possible to assess whether there are long-term changes in these seasonal cycles, as has been observed in the life cycles of European and North American plants.

Why SeasonWatch?



Well, as we noted in the beginning, all of us have observed how the annual temperature and rainfall patterns in the country are changing rapidly. Along with the seasons, the flowering and fruiting patterns of common trees like the Mango and Amaltas also appear to be changing every year. But these are just impressions and are not based on solid information from across the country.

With SeasonWatch we hope to fill this gap in with what we know. By systematically recording the changing patterns of plant life, and understanding how climate affects their lifecycle, we can work together with Nature to conserve her bounty. And watch with wonder as a long avenue of Gulmohar trees simultaneously comes into bloom.

Also, the seasonal cycles can be fascinating to observe, as well as reveal a whole new world of micro-cycles within them!

Here is an example of a chain of ecological interactions that depends on the seasonal resources trees provide:

- Caterpillars and monkeys eat fresh leaves; Bees and butterflies flit over the flowers for nectar and pollinate the flowers while they do so;
- Birds, squirrels, bats and people eat the fruit that grow from the pollinated flowers.

The study of seasonal cycles of flowering, fruiting, leafing, and so on is called **phenology** and we need to understand and study these cycles if we want to know how Nature is changing from year to year.

Which trees are monitored under SeasonWatch?

HOW TO START SEASONWATCH IN YOUR SCHOOL TODAY

Now that you know what SeasonWatch is, here is how you can get started. There are just four simple steps for you to follow. Call your friends together and get ready to have a lot of fun while helping to understand our planet better!

The Four Steps to SeasonWatch

Step 1. **Identify and select trees; assign to watchers**

Step 2. **Note down some main features of each tree**

Step 3. **Observe your trees**

Step 4. **Submit your observations**

Step 1. Identify and select trees; assign to watchers

a. Identify and select trees to monitor

As part of the SeasonWatch beat, you monitor the trees that are growing in your neighbourhood. This could mean trees that grow in and around your school compound or near your house. Think of all the years you have seen these acquaintances around without a proper introduction. With SeasonWatch they can now become your very own special friends. Doesn't that sound exciting? So how do you start?

Before you can become friends you have to know the names of your friends right? This is the way we go about it:

Take a long walk around your neighbourhood with your teacher and try to name as many of them as you can. This is easy enough with familiar trees in the list like Mango, Neem and Jamun but may be difficult for some of the less familiar ones like Red Silk Cotton Tree or the Indian Coral Tree. If you are unable to identify some trees, refer to the **Tree Identifiction Guide** on page 19 of this handbook with its description of the 25 trees in the list. With this guide, you should be able to identify those trees around you that are on the list.

However, if the handbook also does not help, try and ask a **botanist, nature-lover, forester or traditional healer** for help.

Now study the trees that you have identified and tick off the ones that appear in the list in the handbook. From this short-list, you may now select **mature, healthy and undamaged trees** for observation. By mature we mean a full-grown tree that has flowered for two or three years already.

tip

You may use the Tree Identification Guide to learn more about the trees and to identify the species that you don't already know about. You can also get trees identified by speaking with knowledgeable people in your locality.

tip

Keep in mind that if the trees are easy to access, they become easier to monitor repeatedly.

tip

It is good to monitor trees that are known to have flowered over more than one year, so that you are sure they are mature.

b. Give your trees sequence numbers and nicknames

Once a tree is identified, it needs to be numbered and given a nickname. The numbers are in the format **001, 002, 003** etc. The nicknames should be simple, easily recalled names with a description of their location. Good examples are ***'Mango tree near main gate'*** or ***'Neem tree opposite office'*** etc.

You may choose to monitor more than one individual tree of the **same species**, or individual trees of many **different species**, depending on which trees you have access to. It is not necessary to monitor trees of all the species listed in the book.

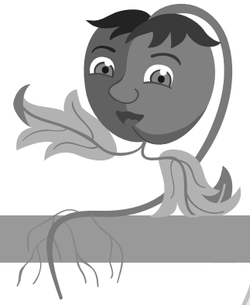
tip

You could monitor a cross-section of species as shown:
3 Mango, 2 Neem, 1 Babool, 1 Gulmohur, 1 Banyan and 3 Purple Bauhinias.

c. Assign watchers to trees

Once the trees are selected, identified and numbered, then your supervising teacher or coordinator will assign one or more child to each tree. One child may also cover more than one species of tree.

For instance, if there are 10 trees and 20 children, 2 children could be assigned to monitor each of the trees or if there are 30 trees and only 10 children, each child could be assigned 3 trees to monitor.



Step 2. Note the main features of your tree

Now that your tree is correctly identified and a number and nickname assigned, you may begin monitoring it. At this point you may want to note down the prominent features of the tree as this will help you in noticing any changes to it.

Here are a some useful sources of information that you will find on the **SeasonWatch website** and in the **Tree Identification Guide/FAQ** sections of this book:

- The **SeasonWatch website <www.seasonwatch.in/schools>**, where you add the trees to the list also provides a **Tree Observation Booklet** for download. This download has two forms that you will need in order to carry out your observations in an organised manner.

tip

The kind of features you need to note down are the height of the tree, its girth, the direction and angle of the slope that it is standing on etc.

- One of the forms from this booklet is the **Tree Details Form** which is also shown below. This displays the specific details of the tree that need to be recorded.
- However, you can also write down all these details in a **notebook** that you can use while monitoring a particular tree. Just remember that it would be best to have **separate books** for each of your trees.

Tree Details Form sample

Tree details:

- Tree species name: _____ *(Neem, Kathal, Aam etc.)*
- Tree number: _____ *(Start from 001 and continue adding 1 for each tree you monitor.)*
- Tree nickname: _____ *(Please make sure that you give a unique nickname for your trees. Choose simple and easy-to-remember nicknames like 'Neem near school gate'.)*
- Girth or circumference: _____ cm *(Use a flexible measuring tape or a piece of string. Select main trunk about 1.5 m or 4.5 feet from the ground and measure the girth in cm. If the tree branches below 1.5 m measure the girth below the lowest branch.)*
- Height: _____ m *(It is possible to get a good idea of the height by measuring the length of the shadow of the tree and comparing it to the length of the shadow of a meter rod or a stick of known height. You can apply the maths that you have studied to do this.)*
- Location type: School campus, Garden/park, Roadside, Forest, Grassland, Plantation, Farmland, Other *(Tick appropriate.)*
- Is the tree damaged: Yes / No
- Is fertilizer used on the tree: Yes / No
- Does someone water this tree: Yes / No
- How far is the nearest source of water: _____ m
- Estimate the approximate slope from the horizontal that the tree is on: _____ degrees
- If you stand on the slope that the tree is on and look downwards what is that approximate direction: _____ *(N / S / E / W / NE / SW / NW / SE)*

Step 3. Observe your trees

- **How often should you observe your trees?**

Once a week!

- **What is it that you need to observe?**

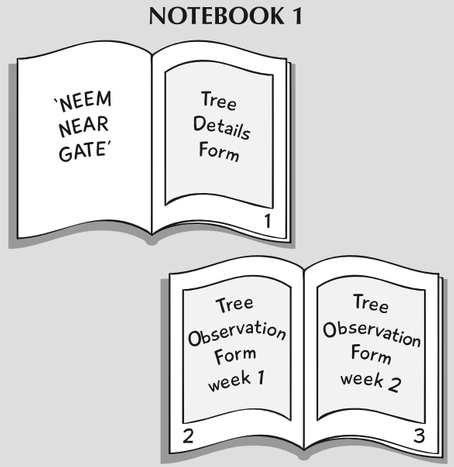
You need to visit your tree once a week and study the flowers, fruits and leaves on the trees. Observing the trees and noting down the state of each tree is the central component of SeasonWatch. This is dealt with in more detail on pages 13 and 14.

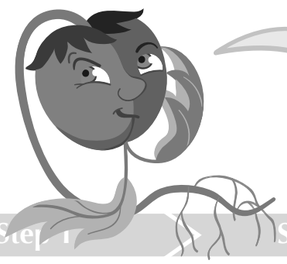
- **How do you record the details?**

Displayed on the opposite page is an illustration of the **Tree Observation Form**. This is the other form that is included in the **Tree Observation Booklet** and is **available for download from the SeasonWatch website**. However, to begin with you just need to copy this table into a notebook and start filling it in. We recommend that you have **separate observation books for each tree** you are monitoring. Keep these notebooks very carefully!

- **Here are the steps to record the information for different trees – an example.**

1. Let us suppose you have five trees that you have identified for monitoring.
2. You will need five different notebooks – one for each tree.
3. Each notebook would have 52 tree observation forms like the one shown on the opposite page. Why 52? One page for each week – which makes it 52 forms for 52 weeks of the year!





Hmmm... That translates to about 4 observations every month, and a busy fun-filled year for you and your friends! Now let us look at some details of the actual observation process.

Tree Observation Form sample

The date is entered here. You will have weekly updates for every tree.

You may enter the state of the leaves in this row. Note how these change over the weeks.

Note the number and condition of flowers and fruits here.

There is also a column for the creatures you see feasting on these yummy resources!

Date of observation

		None	Few	Many	Don't know	Did you see these eating
Leaves	Fresh					Caterpillar
	Mature					
Flowers	Bud					Bee, Butterfly
	Open					
Fruits	Unripe					Bird, Squirrel
	Ripe					

Name of observers

Submitted through the website on

How to observe your trees

Step A Carry the tree observation book with you when you observe your tree. You can easily make your own observation form as shown in the figure above.

Step B Observe your tree for at least five minutes every week. Make sure you enter your observations once a week.

Step C Fill in the date in the observation form. (See the sample form below: 10 January 2012 is written as 10/01/2012)

Step D Observe the leaves on the tree.

- Look separately for fresh and mature leaves. Fresh leaves are newly emerged leaves that have not yet reached the size or colour of mature leaves.
- Are there caterpillars eating the leaves? Circle if yes.
- Select **'None'** if you are sure that there are no fresh/mature leaves. Select **'Few'** if approximately 1/3rd (or less) of the branches have at least one fresh/mature leaf. Select **'Many'** if more than 1/3rd of the branches have at least one fresh/mature leaf. Select **'Don't know'** if you are unable to observe clearly or if you forgot to check the tree (which you should try not to do!).

Step E Observe the flowers on the tree.

- Look separately for buds and open flowers. Buds are flowers whose petals are not fully open.
- Note if there are bees or butterflies sipping nectar from them.
- In the sample observation shown in the figure the tree had no buds and had a few open flowers. And there were bees and butterflies on these flowers. The meaning of **'Few'** is the same as the one that is defined for leaves.

Date of observation 10/01/2012

		None	Few	Many	Don't know	Did you see these eating
Leaves	Fresh				✓	Caterpillar
	Mature		✓			
Flowers	Bud	✓				Bee, Butterfly
	Open		✓			
Fruits	Unripe		✓			Bird, Squirrel
	Ripe	✓				

Name of observers Arun

Submitted through the website on 12/01/2012

Step F Observe the fruits on the tree.

- Look separately for unripe and ripe fruit. Unripe fruits are those that have not reached the size and colour of ripe fruits.
- Note if there are birds or squirrels eating the fruits.
- In the sample observation in the figure there were a few unripe fruits and no ripe fruits, and therefore no birds or squirrels were seen eating fruits!

Displayed above is how the completed tree observation form might look like once you have recorded all the details and circled the appropriate options.

Step 4. Submit your observations

We have seen how the primary information for SeasonWatch is collected on a simple tree observation form. However, for the data to become available nationally for comparison and analysis it needs to be sent to a **central database** that is accessible by anyone. This is possible through the **SeasonWatch website <www.seasonwatch.in/schools>**. The website allows a user to add a tree to the listing and to enter the observation details to it. It also has all the material that is needed to start SeasonWatch.

You have faithfully identified, tracked and recorded the details of your trees. So what else do you need to do? Submit the data carefully through the SeasonWatch website!

Entering data on the SeasonWatch Website

1. Sign in

When you visit the SeasonWatch website **<www.seasonwatch.in/schools>** for the first time please register your school. You will need to select a **username** and **password**. Use this username and password to enter the website.

2. Enter details

You can then begin to:

a. Add your names to the student-watchers list.
b. Register the trees that your teacher has assigned to you.
c. Add observations to the trees that you and other students are going to monitor.

3. Navigation

The website is very intuitive to use:

- Each of the web pages has a **'?'** symbol at the top to help you navigate.
- You can download the SeasonWatch audio-visual presentation from the **'Learn more about SeasonWatch'** link on the login page. This will give you a clear demonstration of how you may make maximum use of the website.

Conclusion

I hope the journey through the SeasonWatch Steps was simple and fun for you. Are you excited about starting on this process with your friends? Are you clear about all the information that you need to do this? If you have answered yes to both the questions, let's move onward!

For further queries or help:

- **FAQ:** Refer to the FAQ section of this book for some frequently asked questions.
- **Online help:** You may contact the SeasonWatch team at schools@seasonwatch.in at any stage for help with the SeasonWatch process.
- The SeasonWatch team gives you access to an expert country-wide panel, made up of scientists and people studying biodiversity, to help you with your queries.

Join me as we take a giant step towards befriending Mother Nature! Do report back to us on our website – we would love to hear from you... Happy watching!

FREQUENTLY ASKED QUESTIONS

You may have many questions about all this. Please see if these Frequently Asked Questions answer them. Otherwise please write to **schools@seasonwatch.in**.

Q **Which schools can participate in SeasonWatch?**
A Any school can participate in SeasonWatch. All the details necessary to participate are right here in this handbook and on the website **<www.seasonwatch.in/schools>**.

Q **When should we start working on SeasonWatch?**
A There are no time limitations or starting dates. A school can start participating any time. How about today?

Q **Do we need to monitor every one of the 25 species of trees?**
A No. From the list of 25 trees, only select the trees that are easily accessible for observation around the school or your home.

Q **How many trees do we monitor?**
A As many as you can easily identify from the list of 25 trees. This may include more than one tree from a single species. For example, you may monitor three Neems by giving each one an unique identification number and nickname.

Q **We have no trees in the school compound so how do we go about monitoring trees?**
A The trees could be outside the school, or in or near your neighbourhood and home.

Q **How much time do we have to spend monitoring each tree?**
A At least five minutes per tree to look at it closely. This needs to be done only once a week so it takes only a little time to connect with your tree and observe it for any changes.

Q **How do we tell the difference between 'few' and 'many' fresh leaves?**
A The terms 'few' and 'many' have the same meanings that they have in English. However to avoid confusion, they are quantified according to a simple rule. If more than 1/3rd of the branches of the tree have even one fresh leaf each, then it is approximated as 'many'. If equal to or less than 1/3rd of the branches have even one fresh leaf each, then it is classified as 'few'. This same logic is applied to flowers and fruits as well.

Q **How do we monitor the trees during the holidays when the school is closed?**

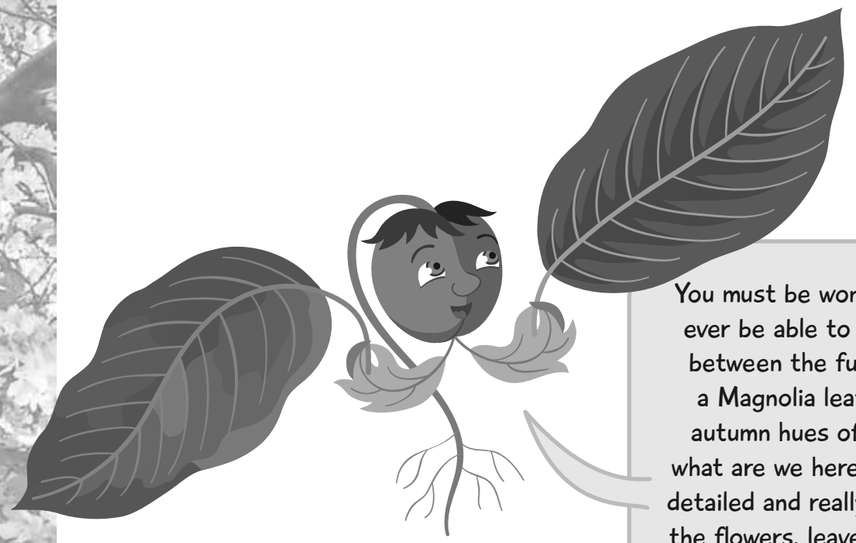
A It takes only five minutes, once a week to monitor each tree. This could be arranged with the coordination of children and/or the caretakers of the schools during the holidays. Anyone could learn how to do the weekly tree observations. The teacher-coordinators in schools need to come up with creative methods to ensure this happens. If it is absolutely impossible to monitor your trees during holidays, then don't worry: it's better to have the information from the rest of the year than to have no information at all!

Q **How do we monitor tall trees that we cannot see the top of? What if the new leaves or buds are coming first on top of the tree?**

A One way is to use a pair of binoculars if they are available. If this is not possible, then it is advisable to choose trees in which the top parts of the tree canopies are clearly visible.

Q **We have trees, but none of them are in the list of 25 species. How can we monitor these?**

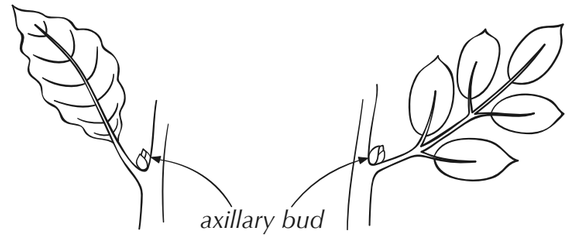
A If you are unable to find trees from among the 25 listed, you can choose from the larger list of about 100 species provided at **<www.seasonwatch.in/species.php>**. However, try your best to locate at least one tree of the focal 25 species in nearby areas.



You must be wondering how you will ever be able to tell the difference between the fuzzy underneath of a Magnolia leaf from the purple autumn hues of a Jarul leaf. Well, what are we here for? Read on for a detailed and really interesting look at the flowers, leaves and properties of each of the species on our list.

TREE IDENTIFICATION GUIDE

The trees being monitored in SeasonWatch are categorized by the overall shapes of their leaves to make the task of identifying the trees easy. Let us first look at the types of tree leaves we are interested in. You may already know that leaves are of two general types: simple and compound.



simple leaf *compound leaf*

Each leaf has a leaf bud called an 'axillary bud' at the base of the leaf-stalk.

If you look carefully at the leaves on the tree you will discover that a Jamun has simple leaves and the Tamarind has compound leaves. Now, if you look closely at the Neem leaves, you will discover that what look like small-toothed leaves are actually leaflets of a very large leaf.

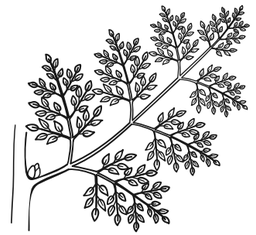
Now that you know a little bit more about leaves let us look at the types of arrangements of compound leaves. Try and remember the names because we will use them inside the Tree Identification Guide to identify leaves.

Odd pinnate

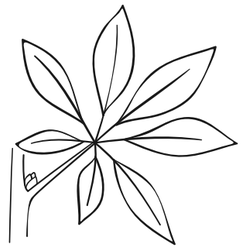
Even pinnate

Pinnate

Bipinnate



Tripinnate



Palmate

SeasonWatch trees by leaf type

All the trees that we are monitoring in SeasonWatch can be categorized under eight broad leaf types as given in the tables below.

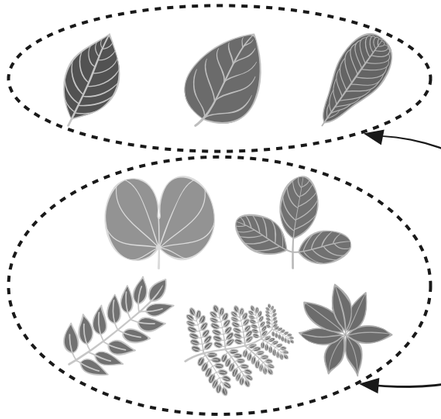
List of trees with simple leaves:

English name	Name in Hindi	Scientific name	Leaf type
Jackfruit	Kathal	*Artocarpus heterophyllus*	Broad in middle
Indian Blackberry	Jamun	*Syzygium cumini*	
Pride of India	Jarul	*Lagerstroemia speciosa*	
Indian Gooseberry	Amla	*Phyllanthus emblica*	
Campbell's Magnolia	Lal Champa	*Magnolia campbellii*	
Box Myrtle	Kaphal	*Myrica esculenta*	
Rhododendron	Burans	*Rhododendron arboreum*	
Himalayan Maple	Kainju	*Acer sterculiaceum*	Broad at base
Mango	Aam	*Mangifera indica*	
Banyan	Bargad	*Ficus benghalensis*	
Mast Tree	Ashok	*Polyalthia longifolia*	
Himalayan Cherry	Padam	*Prunus cerasoides*	
Devil's Tree	Saptaparni	*Alstonia scholaris*	Broad at tip

List of trees with compound leaves:

English name	Name in Hindi	Scientific name	Leaf type
Purple Bauhinia/Orchid Tree	Kaniar	*Bauhinia purpurea*	Two leaflets
Indian Coral Tree	Pangra/Mandara	*Erythrina indica*	Three leaflets
Flame of the Forest	Dhak/Palash	*Butea monosperma*	
Indian Laburnum	Amaltas	*Cassia fistula*	Pinnate/Feather compound
Pongam Tree/Indian Beech	Karanj	*Pongamia pinnata*	
Tamarind	Imli	*Tamarindus indica*	
Margosa	Neem	*Azadirachta indica*	
Walnut	Akhrot	*Juglans regia*	
Flame Tree	Gulmohur	*Delonix regia*	Bipinnate/Twice feathered
Egyptian Mimosa	Babool/Kikar	*Acacia nilotica*	
East Indian Walnut	Siris	*Albizia lebbeck*	
Red Silk Cotton Tree	Semul	*Bombax ceiba*	Palmate

How to use the Tree Identification Guide



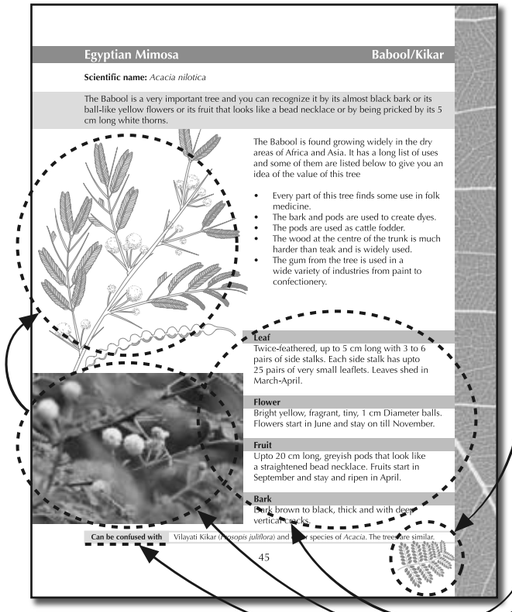
1. Broadly identify leaf type

Is it **simple** or **compound**?
(See the drawings on page 19)

2. Identify leaf shape

If simple:
Is it broad at the middle, base or tip?

If compound:
Does it have 2 leaflets, 3 leaflets or is it pinnate, bipinnate or palmate?
(See the tables on pages 20-21)



3. Match the leaf shape icon

Look for the matching **leaf shape icon** at the bottom of each page of the tree guide.
(This will narrow down your search)

4. Study the details

Read the information given in the tree guide pages under:
Leaves, Flowers, Fruits, Bark

Consult the **photographs, illustrations** and **descriptions**.

Ensure that you not confuse the tree with a species with similar features.

5. Confirm the identity of the tree

Eureka!

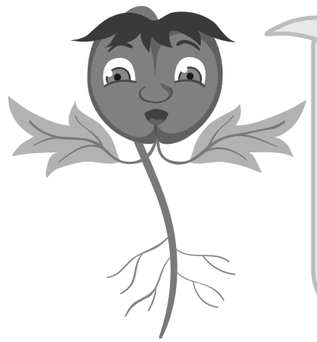
You are now ready for the description of each species of tree on our list. Let's forge ahead!

Jackfruit — Kathal

Scientific name: *Artocarpus heterophyllus*

This is a large tree that has the largest fruit in the world. It is native to the Western Ghats but is now cultivated in many other parts of the country.

The jackfruit tree has been known from the beginning of historical times. The Greek historian Theophrastus writing about 300 B.C. says "There is also another tree which is very large and has wonderfully sweet and large fruit: it is used for food by the sages of India..."



Did you know that the jackfruit is the largest edible fruit in the world? And did you know that the largest land mammal, the elephant, likes this fruit very much?

Leaf
15 to 25 cm leathery leaves, dark green above and light green below.

Flower
Tiny green coloured flowers in clusters. They usually appear in December-March. The male and female flowers are on different flower-heads. Mature male flowers are easy to identify because of the presence of yellowish pollen on them.

Fruit
Gigantic green coloured fruits that ripen during the rains in July-August.

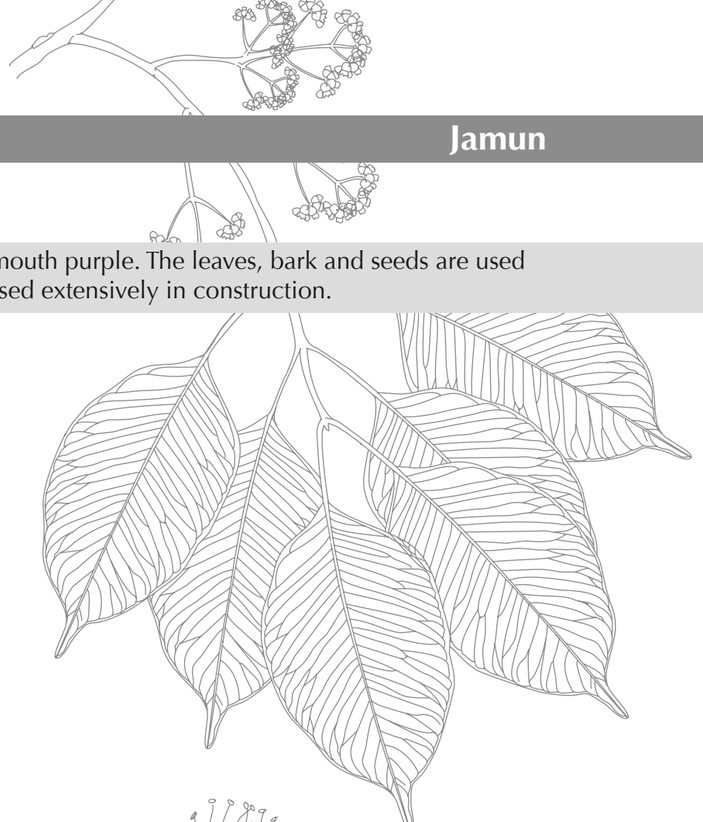
Bark
Thick, dark and deeply cracked.

Can be confused with Dheu (*Artocarpus lakoocha*). The tree and leaves are similar.

Indian Blackberry — Jamun

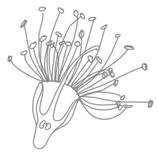
Scientific name: *Syzygium cumini*

The delicious fruits of this tree stain your mouth purple. The leaves, bark and seeds are used in traditional medicine; and the wood is used extensively in construction.



The most important fact, that you already know, about this tree is that you cannot eat the fruit without others finding out about it. Your mouth and tongue gets stained purple. So be careful when you are picking fruit from trees that belong to someone else. But eating this fruit is good because it is used in medicines to cure diabetes, dysentery and for strengthening the teeth and gums. The leaves, bark and seeds are also used to create traditional medicines.

The reddish-brown wood is heavy and is used extensively. This wood is water-resistant so finds use in outdoor and underwater structures.



Leaf

Smooth, leathery, 7-15 cm long, lower side lighter colour than top. The leaves fall from January to March and new leaves that are reddish-brown appear in February-March.

Flower

Tiny 12 mm wide white flowers in dense clusters appear in March-May.

Fruit

Round, deep purple, 1 to 5 cm long fruits. Green when unripe. Fruits ripen in June-August.

Bark

Bark is pale brown-grey with dark patches, cracked and flaking. The upper trunk tends to have smoother bark.

Can be confused with Rai Jamun (*Syzygium nervosum*). The trees are similar.

Pride of India — Jarul

Scientific name: *Lagerstroemia speciosa*

This is a very beautiful flowering tree with pink rose-like wrinkled flowers in large clusters. Maharashtra has honoured this tree by making its flower the state flower.

The bark and leaves of the tree have medicinal properties. The strong reddish-brown wood is valuable and is used for construction work, to make carts and wagons, boxes and panelling etc. and is also supposed to not spoil underwater. It is not often that a tree with beautiful flowers has valuable timber.

Leaf

Up to 26 cm long and similar to a Mango but broader and longer. Leaves shed in February-March turning red or purple before dropping. New leaves appear in April-May and are pink before turning green.

Flower

7 cm wide, pink flowers in large clusters. The flowers have 6 or 7 petals that are wrinkled and have wavy edges. Flowers appear in April-June.

Fruit

Hard, spherical 2 cm long fruits that turn from green to black as they ripen and split open to release the seed. Fruits ripen in November-January.

Bark

Pale brown, smooth or flaking thinly.

Can be confused with Bakli (*Lagerstroemia parviflora*). The trees are similar.

Indian Gooseberry — Amla

Scientific name: *Phyllanthus emblica*

This tree grows wild in forests in most parts of India. The fruit has large quantities of vitamin C, and is famously sour in taste.

The fruit contains 20 times the quantity of vitamin C as orange juice. In Ayurveda it is very highly respected as a miracle drug for many ailments. It is one of the three components of the 'triphala'. Do you want to know what ailments Amla is supposed to cure? OK here is the list. Jaundice, stomach disorders, coughs, dyspepsia, dysentery, enlarged liver, biliousness, haemorrhoids…The list goes on and on with more and more complicated names. Isn't that a miracle fruit then?

Do you know why the sourness of the Amla turns to sweetness in your mouth? This is because of a chemical reaction that the Amla juice undergoes when it mixes with the saliva in your mouth.

Leaf

Only 8-12 mm long. They may look like tamarind leaflets but in amla these are very small individual simple leaves. The leaves shed in November-December and the tree is leafless between February-March.

Flower

Small pink or greenish flowers in clusters below the leaves. Flowers appear in March-May when they are visited by swarms of bees.

Fruit

2-4 cm diameter spherical, smooth, yellow-green and extremely sour. Fruits ripen in November-February.

Bark

Thin, grey, flaking off to show yellow-brown underbark.

Campbell's Magnolia — Lal Champa

Scientific name: *Magnolia campbellii*

A large Himalayan tree with spectacular flowers that is found eastwards of Nepal and grows in elevations between 2,000 and 3,000 m.

Magnolias are generally renowned for their magnificent flowers and Campbell's magnolia is widely considered to be one of the finest species. One look at its huge and colourful flowers tells us why. This native of the Himalayas has spectacular flowers that bloom in early spring before its leaves even appear. Although it is cultivated as an ornamental tree, successful flowering happens usually in areas with mild climate with no late spring frosts.

Young trees take a long time to reach flowering age and need deep, moist soil and a mild, sheltered site.

Leaf

The leaves are 10-23 cm (rarely to 33 cm) long and 4.5-10 cm (rarely to 14 cm) broad, fuzzy underneath and with a pointy tip.

Flower

The flowers are very large, 15-25 cm diameter, with 12-16 petals, which vary from white to dark pink. They appear very early, before the leaves, opening from late winter to early spring. After opening, the innermost petals remain erect while the others spread widely. This arrangement may shelter the stamens and stigmas from rain, snow, and other harsh environmental conditions common during their very early flowering period.

Fruit

The fruits are cylindrical spikes 15-20 cm long, with red seeds. Seeds ripen in July-August.

Bark

Whitish, light-grey bark.

Can be confused with Several species of *Rhododendron*. The leaves are similar.

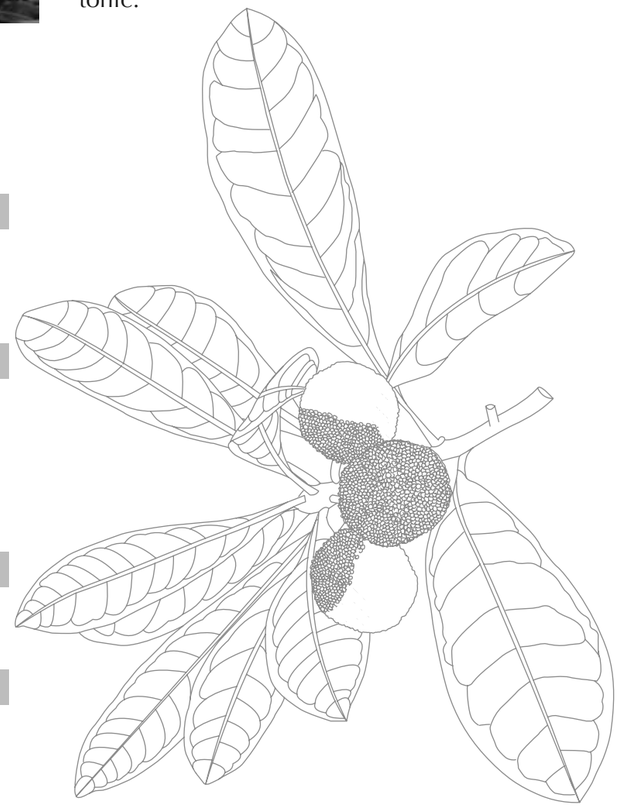
Box Myrtle

Kaphal

Scientific name: *Myrica esculenta*

Kaphal is an evergreen tree found throughout the mid-Himalayas, starting from about 1,300 m and going up to about 2,100 m.

The tree yields a fleshy red fruit which is one of the tastiest wild fruits of the Himalayan region. This fruit tree carries a lot of commercial importance and every year its fruits worth thousands of rupees are collected by the locals from the forests and sold in different towns of Himachal Pradesh and Uttarakhand. The bark of kaphal is said to possess many medicinal properties and the oil from the flowers is used as a tonic.



Leaf

Crowded towards the end of branches, 9 cm long, 3 cm broad; lower surface, pale green; upper surface, dark green.

Flower

The flowers are reddish to white in colour. Female flowers are slim, cylindrical and about 4 cm long bearing about 25 flowers. Male flowers about 3.5 cm long with about 12 stamens. Flowers are seen in February-April.

Fruit

1 cm diameter, red, juicy, ball-like fruits appear in May.

Bark

Light brown to black.

Rhododendron

Burans

Scientific name: *Rhododendron arboreum*

This small evergreen tree is widely distributed across the Himalayas, and is one of the most famous species of rhododendron.

It occurs between 1,500 and 3,500 m elevation, mostly alongside oak and pine. It is impossible to miss its blood-red blooms in the flowering season.

The flowers are used to make a deliciously flavoured squash (burans ka sharbat), which is a refreshing drink during the summers. Juice of the flowers is also traditionally used as a medicine for upset stomach. Rhododendron flowers are also significant culturally, as you'll discover when you visit any temple in the Himalayas.

Leaf

Leathery, 10-20 cm long, bunched at the ends of branches. Upper surface glossy and dark green. Underside has fine hairs and is lighter coloured than top. The leaves remain throughout the year.

Flower

Crimson-red, bell-shaped flowers about 50 mm in length. Flowers occur in dense clusters 10-13 cm across, consisting of 15-20 individuals. Blooming in March-May.

Fruit

Capsules, about 3 cm long, ribbed and with 10 chambers. Present during autumn and winter.

Bark

Reddish-brown and peels off in small flakes.

Can be confused with *Magnolia*. The leaves are similar. Other species of *Rhododendron*. The trees are similar.

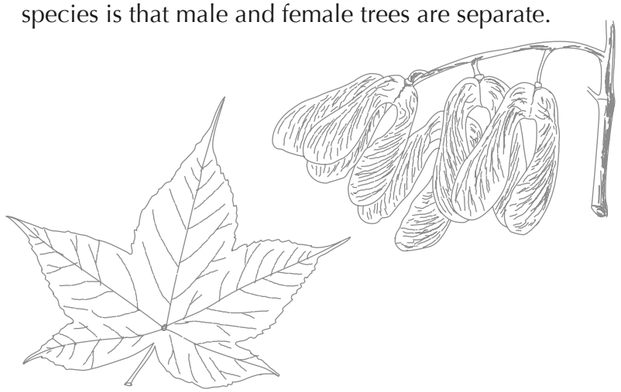
Himalayan Maple

Kainju

Scientific name: *Acer sterculiaceum*

This fairly large deciduous tree is found across the Himalayas from Kashmir to Bhutan, growing at elevations between 2,100 and 3,600 m. The leaves are used for fodder.

It is great fun to watch its winged seeds spinning furiously when they fall, looking like miniature helicopters! Another interesting feature of this species is that male and female trees are separate.



Leaf

Deep green in colour and 10-15 cm across and divided into five (sometimes three) distinct lobes. Leaf margin is irregularly serrated. Young leaves have silky hairs on the lower surface. The leaves are shed during autumn.

Flower

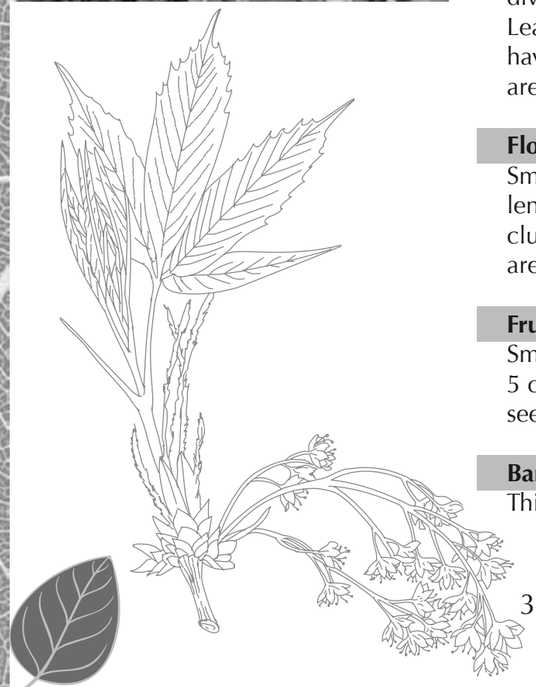
Small yellowish flowers of about 50 mm in length, having five petals. Flowers occur in long clusters, appearing before new leaves. Flowers are seen in March-April.

Fruit

Small nuts with prominent 'wings' totally about 5 cm long, and pale brown in colour. Fruits are seen in July-September.

Bark

Thin, grey and fairly smooth.



Mango

Aam

Scientific name: *Mangifera indica*

Who doesn't know the mango tree, famed in folk stories and for the flavour of its delectable fruit? There are many hundreds of varieties of mango in India.

Someone wise once said that the Mango is the king of fruits and we definitely agree. Did you know that its botanical name 'indica' indicates the world over that this wonderful fruit is an Indian fruit. And did you also know that its English name 'Mango' probably comes from the Tamil and Malayalam word 'maangai'?

The wild mango has a lot of fibre which can come in the way of enjoying the fruit. The fibre-less and tasty varieties in India today are the result of centuries of cultivation. Some people estimate that there are over 500 varieties of mangoes grown in India. How many have you tasted?

One of the largest Mango trees in India is in Chandigarh. It will take 30 children, 5 feet tall each, to hold hands and span the tree trunk. If the sun is overhead it will take 100 children to go around the shadow of its crown. And it is supposed to give 10,000 to 25,000 fruits every year!

Does that sound unbelievable? Why don't you visit Chandigarh when the fruits of this tree are ripening, to count and eat them for yourself?

Leaf

Young leaves are pink or purple and hang limply. Turn deep green gradually.

Flower

Tiny, fragrant yellowish green flowers up to 6,000 in a cluster. Flowers are seen in January-April.

Fruit

Green when unripe and various colours from yellow to red when ripe. Wait till April-July for the fruits, eat one and you can immediately identify this tree.

Bark

Grey-brown and rough and with shallow cracks.

Banyan

Bargad

Scientific name: *Ficus benghalensis*

The banyan is a nearly evergreen, large, spreading tree with prop-roots coming down from its branches. It is found growing wild in forests all over India.

The banyan often starts life as a small innocent plant coming up on another tree. As it grows taking nourishment from the host tree it slowly reaches down to the ground and takes root there and like a very slow moving python it 'strangles' and kills the host tree.

The largest banyan in the world is a 700-year old tree that grows in a village in Andhra Pradesh. To give you an idea about its sheer size – at a distance this banyan looks like an entire forest. 20,000 people are supposed to be able to stand under its shade comfortably. Wouldn't you like to try joining these 20,000 people?

Leaf

Leathery, 14 cm long, broadly oval, deep green above and paler below. The new leaves appearing in April-May are a beautiful pink.

Flower

The flowers grow inside the banyan figs. This is a peculiarity shared by all fig trees. To give you an idea the peepal and goolar are also fig trees and do not have visible flowers.

Fruit

2 cm balls that have no stalks and grow in pairs. They turn a deep red when ripe usually in April-May.

Bark

Grey and silvery and smooth.

Can be confused with Several other species of *Ficus*. The trees are similar.

Mast Tree

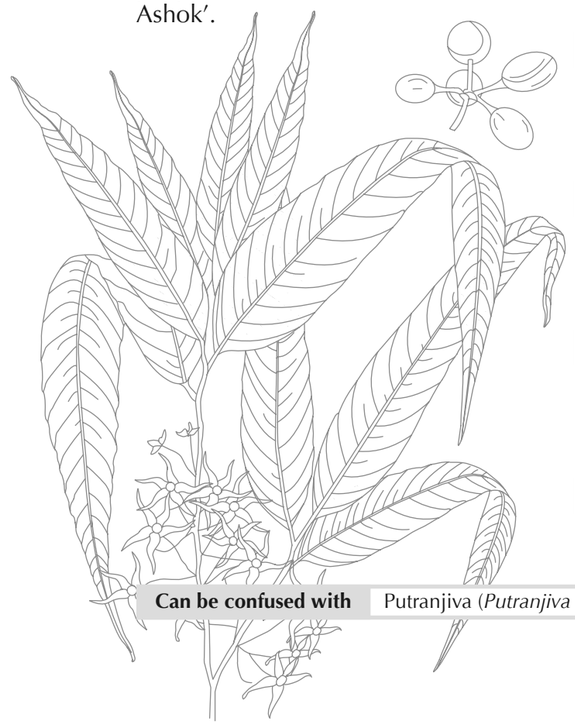
Ashok

Scientific name: *Polyalthia longifolia*

The Ashok is a tall, nearly evergreen tree usually cultivated in a narrow conical form. It can be identified by its long, narrow, glossy leaves with wavy edges.

The leaves of this tree are very easy to identify but the flowers and fruits are usually very well hidden amongst the leaves and difficult to see. The fruit is very well liked by bats and birds and monkeys, and the bark is used in medicinal preparations.

There is a small confusion regarding the name of this tree. Although it is called the Ashok in many parts of our country, the small beautiful tree with red flowers, *Saraca asoka*, is also known as the Ashoka tree in many other parts of the country. The Ashoka tree under which Sita sat in Ravana's Lanka is the *Saraca asoka*. Some people call the Mast Tree the 'False Ashok'.



Leaf

Narrow, glossy and up to 28 cm long with wavy edges. New leaves appear in March-April and again during the rainy season.

Flower

Star shaped, pale greenish yellow, with 6 narrow, up to 2.5 cm long petals. Flowers are seen in March-April for a short time.

Fruit

Grape sized fruits in clusters of 8-20 that are shiny and green turning deep purple as they ripen in June-August.

Bark

Grey-brown that becomes cracked as the tree grows old.

Can be confused with Putranjiva (*Putranjiva roxburghii*). The leaves are similar.

Himalayan Cherry

Padam

Scientific name: *Prunus cerasoides*

A Himalayan tree found at elevations between 750 and 2,400 m. Beautiful to look at when in full bloom and the fruit is good to eat when ripe.

This tree has a variety of uses. Its fruit, gum and seeds can be eaten. The fruits and the leaves give a dark green dye. Seeds can be used in the manufacture of necklaces and rosaries. The wood is hard, strong, durable and branches are used as walking sticks.

Leaf

The older leaves turn yellow and fall in October-December; the new flush appears before the old ones have all fallen and remains fresh and green through the winter.

Flower

Pinkish-white flowers are seen in autumn and winter, October-December, though it occasionally flowers partially out of season (e.g. in July).

Fruit

The fruits are small, yellow, ovoid, 1-1.5 cm long, turning red as they ripen. Fruits ripen chiefly in April-June.

Bark

Greyish brown, smooth, shining, peeling off in thin horizontal strips.

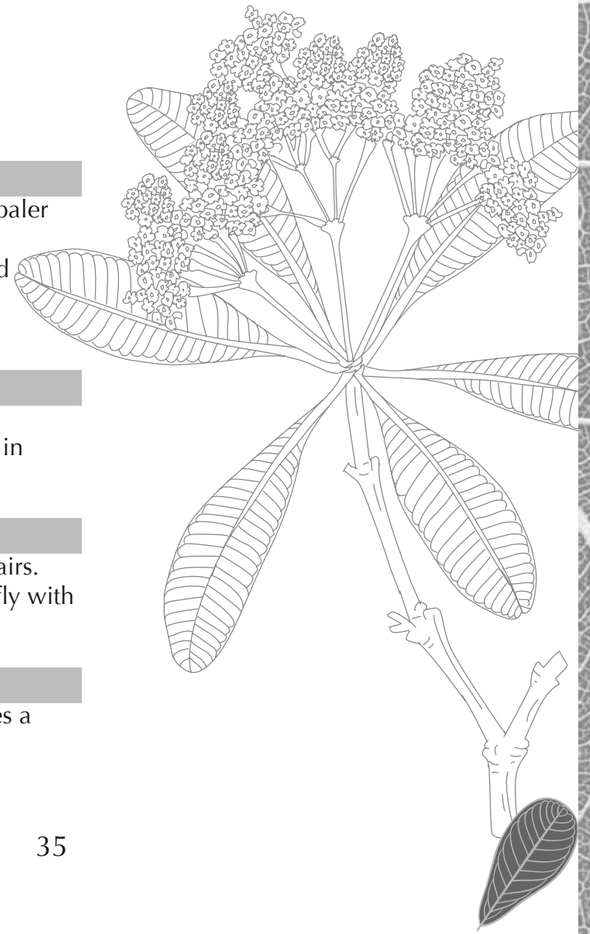
Devil's Tree

Saptaparni

Scientific name: *Alstonia scholaris*

The name *'scholaris'* has come because in olden times the slates that children used were made from the soft wood of this tree.

The name 'Devil's tree' in English and 'shaitan ka jhad' in Hindi have probably come because this tree is shunned by animals because of its poisonous nature. However, 'ditabark', a bitter drug that comes from its bark is used to treat a wide range of illnesses ranging from fever to asthma to diarrhoea to dysentery.



Leaf

Up to 24 cm long, dark green above and paler below. 4-8 leaves around a stem at the same height. New leaves appear and stand out against old leaves in March-April and again during the rainy season.

Flower

Small, fragrant, greenish white flowers in tight clusters at ends of branches are seen in December-March.

Fruit

Up to 40 cm long thin bean-like fruit in pairs. The seeds have long hairs that help them fly with the wind. Fruits appear in May-July.

Bark

Bark greyish outside, yellow inside. Exudes a milky latex when cut.

Purple Bauhinia/Orchid Tree — Kaniar

Scientific name: *Bauhinia purpurea*

There are many types of Bauhinias and their leaves and flowers look similar. It is relatively easy to tell the Purple Bauhinia apart because the petals in its flower do not overlap.

The pods of this tree burst open with a loud sound and the seeds get scattered up to 6 m away. The outer covers of the pods become twisted after the seeds are thrown out. You have to be careful that this gun doesn't shoot its bullets at you.

Leaf

About 15 cm long 'camel's hoof' shaped, usually broader than its length. The twin leaflets are well rounded at the apex and are joined in the middle. Leaves shed in April and are quickly renewed. New leaves also appear in the rainy season.

Flower

Pink or light violet flowers that appear in October-December. The flower has 5 narrow petals. The central petal is lighter than the others.

Fruit

Up to 28 cm long in flat pods. The pods split open with a lot of force when ripe in March-April and scatter their seeds up to 6 m away.

Bark

Ash coloured, with a silvery surface which is somewhat smooth.

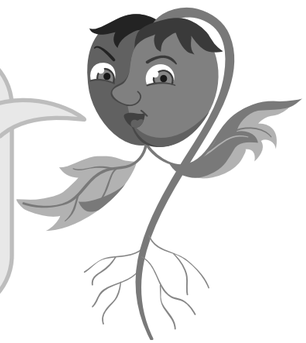
Can be confused with Kachnar (*Bauhinia variegata*). The leaves and flowers are similar.

Indian Coral Tree — Pangra/Mandara

Scientific name: *Erythrina indica*

A beautiful ornamental tree that is planted in gardens and parks, the flowers of this tree are bright red and striking.

A variety of birds are visitors to the coral tree when it is in flower. Rosy starlings, babblers, drongos, tailor birds, bulbuls, sunbirds – all of them like to sip the sweet nectar from the flowers. When you look at this tree the next time perhaps you can notice who is visiting in your neighbourhood.



A way to clearly identify this tree is that the flowers appear when the tree is completely bare of leaves.

Leaf

3 broad leaflets, with pointed tips and the central one on a very long stalk. Leaves shed in February and the tree is bare till after the flowers in April.

Flower

Brilliant red, 4-5 cm long in dense clusters. 5 unequal petals with the central petal nearly 3 cm long. Flowering in late March or early April.

Fruit

Up to 30 cm long, cylindrical, black when ripe. Fruits ripen in May-July.

Bark

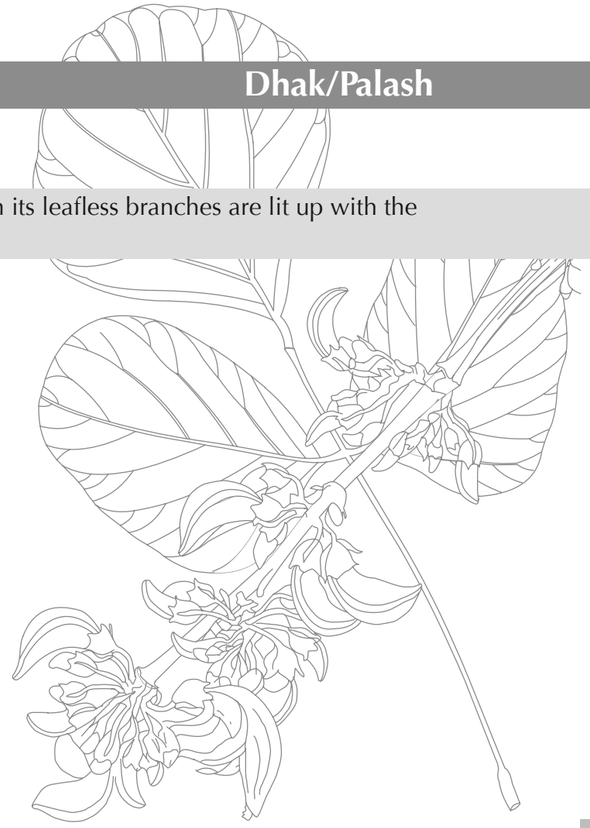
Smooth, greenish-grey with vertical lines of green.

Can be confused with Flame of the Forest (*Butea monosperma*). The leaves and flowers are similar.

Flame of the Forest

Dhak/Palash

Scientific name: *Butea monosperma*



This tree with large leaves is impossible to miss when its leafless branches are lit up with the orange fire of its flowers.

The resin of this tree is used as medicine, the leathery leaves are stitched together to form leaf plates and the flowers are used to make colours for Holi.

In 1757 this tree got mixed up with our history text books because of Robert Clive having defeated Siraj-ud-daulah at the battle of Plassey to establish British rule in India for the next 200 years. (Yes, the name 'Palashi', as the place is known today, comes from the Palash trees that must have existed there. Although the British, who must have found Indian languages as difficult as they found India, could only pronounce it as Plassey).

Leaf

3 large leathery leaflets at the end of a long stalk. The middle leaflet has a slightly different shape from the side leaflets and often points in a different direction. Leaves shed in February-March and new leaves appear in April-May.

Flower

The orange flowers appear in clusters at the top of the tree. The flowers have five petals that are velvety outside and two of these petals join together to form a claw. The dark buds appear in January but the flowers open in March-April.

Fruit

The 15-20 cm long pods have a single seed. They turn brown and papery on the tree before being scattered by wind. Fruits ripen before the rains.

Bark

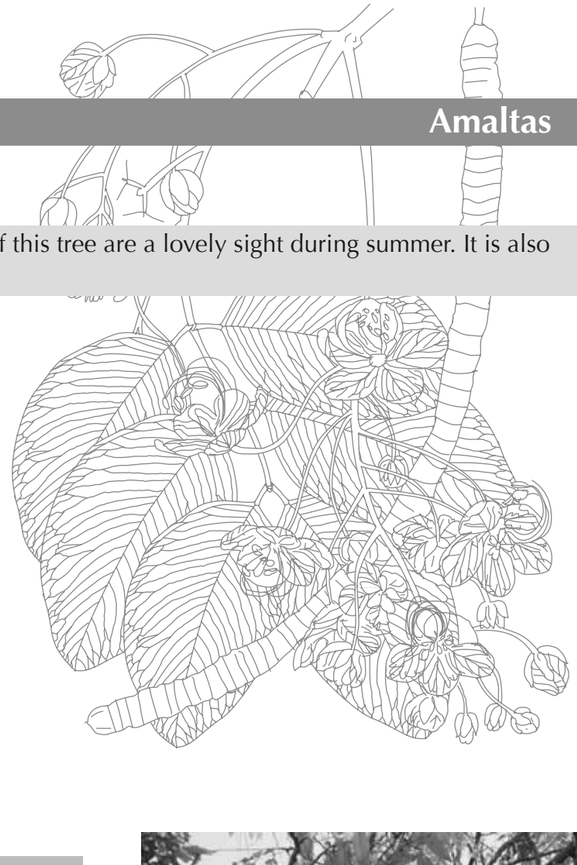
Light brown and rough. A red resin flows out of cuts and hardens into a gum.

Can be confused with Indian Coral Tree (*Erythrina indica*). The leaves and flowers are similar.

Indian Laburnum

Amaltas

Scientific name: *Cassia fistula*



The beautiful yellow showers of flowers of this tree are a lovely sight during summer. It is also the state flower of Kerala.

You know that the fruit of the Amaltas falls on the ground without opening? So how do the seeds get dispersed and how does a new tree come up? In our cities the gardeners take out the seeds and plant them and they take special care so that the seeds germinate and a new tree comes up. But this tree also grows wild in the forests without any gardeners. A scientist discovered in the early 1900's that the only seeds that germinated in the forest were the ones that passed through the stomachs of animals like jackals and monkeys and bears. This means that if the seed fell on the forest floor without an animal eating it, the seed wouldn't germinate.

Leaf

Up to 45 cm long with 4-8 pairs of large leaflets. New leaflets are brownish in colour and appear in May. The tree is leafless between March-May.

Flower

Fragant, bright yellow, in drooping clusters up to 60 cm long. The petals are not all of the same size. The flowering happens in April-July.

Fruit

Long cylindrical pipes up to 60 cm long. Ripe pods are black and fall to the ground without opening. Fruits ripen in December-April.

Bark

Smooth yellowish when young, becoming rough with age and becoming dark grey with plates that fall off.

Pongam Tree/Indian Beech

Karanj

Scientific name: *Pongamia pinnata*

The seeds, root, bark, leaves and flowers all have various uses in traditional medicine so this is a valuable tree.

A reddish oil extracted from the seeds called karanj oil is used to light lamps or as a lubricant for engines.

The young leaves of the tree look very beautiful but the older leaves get badly disfigured by worms that eat these leaves.

Leaf

2-3 pairs of oval, pointed at the tip leaflets with a single larger leaflet at the end. The leaflets are shiny on top and dull below.

Flower

White or pinkish in short drooping clusters. Has a big petal like a hood over 4 smaller petals folded together. Flowers are seen in April-June.

Fruit

Woody, flattened, oval pods about 5 cm long with a pointed beak at the end. The green pods ripen to yellow or greyish brown colours. The pods ripen in March-May of the year after the flowering.

Bark

Medium grey and not rough.

Tamarind

Imli

Scientific name: *Tamarindus indica*

This large tree with very small but dense leaves is believed to have come to India from East Africa many centuries ago. Today it is cultivated all over the warm parts of our country and appears like a local Indian tree.

You may be eating imli every day in your food but it is also used in many traditional medicines and in dyes. And as you may know the wood is very hard so it is not often used as timber.

Leaf

New leaves are light green coloured and appear in mid-March. The leaf is 7-15 cm long with up to 20 pairs of small leaflets each up to 25 mm long. They usually 'close' at night. Leaves shed in February.

Flower

15 mm wide, pale yellow with red veins and with 3 prominent petals. The buds are pink in colour. Flowering usually happens in April- June.

Fruit

Up to 20 cm long, flat and slightly curved. Green at first turning brown and brittle as they ripen. Children love eating these fruits that ripen in winter.

Bark

Rough, dark brown or grey-brown bark that is lightly folded and flaking in patches.

Margosa

Neem

Scientific name: *Azadirachta indica*

The evergreen Neem trees are commonly planted as shade trees along streets but most parts of the tree also have very high medicinal value.

You may have chewed on a neem stick to brush your teeth sometime but do you have any idea about the range of things this miracle tree is used for? Here is a small sample to show you the variety:

a. Neem oil is used in soaps.
b. The flowers are eaten in South India.
c. Extracts are used as a very effective natural pesticide.
d. Ayurveda and Unani systems of medicine use most parts of the tree for medicines.
e. It is drought resistant and gives its welcome shade in very dry areas.
And the list goes on and on...

Leaf

4-8 pairs of dark green, curved, toothed leaflets with a single leaflet at the tip. Leaves fall in March and are renewed in April.

Flower

Tiny, white flowers with 5 narrow, spreading petals and the stamens fused together. Flowers appear in April.

Fruit

2 cm long with a soft pulp. Yellow when they ripen in July.

Bark

Rough, dark grey-brown with vertical cracks.

Can be confused with Persian Lilac (*Melia azadirach*.). The trees and leaves are similar.

Walnut

Akhrot

Scientific name: *Juglans regia*

A Himalayan tree that in forests becomes 25-30 m tall with a clear long trunk and grows naturally at elevations between 1,400 and 3,500 m.

The tree is more common in Kashmir than it is farther east, where, though common locally, it is not so widely distributed. It is extensively cultivated for fruit throughout the Himalayas and in the Khasi hills.

The Walnut is cultivated for its nut that is eaten raw or for its richly flavoured oil. The heartwood is heavy, hard and is prized by fine woodworkers for its durability and luster. It is used for high-end flooring, guitars, furniture, knobs and handles.

Leaf

The leaves are 25-40 cm long with 5-9 leaflets with one terminal leaflet. The leaflets at the apex are much larger than the leaflets at the base. The leaves fall during September-November. New leaves appear in March-April.

Flower

The male and female flowers are different. The slim, drooping, cylindrical male flowers are green, 5-10 cm long, arising singly or in pairs. The green female flowers occur singly or up to four together at the apex of the young shoots. The flowers appear with the new leaves in March-April.

Fruit

The fruits are green, ovoid, about 5 cm long, with a fleshy husk and a corrugated nut. Fruits ripen in September but sometimes as early as July.

Bark

Bark of older tree is dark grey with deep vertical parallel cracks; while that of young trees is light grey with vertical striations.

Flame Tree — Gulmohur

Scientific name: *Delonix regia*

The Gulmohur, the tree with the beautiful red flowers we see so often, is grown all over India but is a native of the forests of Madagascar. Do you remember where that is?

One specimen of this tree that came out of Madagascar in 1828 was planted in Mauritius and then slowly spread to all the warm parts of the world. It came to Bombay just a few years before the great Indian rebellion of 1857.

Leaf

10-20 pairs of side stalks with up to 30 pairs of leaves on each one. Leaves start to yellow in November and the tree is bare of leaves between February-March. New leaves appear in early April.

Flower

Up to 12 cm across with 5 petals – 4 red and the largest one whitish with red and yellow marks. Flowering begins in late April and finishes by June but sometimes stays during the rainy season also.

Fruit

Flat, woody, dark pods up to 60 cm long. The fruits stay on the tree for many months, often till March-April.

Bark

Light brown and not rough.

Can be confused with Jacaranda (*Jacaranda mimosaefolia*). The leaves are similar.

Egyptian Mimosa — Babool/Kikar

Scientific name: *Acacia nilotica*

The Babool is a very important tree and you can recognize it by its almost black bark or its ball-like yellow flowers or its fruit that looks like a bead necklace or by being pricked by its 5 cm long white thorns.

The Babool is found growing widely in the dry areas of Africa and Asia. It has a long list of uses and some of them are listed below to give you an idea of the value of this tree

- Every part of this tree finds some use in folk medicine.
- The bark and pods are used to create dyes.
- The pods are used as cattle fodder.
- The wood at the centre of the trunk is much harder than teak and is widely used.
- The gum from the tree is used in a wide variety of industries from paint to confectionery.

Leaf

Twice-feathered, up to 5 cm long with 3 to 6 pairs of side stalks. Each side stalk has upto 25 pairs of very small leaflets. Leaves shed in March-April.

Flower

Bright yellow, fragrant, tiny, 1 cm diameter balls. Flowers start in June and stay on till November.

Fruit

Upto 20 cm long, greyish pods that look like a straightened bead necklace. Fruits start in September and stay and ripen in April.

Bark

Dark brown to black, thick and with deep vertical cracks.

Can be confused with Vilayati Kikar (*Prosopis juliflora*) and other species of *Acacia*. The trees are similar.

East Indian Walnut — Siris

Scientific name: *Albizia lebbeck*

If you see a bare looking tree full of straw coloured 20-30 cm long flat pods that make a clattering sound in the slightest breeze you may probably be looking at a Siris.

This quick-growing tree is used as a shade-giving avenue tree in many places and it has fragrant yellow-green flowers that look like powder puffs. The twice-feathered leaves make good fodder for cattle and the flowers are a good store of nectar. The tree has shallow roots and it is known to get uprooted in strong winds.

Leaf

Twice-feathered, up to 25 cm long with 2 to 4 pairs of side stalks. Each side stalk has 3 to 10 pairs of 5 cm long leaflets. Leaves start dropping in January and the tree is bare until March.

Flower

Powder puff flowers with long silky stamens that are light yellow with green tips. Flowers are seen in April-May and once more after the rains.

Fruit

20-30 cm long flat straw coloured pods which make a loud noise in the wind. The papery pod ripples over the seeds in a distinctive manner. Pods turn yellow in November and stay on the tree till March.

Bark

Brown or dark brown or grey and rough.

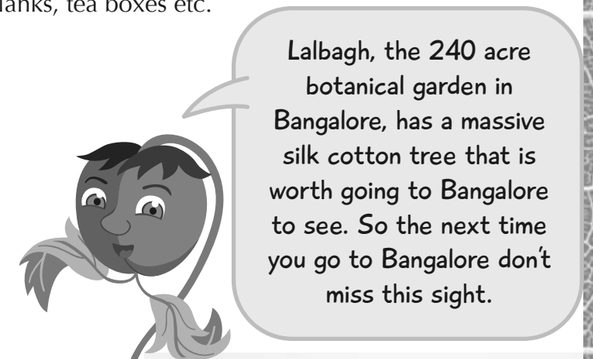
Can be confused with Safed Siris (*Albizia procera*). The leaves are similar.

Red Silk Cotton Tree — Semul

Scientific name: *Bombax ceiba*

This tree has branches coming out in all directions and has many levels at which these branches come out like the ribs of many umbrellas one on top of the other.

The large flowers that fall on the forest floor are eaten with relish by wild animals. The bark and roots are used as a tonic. The soft cotton that flies out of the open pods is used to stuff pillows and quilts. The soft wood is not very strong but is used to create wooden planks, tea boxes etc.



Leaf

Up to 25 cm long, 5-7 leaflets with pointed tips at the end of a common leaf stalk. The tree is bare in February-March and new leaves appear in late March to early April.

Flower

Large red or yellow flowers with 5 petals bent backwards. Flowers are seen in February-March.

Fruit

Woody capsules up to 18 cm long that burst open releasing silky fibres in May.

Bark

Ashy and the lower parts have small conical thorns.

Can be confused with Kapok (*Ceiba pentandra*). The trees are similar.

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And there you are! At the end of this little book and the beginning of a wonderful new journey. Get to know our green friends and get involved! Together, let's make a difference to our understanding and love for the natural world.