Not a single dry leaf should be burnt in India

How to manage dry leaves

Aditi Deodhar , Brown Leaf

BROWN LEAF

About Brown Leaf

Simply put, Brown Leaf is the forum for eco-friendly management of dry leaves.

Strategy for Brown Leaf is three fold..

MULCH: Mimic the forest floor, use dry leaves to protect the soil, conserve water.

COMPOST: Recycle the nutrients and follow soil-to-soil principle of nature.

DONATE: Give away the leaves to the one who wants them for above two activities, mulching and composting.

Read our story here, www.brownleaf.org

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About this document

Do you know what is most challenging about composting?
GETTING STARTED !!

Yes, Believe me ☺

Hence, we decided we will help people get started. We will reach out to every person across India who wants to learn composting and other options.

Yes, teaching composting ONLINE is a little counter-intuitive. But we felt we will not know the result unless we try it.

Though mode of teaching is little unconventional for the topic, this document covers everything you will need for successful compost project.

A word of Advice

Usually in a house/ society, only 1-2 members are keen on composting. Rest are either against or indifferent.

Hence, first success is vital for the person who wishes to do composting.

Once others see the ready compost, they will support the activity in future.

To help you achieve first success, we have provided you proven, tried and tested methods. All the methods here are implemented by Brown Leaf members and we know they work.

First, follow the method as it is, achieve first successful harvest and then feel free to experiment.

Introduction

Rains are over. There is a slight chill in the atmosphere. Winter is just around the corner.

Soon, sweaters, scarves, blankets will come out of the wardrobe, after a long break. It is a healthy season. Eat and be happy. Ideal one to go for a jog in the morning, were sun is yet to come up, slight mist in the air. Everything is happy and dandy.

And suddenly, in blissful morning air, there is acrid smoke. The smoke is coming from dry leaves getting burnt.

Come winter, and leaf fall starts. In a city, it is a major challenge. What to do with all those leaves?

Burning them off seems convenient, easy, isn't it?

Oh, it is not so. Why burning is not a good strategy, we will discuss later in this guide.

First let's discuss, why leaves fall, in the first place.

Why trees shed leaves

Ready for some botany? Don't worry, nothing too complicated ☺.

Let's simplify and understand.

Trees that shed leaves for some time in a year are called "deciduous" trees.

Deciduous word comes from the Latin word, Decidere. It means "to fall off" or "to fall down".

Water absorbed by the roots of the plant is distributed to all parts of the plant and gets evaporated through leaves. It is called transpiration.

Leaves have pores on them called stomata. Stomata open and water is let out.

Why trees shed leaves

Opening of stomata allows Carbon Dioxide to enter through the leaves. Carbon Dioxide is essential for trees for photosynthesis. In simple words, plants prepare their food through this process.
Also, letting out water helps trees to cool off.

After winter, there is summer, the dry season. In the summer heat, soil dries off, water table drops. This is the time when it is necessary to save water. For us and for plants as well ☺

So how to hold in water, as much as possible? By not letting it go out, right?

But if leaves are present, plant will keep losing water.

What could be the solution? To get rid of the leaves!!
Yes, that's what they do. They shed leaves.

Why trees shed leaves

Deciduous trees shed all the leaves. For some duration, there is not a single leaf present on these trees.

Now tree is ready to face summer and the summer heat.

There are trees like Mango, Jamun, Jackfruit, that are never completely leaf-less. They shed leaves but not all at once. They keep shedding them all throughout the year. They are called ever-green or semi evergreen trees.

Okkay, back to deciduous trees.

Shedding leaves not only helps trees, but also helps the soil.

Leaves that fall off from the tree, cover the soil around the tree. Leaves form a layer over soil. Because of this leaf cover, sun light cannot reach the soil. Even soil can retain moisture.

What happens in nature

November arrives, and we see heaps of dry leaves everywhere. They are just everywhere. Streets, footpaths, gardens, society premises, backyards. Our city literally gets drowned in dry leaves.

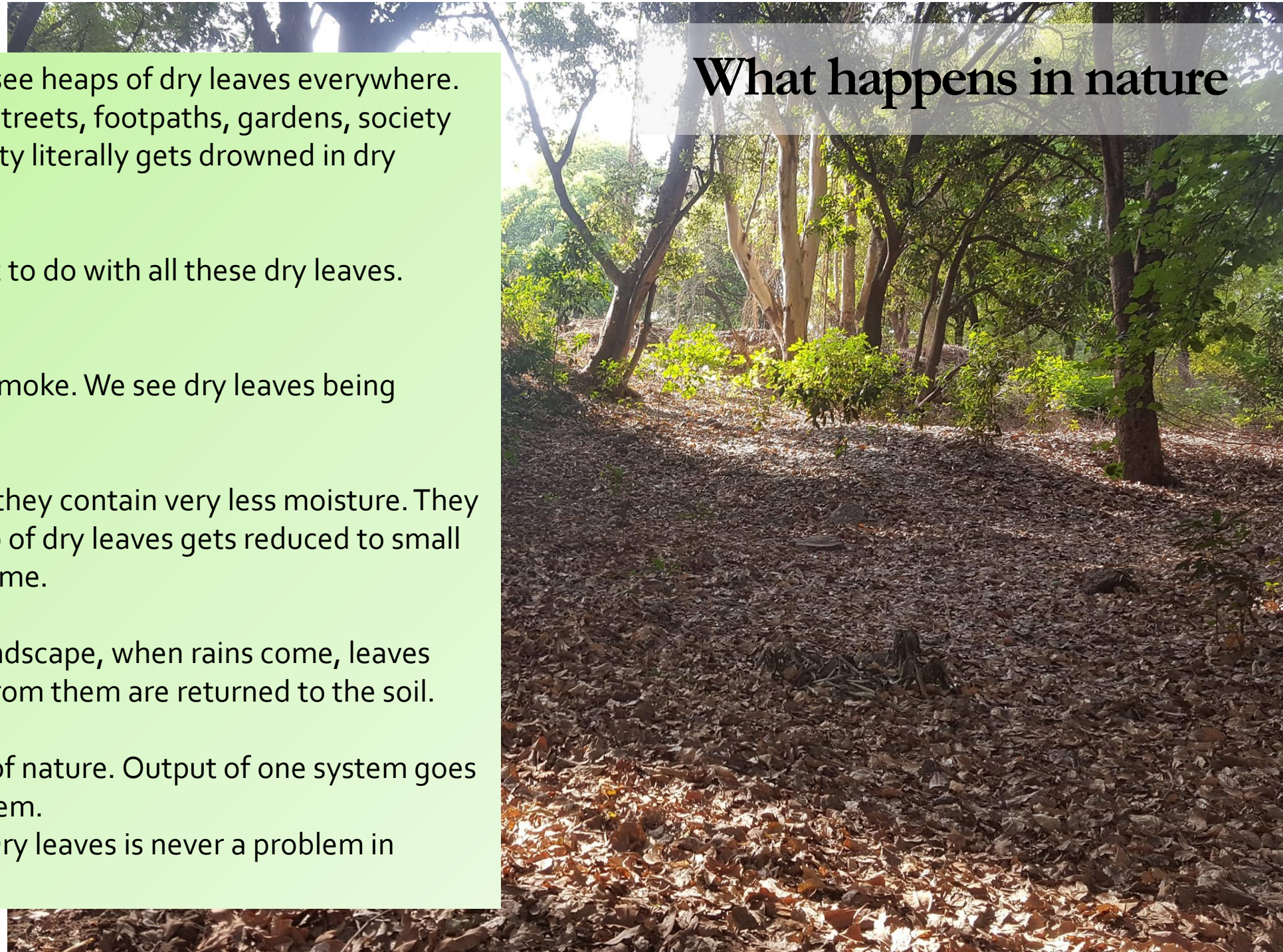
We simply don't know what to do with all these dry leaves. What do we do?

There is fire, there is acrid smoke. We see dry leaves being collected and set on fire.

They are dry, right? Means they contain very less moisture. They burn off easily. A large heap of dry leaves gets reduced to small quantity of ash, within no time.

In forests, or any natural landscape, when rains come, leaves decompose and nutrients from them are returned to the soil.

That is the circular system of nature. Output of one system goes as input to some other system.
Hence there is no waste. Dry leaves is never a problem in natural landscape.



Why is it a problem for us?

In our cities and towns there is no space (literally :-))

for this natural process to take place.

Most of the surfaces are covered with roads, building, tiles, paver blocks, right?

And even if space is available, we are not comfortable with large heap of dry leaves, isn't it?

So, for us, dry leaves is problem, the waste. Something we should get rid of.

Why is it a problem for us?

How can we solve this problem?

Yes, simple!!

Create the circular process that exists in nature :-)

Don't worry, I will show you how.

We will discuss it in detail later.
Let's discuss in the next blog, why exactly burning of dry leaves is not advisable.

Why we should not burn dry leaves?

Let's see.

First, when leaves are burnt, there is fire. It is open fire. Means smoke is inhaled by people around. Smoke is carried by winds and reaches even people quite far from the place.

Burning of dry leaves generates a large quantity of particulates. These particulates are carried by the wind. They can reach deep in lung tissue of people around and can cause

- Coughing
- Wheezing
- Chest pain
- Shortness of breath
- Long-term respiratory problems

For the people who suffer from asthma or other breathing disorder, leaf burning is extremely hazardous.

Why we should not burn dry leaves?

Life on earth is carbon-based. We all, i.e. all the living things are made up of carbon.

So, when any organic matter is burnt, that carbon combined with oxygen is let out in form of carbon dioxide.

If the leaves in the heap smother, i.e. they do not get enough oxygen, then Carbon monoxide is released.

Carbon monoxide is dangerously hazardous gas. It gets absorbed in blood where it reduces oxygen-carrying capacity of the Red Blood Cells (RBCs).

It also is one of the greenhouse gases, contributing to global warming. Its impact towards global warming is more than other common greenhouse gases, like Carbon dioxide and Methane.

Why we should not burn dry leaves?

Fire can always spread with wind. So, there is a risk of fire spreading to surrounding areas. It is risky for people and properties around. Green trees, plants nearby get damaged due to fire.
So, burning leaves is health as well as fire hazard.

BUT THAT IS NOT ALL.

Tree absorbs various nutrients from the soil. Some percentage of those nutrients are present in these dry leaves.

When leaves are burnt, we lose those nutrients. The nutrients that would have nourished the soil, get destroyed.

In all, burning off dry leaves is entirely lose-lose situation.

We lose
clean air & beneficial nutrients for our soils.

Okkay, this all is all fine.

But what to do with all those leaves?

Yes, this is a valid question.

Telling people not to burn dry leaves is not enough.

We need to provide alterative.

So, what are the alternatives?

Mulch

Compost

Donate

We will talk about each option in detail in next few pages.

1

MULCH

https://brownleaf.org/mulch/

MULCH

Mulching is the process by which we mimic what happens in the natural landscape.

What happens in the natural landscape?

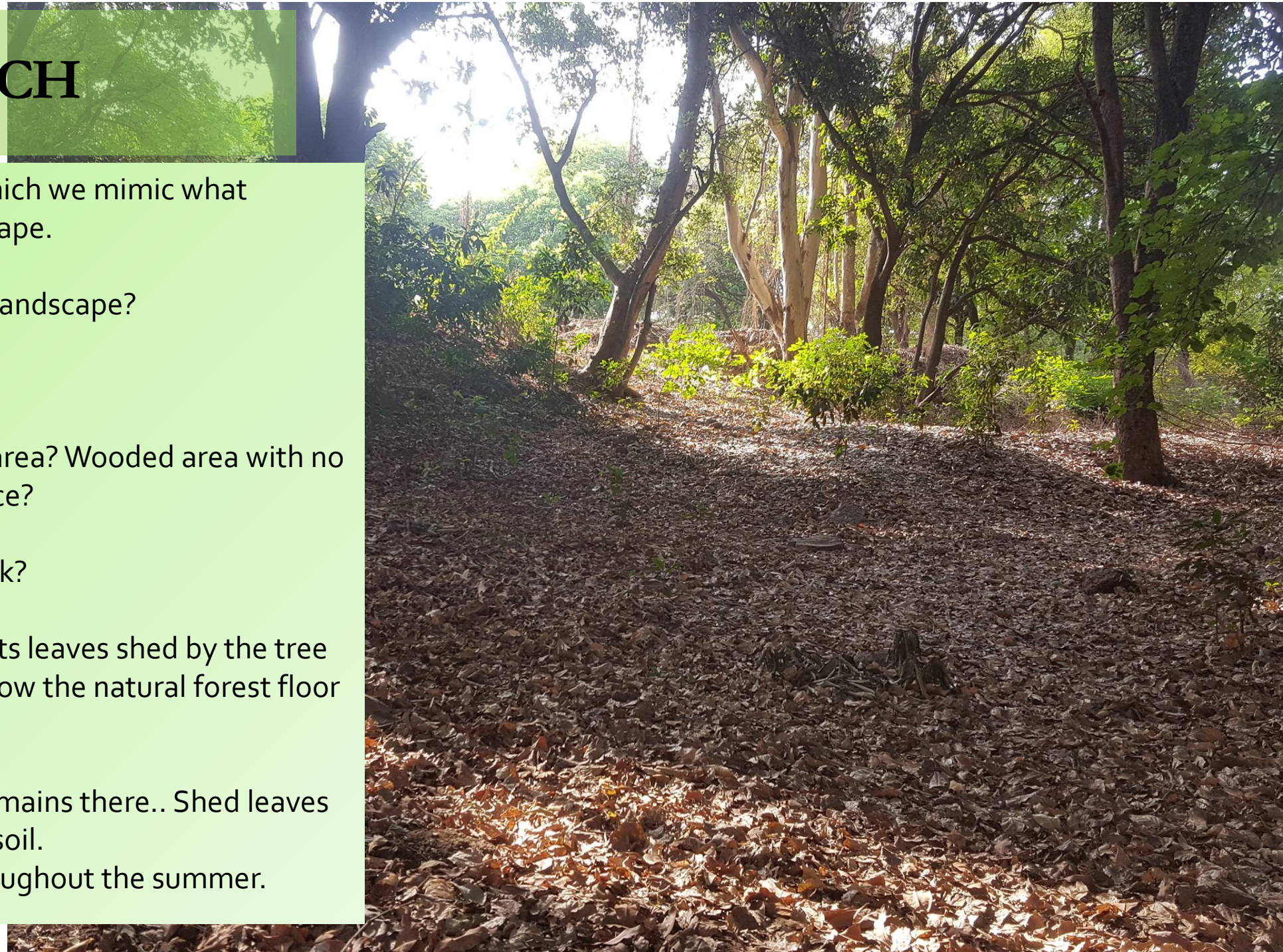
Let's see..

Have you been to any forest area? Wooded area with no or minimal human interference?

How does this forest floor look?

If we do not sweep and collects leaves shed by the tree in the backyard? Yes, that is how the natural forest floor looks like.

Whatever falls on the floor remains there.. Shed leaves form a carpet, layer over the soil.
This layer remains as it is throughout the summer.



MULCH

When rains arrive, leaves decompose.

Some proportion of nutrients that the tree absorbs from the soil are present in these leaves.

These nutrients, when leaves decompose, are returned to the soil. Soil keeps receiving organic matter and retains its productivity.

This is nature's way of recycling nutrients. Output of one element serves as input to some other element in the system. It is cyclic process.

There is no end to it and hence there is no concept of WASTE.

Layer of leaves protects soil from scorching summer heat. Since sun-rays do not reach the soil directly, soil retains moisture.
Various insects in the soil find shelter under these leaves.

How to do mulching?

Take dry leaves. Crush a bit with your hands.

Place those leaves in the plant bed/ pot, covering the soil completely.

That's it, done!!

Make sure soil around is covered with leaves.

Don't sweep away all the leaves from your garden.

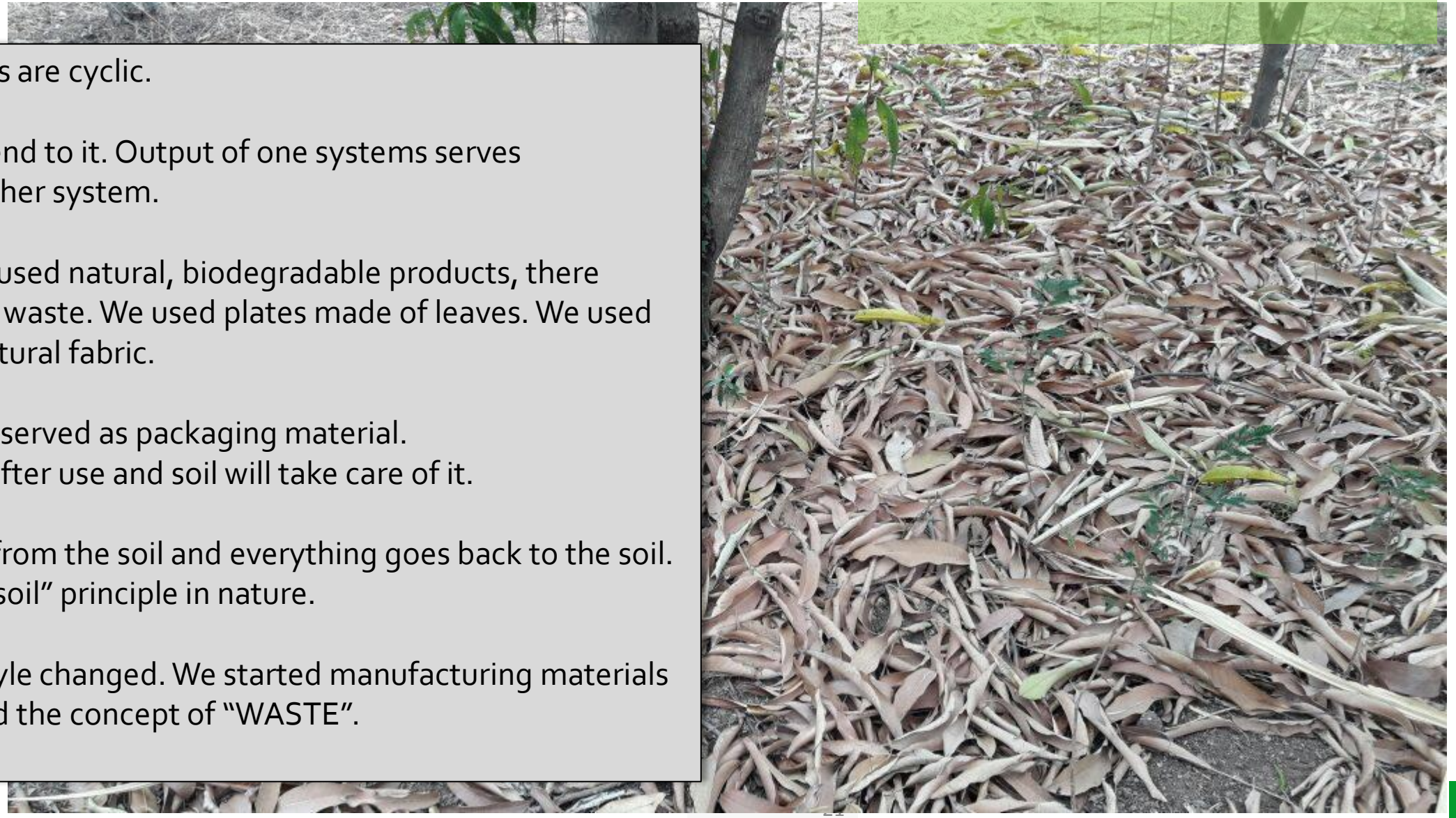
Leaves that have fallen in the plant-beds, under large tree, let them be there. (as far as possible).

2

COMPOST

https://brownleaf.org/compost/

COMPOST



In nature, processes are cyclic.

Means there is no end to it. Output of one systems serves as input to some other system.

While we, humans used natural, biodegradable products, there was not concept of waste. We used plates made of leaves. We used clothes made of natural fabric.

Newspaper, leaves served as packaging material.
You just discard it after use and soil will take care of it.

Everything comes from the soil and everything goes back to the soil. This is the "soil-to-soil" principle in nature.

But then, our lifestyle changed. We started manufacturing materials and that introduced the concept of "WASTE".

COMPOST

As you see, WASTE is quite a recent concept. Our ancestors never had to deal with this problem. Because of our changed lifestyle, our modified living places, we constantly encounter waste.

Same is with dry leaves.

For forest, dry leaf is never a problem. Whatever falls on the floor remains there.. Shed leaves form a carpet, layer over the soil. This layer remains as it is throughout the summer.

When rains arrive, leaves decompose. Some proportion of nutrients that the tree absorbs from the soil are present in these leaves.

These nutrients, when leaves decompose, are returned to the soil. Soil keeps receiving organic matter and retains its productivity.

COMPOST

If we can follow this process, major challenge of leaf litter management will be solved, isn't it?

So how do we do that in cities and towns?
Agreed, we cannot keep leaves as it is and let the natural process take place.

In many instances, our premises are tiled/ paved. There is no open soil available.
And how can we keep such a large quantity just heaped in the premises.

I am with you on this. 100%.

But here is my solution. We modify this process a bit.

How?

We compost these leaves, but not where they fall, but at a location convenient to us.
And we do not wait for the rains. We speed up the process.

Let's discuss..

DRY LEAF COMPOSTING

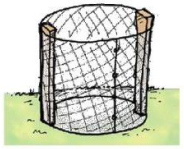
✓ CHECKLIST

I wish to compost dry leaves. What do I need?

✓ The place to carry out composting, with water source nearby

ditch

pile



enclosure

Yes, I have the place. Now what?

✓ Put leaves in ditch/ pile/ enclosure

✓ Add microbes

(soil/compost borrowed from somebody/ready culture by Inora/Daily Dump)

✓ Keep adding leaves

✓ Water **DAILY**

✓ Add microbes once a week

Okkay, Got it, then?

JUST SIT BACK AND RELAX!!

Even if quantity seems overwhelming initially, **DON'T WORRY!!**
When leaves start decomposing; volume reduces in no time.

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COMPOST

This poster contains glimpse of composting methods

Let's dive in details of each

Pit Composting

Okkay, digging ditch/ pit, sounds simple..

Where?

Near a water source and where there is no risk of people falling in it ☺

What dimensions? As per your leaf quantity

Fine, it is ready, what now?

- ✓Sprinkle cow urine
- ✓ Erect PVC pipe with holes to provide aeration
- ✓Keep adding leaves
- ✓Water it
  - DAILY in summer
  - Alternate days in winter
  - Not in the monsoon

Photo and method details
Courtesy:
Mr. Vivek Bapat, Pune

Then? That's it! Sit back and Relax!!

That's it? Are you sure?

Absolutely! No problem of rats/ mosquitos

Soil contains microbes, which aids composting

Note:

If it sounds much hustle, or if you are not interested in using the compost, then here is "Out of sight, out of mind" method for you,
Dig a ditch, keep adding leaves. When leaf fall is over, just cover the ditch with soil. And Done!! Forget about it. Really, no kidding ☺
Let rains and soil do the work for you, at their own pace.

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PIT COMPOSTING

PILE COMPOSTING

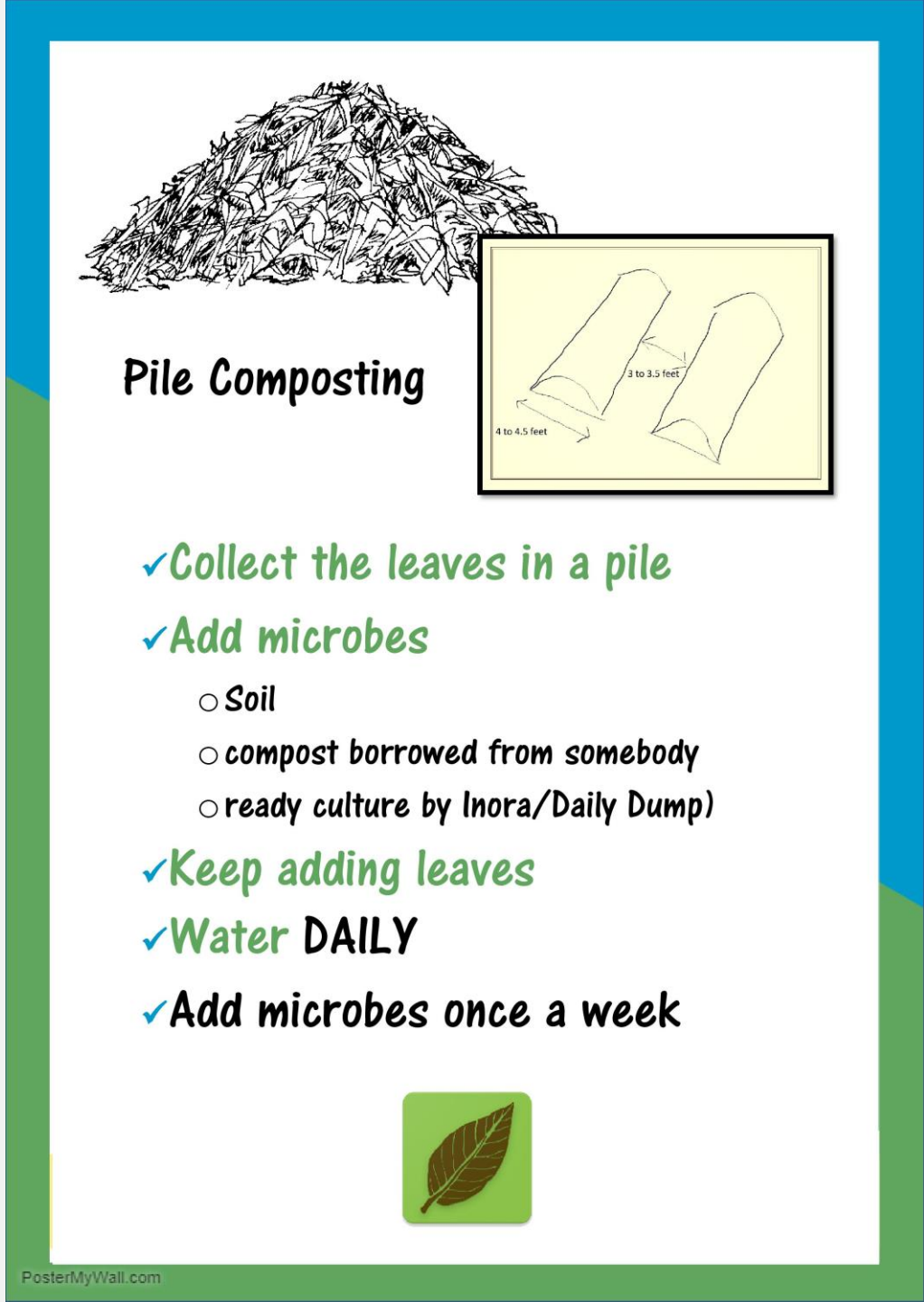
Pile can be a round/ rectangular.

Diameter or breadth of the pile should be such that person would be able to stand by the side and reach the centre of the pile.

Multiple rectangular piles can be made if quantity of leaves is large. (Refer to the poster here).

In case of multiple piles, distance between them such that person would be able to stand in between comfortably.

For such parallel piles, shift upper layer in the gap between the piles, and harvest the compost that is ready in the lowest layer.



Construct enclosure

- ✓Deposit leaves in the enclosure
- ✓Add microbes
  - soil
  - compost borrowed from somebody
  - ready culture by Inora/Daily Dump
- ✓Keep adding leaves
- ✓Water DAILY
- ✓Add microbes once a week

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ENCLOSURE COMPOSTING

WHAT IS COMPOSTING?

Compost (/ˈkɒmpɒst/ or /ˈkɒmpoʊst/) is organic matter that has been decomposed in a process called composting. This process recycles various organic materials otherwise regarded as waste products and produces a soil conditioner. (Wikipedia)

Biodegradable component of waste is called "wet waste". It is food scraps, kitchen waste, dry leaves, grass, saw dust etc. This is the component that we focus on for composting.

We can neither start composting nor can we stop it. It is a natural process and it continue without human interference.

In cities, space is the major constraint. Hence, it is not possible for us t let the process take its natural course.

We need to arrange a suitable space and sometimes, help speed up the process.

Let's discuss a bit about basics of composting and then discuss how we speed up the process.

BASICS OF COMPOSTING

Composting is just like making curd from milk. We add half a teaspoon of curd to warm milk. Curd contains bacteria, which multiply and ultimately entire milk is converted into curd.

What exactly do we do?

Nothing much, all work is done by bacteria. We just ensure suitable conditions, i.e. temperature of the milk.

Same is the principle in composting. We add microbes to wet waste. Breakdown of organic matter is by microbes i.e. bacteria, protozoa, fungus.

They are called "chemical decomposers". Then there are insects (mechanical decomposers) that break down organic matter into smaller chunks making it easy for microbes to do their job. Black Soldier Fly maggots, White Grubs, Wild Cockroaches are some of the examples of mechanical decomposers.

How do we provide microbes? It is called culture. Soil itself contains microbes and hence acts as culture. Then we can borrow compost from a friend, which would act as culture for our composting. Some ready-cultures can be bought, such as Compost Culture by Inora, Microbe mixture by Daily Dump, Culture by Mahatma Phule Krishi Vidyapeeth (MPKV)

ATM OF COMPOSTING

We discussed how we ensure presence of sufficient microbes. Let's discuss suitable conditions for composting.

It is ATM. **Aeration (A), Temperature (T) and Moisture (M)**.

Aeration:

Oxygen is necessary for decomposing process. In absence of oxygen, process turns anaerobic. As a result, Methane gas is produced, which has a foul smell. It is also one of the greenhouse gases, contributing to global warming.

Process also turns anaerobic if water logging happens. Hence it is necessary to drain the excess water.

In pit composting, we suggesting erecting a PVC pipe with holes in it, to ensure aeration to lowest layer.

Enclosures that we suggested, are porous and hence by design, sufficient aeration and draining of excess water is ensured.

ATM OF COMPOSTING

Temperature:
Certain temperature is required for growth of bacteria. Living in a tropical country like our's, temperature is not much of a problem.

For pit/ pile/ enclosure, make sure they are not too narrow. i.e. length/ diameter of min. 2 feet is required to contain heat.

Moisture:
In case of kitchen waste/ food scraps, they already have water content. So moisture is automatically provided.

If composting only dry leaves, then we need to provide moisture. Just like we water plants, we need to water the pit/ pile/ enclosure.

COMPOSTING

Temperature:
Certain temperature is required for growth of bacteria. Living in a tropical country like our's, temperature is not much of a problem.

For pit/ pile/ enclosure, make sure they are not too narrow. i.e. length/ diameter of min. 2 feet is required to contain heat within the heap required for the process.

Moisture:
In case of kitchen waste/ food scraps, they already have water content. So moisture is automatically provided.

If composting only dry leaves, then we need to provide moisture. Just like we water plants, we need to water the pit/ pile/ enclosure. Ensure content is moist, not wet.

Creating alternate layers of dry leaves and kitchen waste provides required moisture.

It is all about C and N

Bacteria need Carbon and Nitrogen, both for survival and growth.

So what contains Carbon and what contains Nitrogen?

Here is an easy way to remember.. Greens contain N and Browns contain C.

Food scraps, kitchen waste, grass has Nitrogen. Dry leaves, saw dust, hay has Carbon.

For efficient composting, ratio of C:N should be 30:1, Ideally!!

Creating alternate layers of dry leaves and kitchen waste is the best way.

However, kitchen waste does attract rats. So, if you are doing composting for the first time and you are doing it in common society area, then we suggest go for "only dry leaf composting" for the first time.

Once, you gain confidence, go for dry leaves + kitchen waste composting.

Important Note

When you start composting, after a few weeks, you will notice, leaves are as it is on the surface and around the sides.

Don’t panic. Nothing is wrong with composting. Everything is fine.

Whether it is pit/ pile/ enclosure composting, always remember, leaves on the outer layer decompose slow. Reason is, outer layer loses moisture fast.

Remember ATM of composting? Moisture is one of the vital components.

Hence leaves on outer side, will remains almost as it is. But inside, and in lower layers, compost will be ready. Leaves in the lowest layer will compost first.

These intact leaves in fact prevent ready composting falling off.

In case of pit/ pile composting, simply remove the upper layers and harvest compost form lower layers.

In case of enclosure, remove outer layer and harvest compost from inside.

Important Note

Leaves at the surface are almost intact. Just scrap away the leaves at the surface, and inside, notice, it is black compost ready. So, don't worry ☺

WHAT TO COMPOST

PIC	NAME	CAN BE PUT IN COMPOST?	NOTE
 	Vegetable- fruit peels, spoiled food		Vegetables scarps, fruits peels, frozen food past its expiry, food gone bad, cooked food, tea, coffee residue
 	Egg shells (crushed), Egg-cartons (tore to pieces)		Wash egg shells to remove residue of yolk and White from the egg shells, crush the shells, tear the carton to pieces
  	Papers, paper napkins, post it, tea bags		Tear paper, paper napkins, post-its to help the compost process. Remove laminated tag from tea bags since that will not decompose
  	Cut nails, hair, dust from house sweeping		Nails, cut or fallen hair, pet hair cobwebs removed, dust and dirt swept from the house. Poultry droppings
  	Old spices, food leftover, used match sticks		Left-over stuff -old spices, floor, legumes, pulses, grains. Used matchsticks
 	Dry Leaves, Grass, hay from fruit boxes		Dry leaves, green leaves, grass, lawn mowing, hay from mango/ fig boxes

COMPOST CHECKLIST

- Deposit dry leaves/ kitchen waste daily
- If only dry leaves, water
  - Daily in summer
  - Skip when rains
  - Alternate days in winter
- Add culture once a week

HAPPY COMPOSTING!!

"Not a single dry leaf should be burnt in India"

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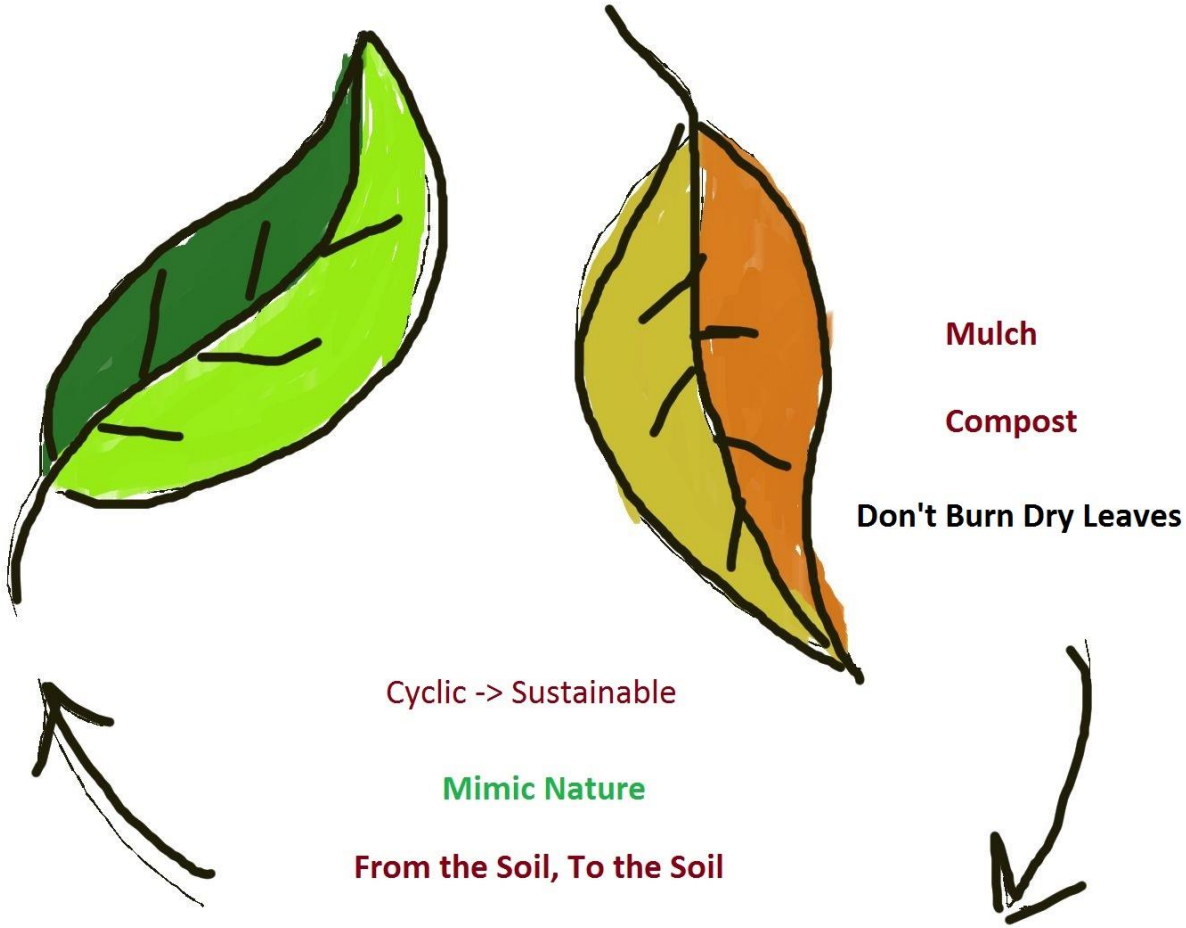
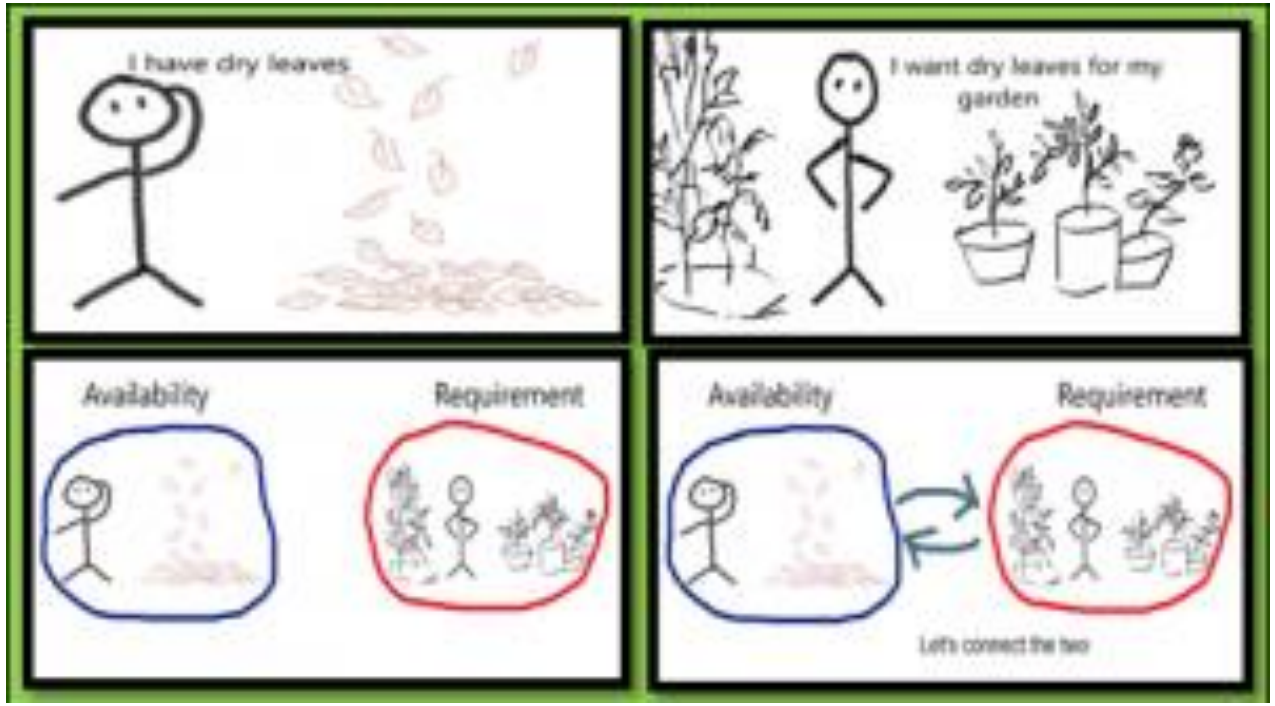
3

DONATE

https://brownleaf.org/compost/



For dry leaves, mulching and composting are two best strategies.



https://brownleaf.org/donate/

If at all these two options are not possible.

Or sometimes, even after composting, large quantity remains.

What we do?

Here is the 3rd option. This is the option that distinguishes Brown Leaf.

Third option is “Donation”.

Exchange of dry leaves from the people who have dry leaves to the people who want dry leaves.

Who are these people who want dry leaves?

There is a growing trend towards gardening and terrace gardening in the cities. Pune and Bangalore are pioneers in this. Other cities seem to follow the suite.

These gardeners are in constant need of dry leaves. As donors wonder what to do with dry leaves. These takers too have similar problem. Where to get dry leaves?

What if we connect these two people? Done!! Problem is solved, right?

How to go about it?

In Pune, we have formed a whatsapp group. This group comprises of both, the leaf donors and the leaf takers.

In the leaf fall of 2017, all these group members together exchanged around **5000** gunny bags of dry leaves. Remember, if not for Brown Leaf forum, all these leaves would have been burnt.

https://brownleaf.org/donate/

Acknowledgements

This document was not possible without help and guidance of

- Sejal Sheth
- Kirti Bhave
- Vivek Bapat
- Anjali Lele
- Aniruddha Deshpande
- Neela Panchpor
- Niranjan Upasani
- Shashikala Dagade
- Dr. Aruna Patil
- Anuradha Ganu

Thank You

- Aditi Deodhar
- pune.brownleaf@gmail.com
- www.brownleaf.org
- www.facebook.com/BrownLeafPune