

Leaves and Life - Some Reflections



Dr. Nivedita L Rao
Professor
Dept. of Biochemistry
Yenepoya Medical College
nlrdr@yahoo.com

The Leaves

Leaves are specialized for photosynthesis or they capture of energy from sunlight, carbon dioxide in air, water and minerals from soil to convert them into simple sugars and energy-rich organic compounds. Cellular respiration is the aerobic process by which living cells break down glucose molecules, release energy in the form of ATP in a three-step process, which involves glucose and oxygen reacting to form carbon dioxide and water. Interestingly, these biological processes are interdependent and responsible for the exchange of oxygen and carbon dioxide between living organisms and the environment.

Delving into the topic of leaves leads into a fascinating arena of a treasure trove of raw materials and products with pivotal roles in lives, including human.

- Leaves are nutrient source for herbivores from the smallest beetle to the largest African elephant. Patrode is an example for delicious spicy snack common in Mangalore is made from the *Colocasia* leaves. Spinach leaves, popularized by the cartoon Popeye consuming cans of spinach for their magical strength-giving properties, are rich sources of several vitamins and minerals.

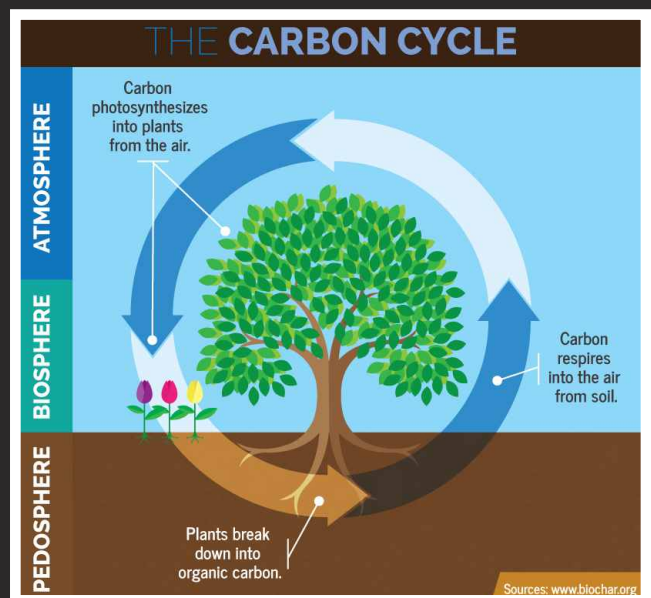


- Many leaves possess medicinal properties useful for healthy human living. Ayurveda, Sidda and Unani practices routinely use leaves for medicinal preparations. Leaves of tulsi, neem, mint, guduchi (or amrut), curry, papaya and turmeric are just a few examples used in traditional medicine. During the COVID-19 pandemic, home-made drinks (or kashaya) from leaves such as tulsi and amrut have become common and popular in India as they are believed to offer protection against the dreaded virus. In Delhi, the Indian metropolitan city, it was reported that tulsi plants became sought-after commodity for thefts during the COVID-19 pandemic!

- Leaf utensils have been in use to serve food as well as cook food. Banana and palash (*Muthuga* in Kannada) leaves are used as plates in India. Palash leaves are woven together to make the plate, while the banana leaf needs no such efforts, they can be used to pack food materials on gentle heating. These leaves have natural antibacterial and antiseptic properties, which make dining using them a healthy option. Idlis, the fermented rice cakes are commonly steam-cooked in jack or screw pine leaf cups in Mangalore. Turmeric leaves are used to steam sweet-rice dumplings. This method of cooking not only adds distinct flavors to the foods but medicinal properties too. Jackfruit leaves are dense in antioxidants and have antidiabetic properties. Turmeric leaves have anti-inflammatory and anticarcinogenic potential. Leaf utensils are disposable (unlike washing other utensils) and save plenty of water. They are 100% biodegradable, compostable and cows devour them making their use environment friendly and sustainable. Some restaurants, cafeteria and institutions use plates made out of leaves during a water scarcity.
- Certain leaves are raw material for a variety of products such as bags, baskets, hand fans, hats and a host of items. Creating handicrafts using leaves is not only an art, but it also provides ample livelihood avenues for communities those living in rural hinterlands too. Palm leaves are commonly employed for this purpose. Traditional palm leaf umbrellas are still in use by orthodox temple priests evident from their recent sighting during the Sri Krishna Janmastami festival on a rainy day in Udupi (Karnataka). There was an era when people used leaves to write on and to paint on, instead of paper. Palm leaves known as 'Patra' were commonly used for ancient Sanskrit and other holy scriptures in India and peepal leaves for paintings.
- Fallen leaves that cover the soil floor protect the soil from pelting rains, allow the water to gently soak into ground and retain moisture.

Consequently, growth of other plants with substantial roots prevents erosion. Leaf litter serves as mulch or layer of material on the surface of soil, keeping the soil cool, holding in the moisture for long duration and leading to form humus that is most useful material as perfect manure with high water holding capacity. In winter, leaf litter serves as a blanket to protect roots. Leaf litter protects precious seeds which will germinate later and with nutrient rich humus. Leaves from hardwoods slowly decompose in a few months microorganisms like bacteria and fungi. Enormous volumes of dead leaves and decades, hundreds, perhaps even a thousand of years are required to create an inch of topsoil depending on the geographic locations and climatic conditions.

When leaf litter is flattened again on the forest floor, a new, and reverse, process begins. This is part of one of the fundamental cyclic process in nature, called the carbon cycle, one of the important biogeochemical cycles. Carbon gets recycled through the environment first as a gas-free in the atmosphere, and then captured by plants to build sugars and other metabolites.



Leaf Decomposition

Leaves are rich in micro-, macro-nutrients such as potassium, lignin, cellulose, nitrogen, phosphorus and others. Accumulation of leaves have the capacity to build the forest ecosystems.

For example, in mangroves which are detritus-based ecosystems, dead leaves, other components of mangrove trees and vegetation are recycled to build up habitats (or nursery grounds) to fish, crabs, sea cucumbers, algae, fungi, insects and so on)... Leaf litter and other recalcitrant (slow degrading) products of plants serve as source of energy to aquatic fauna in ponds, streams and rivers leading to detritus food chain from where the energy will be transferred from bacteria and fungi to the higher tropic levels to invertebrates (e.g. prawns and crabs) then to vertebrates (e.g. fishes, prawns and aquatic birds).

Leaves are decomposed by soil bacteria, fungi, mites, millipedes, earthworms and insects as they use leaf litter as food. Soil microorganisms breakdown the complex lignin and cellulose of leaf litter into simple compounds and ultimately into humus rich in organic matter. Such humus supports innumerable number of organisms and provides sufficient nutrients to plants to grow and perpetuate.

Game-Change is Needed

People need to appreciate natural processes of decomposition of organic matter and understand the consequences of blocking such natural processes. In olden times, there existed a practice of not sweeping away leaves fallen in the backyard. They were just left there or used as compost in the tree or plant basin. Rotting or decomposition, is law of nature for preparing the soil and providing the building blocks for a flush of new greenery to the next spring. The leaves that fell this season are on their way to being the new leaves of later seasons. When leaf litter gets bagged up in plastic and hauled off as garbage, nature's hard earned savings are given away free of cost. Game-change in people's mindsets (to those who have leaf-/detritus-hating attitudes) is needed to enable environment friendly practices to cater to the needs of gardens or farmlands or forests. Nature preservation is prime responsibility of everyone, like social responsibility. It is the need of the hour to protect and nurture our environment for long-lasting benefits.

Better Practices Need to be Implemented

- Meticulous landscaping, a feature of modern living, which harms the tiny invertebrate species that live on the garden floor must be avoided. Use of Mexican grass leads to deterioration of the habitat in long run and succumb for diseases. One can develop the landscape with mixture of natural grass growing in a specific land. When all the leaf debris are swept away, their nests and dens are also taken away. Because these invertebrates are at the bottom of the food chain, this also negatively affects the living creatures further up.
- Extensive covering of earth surface soil with concrete, cement or interlock pavements must be avoided. Not just leaves, rain water too find it difficult to permeate into the soil leading to deepen the level of ground water. Over time, that leads to water logging and floods during heavy rains causing havoc as experienced in metropolitan cities like Mumbai, Delhi and Bangalore. But in a natural habitat, such water logging leads to create new life forms as we see in freshwater and marine (salt) marsh lands.
- Use of leaf products such as baskets, bags, utensils must be practiced and promoted in everyday life.

Unlike the 'Last Leaf' in the short story by noted author O. Henry that refused to fall off its creeper, leaves have to fall off sometime. After delivering their duties, falling leaves deserve their natural resting place which is the soil. Fallen leaves return to the roots or to the soil organisms in a precious, natural cyclic manner with elegant energy flow. Let that not be disturbed...



Leaves- food for beetle and humans



Leaves - with medicinal properties



Tulsi (Holy basil)



Pudina (Mint)



Amrutaballi (Giloy)



Doddapatre (Indian mint)

Leaf utensils



Leaf plates Palash



Jackfruit leaf cups (kotte)



Banana



Turmeric leaf dumplings



Screw pine (mooday) leaf idlis

Palm leaf products



Hat



Hand fan



Bag

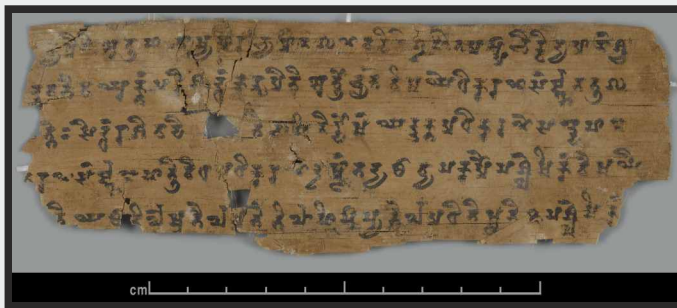


Umbrella

Other leaf products



Peepal leaf painting



Leaf scripture

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