PLANTS AND PEOPLE

Plants were the earliest form of living things. 10 million years ago, they were in fully developed existence with stems, fruits and flowers, much before primitive man made an appearance.

Plants and people have since had a closely interwoven relationship. Plants satisfy every want and need of man: food, clothing, shelter, tools, medicines, dyes, etc.

Of the 2 million plants estimated to be in existence, only 260,000 have been identified

Groups of plants	Types included	No. of species	Time of origin Millions of years ago
Angiosperms	flowering plants (monocots, dicots)	250,000	140 – 60
Gymnosperms	conifers, cycads	700	230
Pteridophytes	horsetails, club mosses, psilophytes	11,000	340
Bryophytes	liverworts, mosses	25,000	400
Chlorophyta	algae	20,000	500
Primitive plants	blue green algae	-	3000 - 1000
Bacteria	staphs, bacilli, etc.	Billions	-

This exhibition showcases the role of plants in the lives of people with an aim to create both respect and a sense of protection for them. Plants give us so much and take only the air we exhale from us.

THE FOOD FACTORY OF THE EARTH

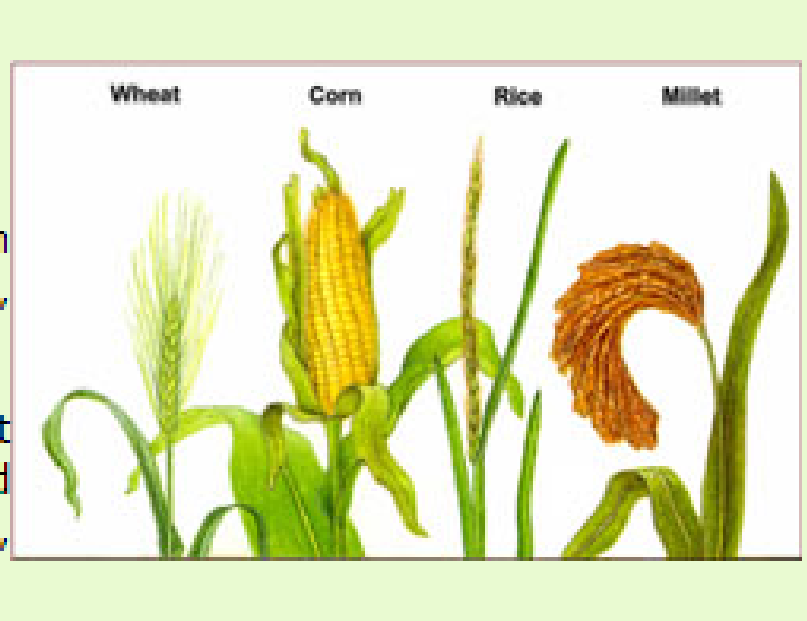
Without plants, there is no life. All life forms need energy to live and work. The sun is the source of this energy but in the form of light. Men and animals cannot utilise this energy, but plants can trap the sun's rays, convert it to starch and store it in their leaves, stems, roots, fruits, etc. All other living creatures like man, animals, birds, fish and insects have to eat plants to get this energy. Even carnivores, by feeding on herbivores actually gain their energy from plants.

Plants for food

The earliest people ate wild fruits, mushrooms, nuts, roots and seeds. At the end of the Ice Age (about 11,500 years ago), the climate became warmer and affected the food supply. New plants, such as grains, replaced older plants. People began to experiment with methods of controlling their supply of food. This led to the beginning of farming. Neolithic people (8500-4000 B.C.) are credited with first producing bread, beer, and an array of grains we continue to enjoy today. Assured of a steady food supply, their nomadic lifestyle was replaced by settlements.

There is an incredible variety and abundance of edible plants available to us. Carbohydrates, proteins, minerals, vitamins, fats and condiments are all provided by plant foods. However, of the 20,000 known species, over the centuries, fewer than 20 species of plants now supply about 90% of our food requirements. Plant foods not only give us energy, vitamins and minerals, but also the means to sweeten and add taste to our food and some even make a tasty drink. Every country and region has contributed important foods now grown globally.

Plants for energy



From around 20,000 years ago, people of the Levant (Southern Israel and Jordon) relied increasingly on wild cereals. Rice, wheat, potatoes and cassava are the staple energy foods.

Wheat was the first plant to be cultivated. Remains of wheat grains, tools and implements used to sow, harvest and grind wheat, dated around 9000 B.C. have been found in Damascus, Syria.

Rice is the staple food of more than half the world's population and was first cultivated in Southeast Asia in China, Thailand, and the Malabar Coast of India.

Potato is the world's most widely grown vegetable. Rich in starch, proteins, vitamins and minerals, it originated in the valleys of the Andes Mountains.

Cassava (Tapioca) has bulbous, edible roots packed with starch. Even the leaves can be boiled and eaten. Native to South America, it was first cultivated in Sri Lanka in the 1700s.

Maize (corn) from wild plants was first gathered and eaten by Mexican Indians about 11,000 years ago. The Aztecs, Mayans and Inca civilizations survived on maize. Cornflakes and popcorn have the highest demand for maize today.

Millets include pearl millet, finger millet, barnyard millet, foxtail millet, etc. They are grown only in rainfed areas unsuitable for rice and wheat cultivation. They have excellent nutritive value, being high in proteins and are known as the ‘poor man's protein”.

Pulses for proteins

Pulses are the edible ripe seeds of several plants of the pea family. It is a general name applied to peas, beans and lentils. They are often rich in protein and nutritious. Legumes include lentils, peas, beans, soyabeans, peanuts, etc. They are planted specifically to improve nitrogen content in the soil through root nodules.

Nature's gifts

Vegetables and fruits are the source of vitamins and minerals, necessary for good health and growth. Even before their intrinsic value was realised, Stone Age men were using several vegetables cultivated today.

Three vegetables of Indian origin cultivated widely are black-eyed beans, cucumbers and brinjals (egg plant).

Fruits are the most delicious of plant foods. Naturally sweet and enriched, they are a complete food that can be eaten without cooking or preparing. Figs, dates, pomegranates and apples were amongst the earliest fruits grown.

Sweet sensations

Chocolate would not be edible but for sugar. Most people have a sweet tooth, craving for sweets, sweetmeats and chocolates. Sugar can be traced back several thousand years to China and India. Soldiers of the Persian Emperor Darius (510 B.C.) saw sugar cane, a giant grass, growing on the banks of the River Indus. They called it "the reeds which produce honey without bees". Sugar was extracted from the cane by chewing and sucking. Later, a syrup was extracted by means of pressing and boiling the cane. This process was first practiced in India and became the basis for producing sugar in solid form.

The sugar cane and the sugar beet are the most efficient plant fixers of solar energy.

Spices - worth more than gold

Spices, are aromatic flavorings made from parts of plants native to tropical Asia and the Moluccas, or Spice Islands, of Indonesia. Malabar or Kerala as it is now known, was famous for spices, particularly pepper, and was called as the Spice Coast. Throughout history, the country that has controlled the spice trade has been the richest and most powerful in the world. Archeologists estimate that by 50,000 B.C., primitive man had discovered that parts of certain aromatic plants help make food taste better. With few exceptions, the spices and herbs known today were being used early in human history.

The great variety of herb and spice flavors are produced from nearly all parts of plants

- **fragrant leaves:** basil, bayleaf, coriander, mint, fenugreek
- **ripe fruits or seeds of plants:** chilies, coriander seed, fennel seed, mustard seed, nutmeg, pepper, poppy seed, cloves and cardamom, and sesame seed
- **roots:** garlic and ginger
- **bark:** cinnamon

Vanilla, the essence of ice creams, chocolates and cakes, comes from an orchid, which must be hand-pollinated and the pods specially cured before the beans produce their aroma.

Fats for frying

Many plants produce seeds that are rich in oil, and this oil can be extracted under pressure. Volatile essential oils are produced by aromatic plants, forming food reserves in fruits and seeds, especially in dry regions. Mustard, soya, groundnuts, sunflower, sesame, olives and coconuts produce an edible oil, which is used widely in cooking food. Palm oil, made from the fruit of the oil palm tree, is one of the most widely used vegetable oils in the world.

Thirst quenchers

Tea from Asia, coffee from Africa and cocoa from South America are the world's favourite beverages. They all contain caffeine, a stimulant. Tea is the world's most popular beverage after water. China was the main source of tea, whose cultivation spread through trade to other parts of the world. Camellia assamica, a wild tea plant, growing in Assam, India was later discovered by the English. Coffee (Coffia arabica) was not cultivated until the 15th century, when extensive plantig was carried out in the Yemen region of Arabia. Cocoa is the main ingredient of chocolate and drinking chocolate. The cacao tree produces a fruit from which cocoa is derived. Fermentation of the fruit yields the cocoa seed, or bean, with its distinctive flavour. Côte d'Ivoire, Ghana, Nigeria, and Brazil are leaders in cocoa production.

Wine is made from grapes. After the grapes are crushed, the juice is converted into wine through a process called fermentation. Wine is then aged until it is ready for drinking. The production, use, and enjoyment of wine dates from at least the beginnings of recorded history.

Toddy or palm liquor is famous in India for its rejuvenating and medicinal qualities. The juice of fruits and vegetables and the clear water of the tender coconut are other naturally sweet and refreshing drinks.

PLANTS TO SPIN AND WEAVE

Plants are the source of many natural fibres. The chief vegetable fibres are structurally of four kinds: seed fibres, the soft hairs that surround the seeds of certain plants; bast fibres, the tough fibres that grow between the bark and stem ; vascular fibres, the tough fibres found in the leaves and stems and entire stems of grasses. Fibres can be spun into yarn and woven into fabrics and twisted into ropes. Ropes have been used since prehistoric times to lift and move objects. Cotton, flax, hemp, jute and sisal are the chief plant fibres.

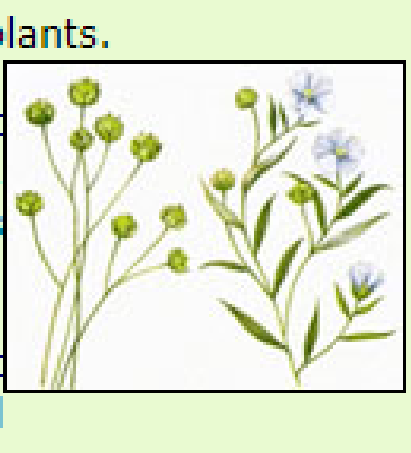
Cotton is the most widely used of all plant fibres for making both soft muslin and hardy denim. It is easily washed and can be dyed in vibrant shades. The cotton plant has been cultivated and its fibres woven into cloth for thousands of years. It has been grown and used in India for at least 5000 years. Cotton was used also by the ancient Chinese, Egyptians, and North and South Americans.

The fibre, called the lint, grows out of the seeds and is spun into yarn and woven into fabric. As the cotton fibre can absorb moisture in its centre, cotton clothing feels cooler in summer and warmer in winter.

Refined cottonseed oil is a popular cooking oil while unrefined cottonseed oil is used to make soap, cosmetics and drugs. The cottonseed meal that remains after oil extraction serves as livestock feed and plant fertilizer.

Jute is one of the cheapest natural fibres, and is second only to cotton in amount produced and variety of uses. It is used chiefly to make bags and sacks. The fibres are also woven into carpets and hessian (used in packing) and blended with other types of fibres to make twine and rope. China, India, and Bangladesh are the main producers of jute. Jute is biodegradable (deteriorates organically) and replenishes the earth with nutrients.

The **hemp** plant is native to Central and Western Asia. Hemp fibres obtained from the plant's woody stem are used to make ropes, twines, cords, sailcloth and tarpaulin. The cultivation of hemp is restricted in most countries because two illegal drugs, marijuana and hashish, are obtained from hemp plants.



Flax has been used as a fibre for thousands of years. Linen is made from its fibres. It ranks among the strongest natural fibres. The Egyptians wrapped mummies in linen, and the ancient Greeks, Egyptian and Israelite priests wore linen cloth at religious ceremonies.

Linen fabric is used for tablecloths, napkins, dish towels and handkerchiefs, because it wears well and is highly absorbent. The seeds contain linseed oil, which is used primarily in the production of paints and varnishes.

Coir is the husk covering the shell of a coconut and is made of short, stiff fibres which can be made into mats, ropes and brooms.

Sisal is the name for two tropical plants with swordlike leaves Agave americana and Agave sisalana, that yield a valuable fibre. It is used in making ropes, twines, mats and brushes.

PLANTS FOR HEALTH

Healing plants

Many a cure for illness and disease lies locked within plants. Forest dwellers discovered the use of different plants in the treatment of various ailments and diseases, some of which have been used as medicines for hundreds of years.

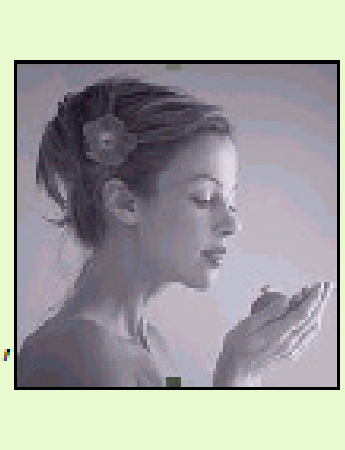
Ayurveda (5000 B.C.), Siddha and Unani are all indigenous systems or alternative systems of medicine, founded on natural medicines extracted from plants.

Spices and herbs also play important, sometimes magical roles in medicine.

- The bark of the cinchona tree is used to make quinine, used to treat malaria and other diseases
- Digitalis, from the dried leaves of the purple foxglove plant, is used in treating heart disease
- The leaves of the Madagascar periwinkle are vital for treating various types of cancer
- Taxol, a drug prepared from the yew tree, is used in treating breast cancer
- Atropine, derived from the belladonna or deadly nightshade plant, is used to relax the eye muscles and dilate the pupil
- Morphine, the first plant drug isolated is used as a painkiller. It is got from the opium poppy
- The juice extracted from kilanelli leaves is used to treat jaundice
- The leaves of adathoda are made into a paste and used to treat respiratory tract ailments

Flower essences and essential oils extracted from leaves, stems, flowers, bark, roots, or other parts of a plant are increasingly used in healing physical and emotional ailment. The Bach Flower Essences is a system of 38 Flower Essences used to correct emotional imbalances. Aromatherapy uses essential oils with a pleasing, natural aroma, for psychological and physical well-being. Ayurveda incorporates aromatic massage as one of its main aspects.

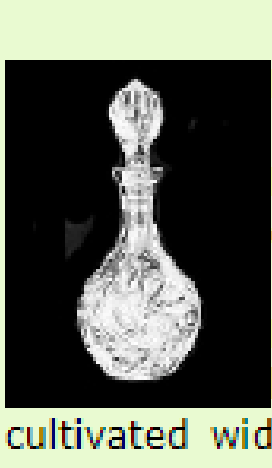
Natural beauty



The Egyptians were the first to prepare cosmetics from plants.

The hibiscus, amla and shikakai are used to care for the hair and skin, while Aloe vera, cucumber, carrots, lime, flowers and herbs are popular ingredients of skin care products.

PLANTS FOR FRAGRANCE

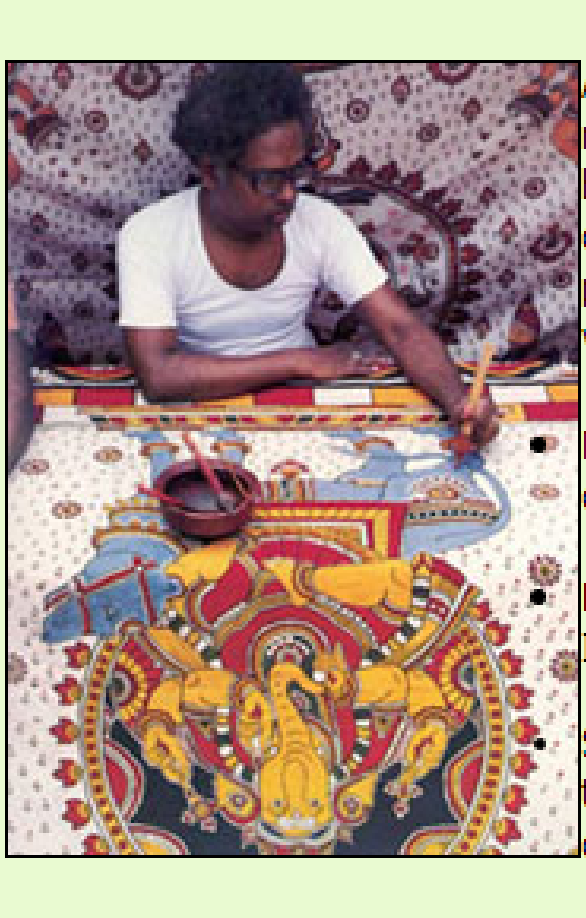


Flowers and perfumes

By 3000 B.C., the Egyptians and other people of the Middle East were cultivating a variety of garden flowers, including jasmines, poppies, and water lilies.

Fragrant flowers have always been sought after for making sacred offerings, adorning the hair, flower arrangements, garlands, bouquets and for making perfumes. Exotic flowers cultivated widely for the perfume and floral decoration industry are jasmine, lavender, frangipani, rose, lilies, vetiver, etc.

COLOURFUL PLANTS



A dye is a chemical compound used to produce long-lasting colours in materials. Most natural dyes came from such parts of plants as the bark, berries, flowers, leaves and roots. Being of natural origin, many of these colours are safe to colour food as well. Kalamkari and Madhubani styles of painting done in Andhra Pradesh and Orissa respectively, use natural vegetable dyes.

- Natural indigo, a dark blue dye, comes from the indigo plant, which grows chiefly in India. It is still used on denim fabrics
- Henna, an orange-brown dye made from a shrub, was used to colour leather. It is also used to dye human hair and colour the palms and feet
- Saffron is a brilliant yellow dye produced by drying the stigmas and part of the styles of the purple autumn crocus. Saffron is also used in flavouring and colouring foods, especially sweets
- Turmeric, a yellowish powder got by grinding its fleshy roots has been used for hundreds of years as a dyestuff and as a spice

OILS AND WAXES FROM PLANTS

Vegetable waxes occur on the exposed surfaces of many plants. Though their actual purpose is to reduce moisture loss from the surface of leaves, they serve us in different ways.

- Waxes from the wax myrtle and carnauba palm are used in candle making and in shoe, furniture, floor and other polishes.

Oils are extracted from different parts of a plant like seeds, nuts, bark and leaves.

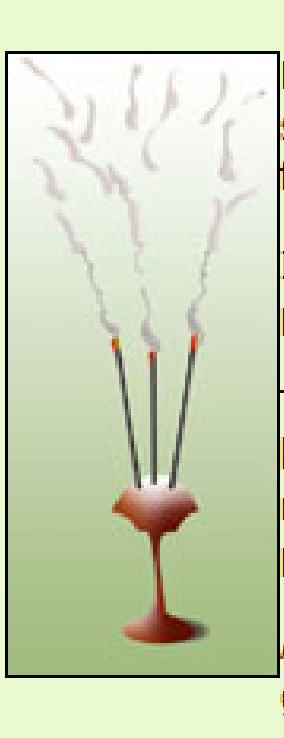
- Eucalyptus oil distilled from the leaves of the blue gum tree has a pleasant aroma that is inhaled to clear a cold. It also repels insects.
- Castor oil from the seeds of the castor - oil plant is used in illumination and also has some medicinal properties.
- Turpentine, an essential oil extracted from the pine tree, is used widely as a solvent for paints and varnishes.
- Linseed oil, extracted from flax seeds, is used in the paint industry.
- Tannic acid from the bark of the hemlock and other trees is used in processing animal hides.
- Soap is formed by a chemical reaction called saponification between various oils, fats and caustic soda (NaOH, also known as lye). Though soap can be traced into distant times, it was not used or known for its real qualities for thousands of years.

Natural nutrients and essential oils are used for making natural soaps. Olive, coconut and palm, apricot kernel, avocado, jojoba, hemp or sweet almond oils are used.

Plant secretions

Natural resins secreted by many plants, are sticky, liquid, organic substances that usually harden, on exposure to air. They are used as glues and incenses.

Amber is a fossil resin obtained from the now-extinct *Hymenea protera* tree.



Rosin, extracted from pine pulp is used in sizing paper, adhesives, soap making, varnishes and paints, even chewing gum and as a friction-producing coating for the bows of stringed instruments.

Incenses are aromatic resins or plant secretions from woody surface. When burned, they produce a pleasant aroma.

The practice of burning incense at religious ceremonies to produce a pleasant smell was known even in ancient times. In the Bible, the three wise men brought frankincense and myrrh to greet the baby Jesus. Incense sticks are made by applying a combination of perfumes and incenses onto thin sticks.

A gum, is a water soluble resin. Gum arabic, from acacia trees is the best-known natural gum.

LIVING WITH PLANTS

Tribal communities

Forests are home to many tribal communities, providing them with food, water, and the materials for everyday living, and are also a spiritual and cultural home. As the forest is their home and they depend on the forest produce, they take only what they need and conserve the rest.

In India, millions of tribal and landless people survive by gathering and selling forest products such as nuts, berries, medicinal herbs, honey and wax.

Sanctifying plants

In India, there is an ancient tradition of designating patches of forestland on the fringes of villages as sacred groves. As the grove is considered to belong to the presiding deity, indiscriminate removal of plants or plant parts is forbidden.

Individual trees were also designated as sacred and worshipped, due to an ancient lore or myth associated with its origin, an event that took place in its vicinity or because of an idol or deity resting in its shade.

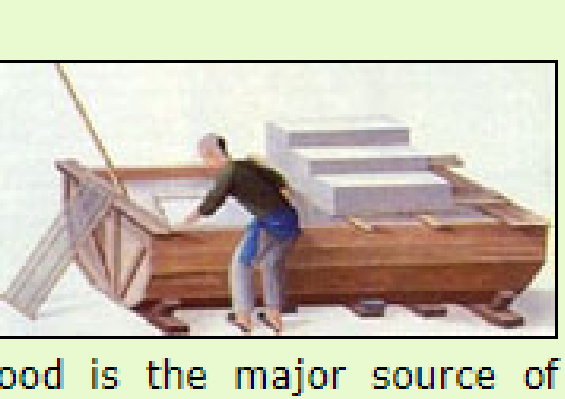
PLANTS IN CULTURE AND TRADITION

Plants occupy pride of place in our religious customs and traditions. Only natural products of plant origin are offered or utilised.

Flowers and incense are a must at any auspicious occasion, as also burning camphor, breaking coconuts, offering betel leaves and nuts, turmeric, kolams or decorations on the floor with rice flour and mango leaves.

The thulasi plant is extremely revered and finds a place in every home. The dharbai grass is important for any auspicious occasion.

PLANTS TO WRITE ON



Paper gets its name from papyrus, a reed that the Ancient Egyptians used for making a writing material.

Paper as we know it was invented in China more than 2,000 years ago. The material used was probably the bark of the paper mulberry tree.

In ancient India, palm leaf manuscripts were used for writing. Today, wood is the major source of papermaking fibres. Fibres of bamboo, cotton, esparto grass, hemp, jute, sugar cane, wheat and rice straws and various woods can be used for making paper.

Wood chips are reduced to a pulp by chemicals, heat, or other treatment. The pulp is then formed into a mat, filtered, drained, and pressed.

Black ink is made from the soot of pinewood or oil smoke, and a gum substance.

THE SOURCE OF ENERGY

By the beginning of the Carboniferous Period-about 360 million years ago-vast swamps had developed. Forests of giant club mosses and horsetails up to about 40 metres tall grew in these warm swamps. Ferns about 3 metres tall formed a thick undergrowth that sheltered huge cockroaches, dragonflies, scorpions and spiders.

When plants of the swamp forests died, they fell into the water and mud that covered the forest floor. The water and mud did not contain enough oxygen to support decomposers, so the plants did not decay but became buried under layer after layer of mud. Over millions of years, the weight and pressure on the plants turned them into great coal deposits.

Petroleum and natural gas deposits were formed by the death of marine plants and the weight of the sea and sand above them.

THE STRETCH AND BOUNCE PLANT

Rubber is one of our most interesting and important raw materials. Natural rubber comes from the juice of a tree. Only rubber is elastic, airtight, water-resistant, shock absorbing and long-wearing.

More than half of the rubber used in the world goes into tyres and tubes for cars, aeroplanes, bicycles, buses, trucks, tractors and construction machinery. A typical car has about 600 rubber parts.

Wild rubber came from the Amazon Valley of Brazil. An amateur botanist took the seeds to England. Almost all the plantation trees in Indonesia, Thailand and India were grown from seedlings raised from these seeds.

THE BOUNTIFUL PALMS

Palms are an ancient group of plants. They once grew in all parts of the world, and palm fossils have been found as far north as Greenland. They provide food, drink, fibres and building material for the people. There are more than 2,800 kinds of palms, and they vary greatly in size and the kind of flowers, leaves and fruit they produce. All parts such as the leaves, stems, seeds, fruits and nuts are useful.

- Date palm, yields dates, a common and nutritious food in desert areas.
- Coconut palm, gives coconuts from which oil and milk can be extracted. Coir, palm leaves and fronds also find use.
- Palmyra palm yields a sap from which palm sugar is made.
- Palm oil is extracted from the seeds of the oil palm.
- The stems of the Rattan palm are used to make furniture.

WOOD: A VERSATILE MEDIUM

Wood is soft and can be sawn, chopped or crafted into different shapes. It has hence been adapted in a number of ways to help man in his pursuit of progress

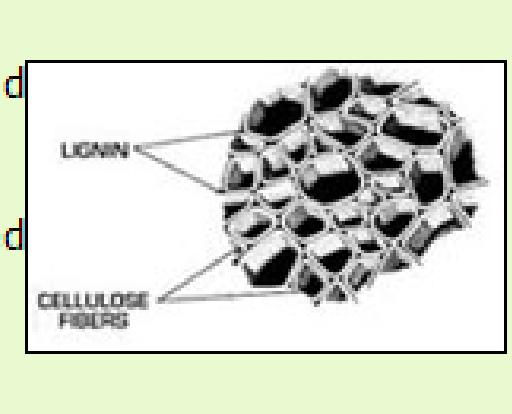
- Construction of buildings , ships, boats, vehicles, bridges and railway sleepers.
- Making tools and implements, musical instruments, toys, furniture and artefacts.

Teak, rosewood, mahogany, walnut, cedar, sal and bamboo are popular varieties of wood.

Fuelwood

In developing countries like India, wood is the primary fuel for cooking and heating. Casuarina trees are preferred. In industrial countries, wood has been burned mainly in fireplaces and charcoal grills.

FROM PLANTS TO PLASTICS



Cellulose is the main ingredient of wood fibres, while lignin is found in and between wood fibres.

Cellulose acetate and cellulose nitrate are prepared from cellulose. Both are used in making rayon, adhesives, lacquers, plastics, cellophane and photographic film.

Cellulose nitrate is an ingredient of explosives like guncotton.

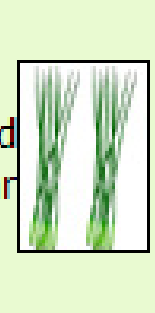
Rayon, is cellulose xanthate. It is used as a fibre, to make rayon clothes like Hawaiian shirts. Viscose is a kind of rayon, made by dissolving cellulose and reforming it in filaments. Trees are 50% cellulose and cotton is 90% cellulose, so viscose is described as a natural, or recovered fibre.

Cellophane is cellulose which has been stretched into thin transparent sheets and is used in the packaging of food and other perishable products.

Lignin makes up 30% of the dry weight of wood.One of the biggest energy expenditures in paper making comes from removal of the brown lignin from the wood so that only the white cellulose is left to make paper.

Lignosulfonates were used in leather tanning and dyes, inks and concrete; in food products, as emulsifiers in animal feed and as raw material in the production of vanillin.

GRASSES OF USE



The strength and flexibility of grasses and even some reeds finds application in weaving. Mats and baskets can be made from them. The Pattamadam pai is made from korai grass. African tribals wear grass skirts.

Bamboo and sugar cane are giant grasses. Bamboo regenerates quickly and the hard stems are a cheap and convenient resource for making furniture, baskets and screens. Bamboo stems are edible and the material of which flutes are made. After extraction of sugar, the crushed stems of the sugar cane, known as bagasse, are used in making paper.

CONCLUSION

Plants provide food, clothing, shelter and many, many items of convenience for our use. Even on dying they enrich the soil and help other plants thrive. They bind the soil with their roots and mop up the rainwater, at the same time preventing soil erosion and replenishing the ground water. Their leaves act as a huge sink that absorbs carbon dioxide and reduces global warming. And the more trees there are, the more rain falls on earth.

So, why then do we persist in destroying plants that dedicate each and every part and function to our well being?

Without plants there is no life. Plants satisfy every want and need of man: food, clothing, shelter, tools, medicines, dyes, etc.

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