Indian J. Applied & Pure Bio. Vol. 31(1), 112-115 (2016).

Study of features of Bark of some common trees of the East Nimar Area (M.P.)

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Abstract

The bark is the outermost protecting layer in perennial plants which results in the form of activity of lateral meristems. The bark tissue posses specific biochemical and physical features. With analysis of these features one can use these materials for different purposes. The product made by stem bark of various trees are cheaper and environmental friendly, as not polluting the environment.

Bark is a very complex structure, consisting of cells that are formed from lateral meristems and often containing living as well as non living cells. The term bark refers to all tissues of a woody stem or root occuring just outside of the vascular-cambium. The bark most typically serves two very important functions. The outer bark forms a protective barrier between the plant axis and the outer environment. The inner bark includes living cells which is responsible for some transportation. The bark layer is considered to be a replacement for the epidermis of the stem and root as the plant axis becomes older and grow thicker[5]. The thermal insulation capacity of tree bark plays an important role in case of forest fire also. The thick and well insulated bark protects the cambium layer of the tree. Bark used for insulation purposes can be recycled without polluting the environment. The bark contains protective material such as tannins and suberins in higher amounts and thus the bark has natural protective elements against decay.

Khandwa district, popularly known as east nimar, is situated between 21°5′ and 22°25′ N, 75°57′ and 77°13′ and occupying a strip of mixed hill and plain at the western extremity of Narmada valley and of the Satpura plateau. The area is dominated by deciduous perennial trees.

The present study is made to analyze the biological, chemical and physical features of the stem bark of some common trees of the area. As mostly the bark is produced in huge quantity, but local people used it for fuel purpose only. Emphasis should be given to proper utility of these plants sources, so we

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can develop means of value added products, which are not only economic but ecofriendly too.

A survey is made to collect and analyze the stem bark of some common trees. The plants were identified with the help of relevant literature. The features of bark of each plant have been noted (Table-1). On the basis of peculiar features the thermal insulator capacity of bark were analyzed.

Table-1. Features of bark of tree species[2,4]

S. No.	Botanical Name	Common Name	Family	Bark – Features
1	*Aegle marmelos* (L.)	Bel	Rutaceae	Creamy brown,corky, rough
2	*Ailanthus excelsa* Desf	Addu Maharukh	Simaroubaceae	Greyish brown, smooth in young condition, bark become fissured and rough in old age
3	*Azadirachta indica* A. Juss	Neem	Meliaceae	Dark brown, rough with deep vertical furrows
4	*Bauhinia purpurea* L.	Kachnar	Leguminosae	Grey brown, scaly, lenticels are prominent
5	*Bombax ceiba* L.	Semal	Bombacaceae	Silver brown, smooth in young condition and vertical fissures in old stage, conical spines
6	*Butea monosperma* Lam.	Palas	Leguminosae	Greyish brown, thin crackings, red coloured latex
7	*Cassia fistula* L.	Amaltas	Leguminosae	greenish yellow, Smooth, older bark- dark brown with scabby scale
8	*Dalbergia sissoo* Roxb.	Shisham	Leguminosae	Dark Brown and rough , later become cracked
9	*Delonix regia* (Hook.) Raf.	Gulmohar	Leguminosae	Yellow Brown, Smooth ,
10	*Dryptes roxburghii* (Wall) Hurusawa	Putranjiva	Putranjivaceae	Grey with horizontal lenticels
11	*Eucalyptus tereticornis* Sm	Nilgiri	Myrtaceae	white grey and blue, smooth, Dry irregular sheets,
12	*Ficus benghalensis* L.	Bad	Moraceae	Grey, smooth
13	*Ficus benjamina* L.	Benjaminia	Moraceae	Brownish, smooth

14	*Ficus racemosa* L.	Gooler	Moraceae	Brown pinkish, smooth
15	*Ficus religiosa* L.	Peepal	Moraceae	Grey brown and yellow brown, rough and scabby patches
16	*Gmelina arborea* Roxb.	Khamer	Lamiaceae	Creamy brown, smooth
17	*Madhuca longifolia* (Jkanig) JF	Mahua	Sapotaceac	Brown with fissures, milky sap
18	*Mitragyna pyrvifolia* (Roxb.) Korth	Kadam	Rubiaceae	Yellowish,Smooth with prominent lenticels in old bark
19	*Murraya koenigii* (L.) Spreng	Meetha neem	Rutaceae	Blackish, rough
20	*Nyctanthes arbourtristis* L.	Parijaat	Oleaceae	Dark grey in the form of sheets
21	*Phyllanthus emblica* L.	Aamla	Phyllanthaceae	Brown,thin, paper scaly
22	*Pithecellobium dulce* (Roxb.) Benth.	Jangal Jalebi	Leguminosae	Brown, irregular spines, rough and furrowed
23	*Plumeria alba* L.	Champa	Apocynaceae	Greenish – yellow, Smooth
24	*Polyalthia longifolia* Sonn.	Ashok	Annonaceae	Blackish, Rough
25	*Pongamia pinnata* L. (Pierre)	Karanj	Leguminosae	Grey brown, smooth vertical fissured
26	*Santalum album* L.	Chandan	Santalaceae	Reddish brown, Smooth
27	*Senna siamea* (Lam.) HS	Siama	Leguminosae	Blackish brown, Smooth,

Biochemical features:

There is a great variety in structure and appearance of the bark. Many times the features have been changed in the old age. Generally stem bark contains tannin and suberin in higher amounts and so it acts as natural protective element against decay. Tannins are bitter polyterpenes that are rejected by many animals. Bark can also have bitter alkaloids. Bark have pigments that give colour to the layers. In some cases bark is light coloured when initially exposed but darkens when the pigment is oxidized. Several secondary metabolites of plants as tannins, flavonoids, alkaloids and aromatic compounds are involved in defense mechanisms against many microorganisms and insects.

Bark contains glucose, gallic acid, steroids, essential oils, etc. in different plant species. In the present studies some chemicals were noted with antibacterial activities. Neem bark specially contains margocin, nimbadin, nimbosterol which act as antiseptic substance. Many stem barks used in skin disease treatment.

Phytochemical constituents such as tannins, flavonoids, alkaloids and several other aromatic compounds are secondary metabolites of plants that are involved in defense mechanisms against attack by many microorganisms. The metabolic extract of *Alstonia scholaris* has antibacterial activity against *Bacillus subtilis, E-coli* and *Proteus mirabilis*[1].

Thermal Insulation Features:

The thick and well insulated bark protects the cambium layer of the tree.
The bark structure differs in sclerids and stalk fibres. The air trapped within the bark pieces created a composite system. The heat is transmitted partly through the trapped air flow and through the linked thermal bridge system created by the contacting chip elements. The more the air flow and the size of contact surface decline, the more efficient evolved thermal resistance is.

There are more significant differences between the outer and inner bark in terms of structure and chemical components.

The inner bark fibres play a cross linking role in the chip, they also form further air layers between the bark elements reducing the connecting surface of bark pieces. Similar to the insulation material, such as rocks and glass wool, the wood bark fibres have air layers or space between them, so that they can improve the air filling ratio of the system. Moisture content influences the thermal insulation capacity of chipped bark. Static air of 0-0.25 W/ml values improves the thermal conductivity of the composite system. The heat is transmitted partly through the trapped air flow and through the linked thermal bridge system created by the contacting chip elements. The high specific heat and good thermal conductivity of water influenced the thermal conductivity values unfavorably. Water fills cell lumen and provides better heat transfer in cell- walls. water vapour is able to transfer high amount of heat because of its high specific and latent heat. The heat difference can result also in vapour flow and so the heat transfer is increased by the specific heat amount of transferred vapour[3].

With studies of various stem bark material it is clarify the usability of bark in production of quality composite boards. Antibacterial, high resistane to water and thermal insulator properties make it ideal for manufacturing of many goods. These products are environment friendly and so the plant residues in the form of barks become a source for development of value added products.

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