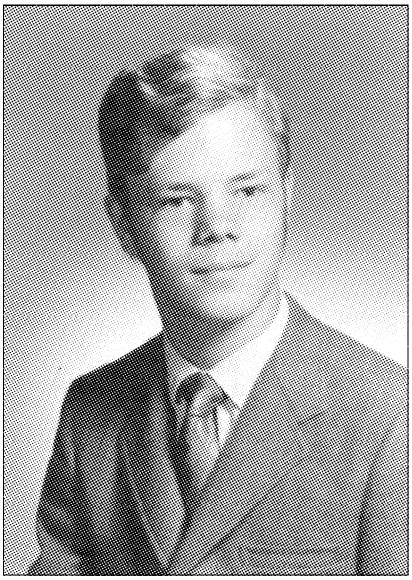
The Woody Notes of Fragrance



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Fragrance Books Inc.

www.perfumerbook.com

New Jersey - USA

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To my late much loved father Ray and beloved mother
Helen Roberta without them non of this work
would have been possible

THE WOODY NOTES OF FRAGRANCE ©

Designed by Glen O. Brechbill

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First Edition

About the Book

The Woody Notes of Fragrance is basically about the wood ingredients that are used in fragrance creation. The Good Scent Company has a fairly complete listing on synthetic ingredients, including my own notes to the back of the book. I wanted to make this a predominately essential oil book, and save data that is slowly disappearing due to over regulation.

Woody aromatic materials are based on wood related materials such as cedar, fir or pine. They can make up a very small part of a fragrance blend or be a majority note. Synthetic notes are popular because they are based on petroleum, and are cheaper to produce. They mimic what is found in nature, and say it is better.

The hysteria created by the folks at (IFRA), and indirectly by the major five is obvious. The large international houses control eighty percent of the worlds fragrance market, and want to control more through a monopoly that is slowly strangling the heart of the art.

During the past twenty or so years RIFM the research arm of the industry is slowing eliminating many natural ingredients. As a perfumer palette is reduced synthetic ingredients play an important role in most fragrances created today. Natural ingredients ad life and diffusion to a fragrance blend. The amendments that IFRA creates are thus slowly destroying the creative art.

This organization operates much like many secret police organizations that totalitarian regimes create to stay in power. Homeland Security a by-product of September 11, 2001 created by the Patriot Act has a dark side that in the wrong hands would prove scary. Fragrance products are analyzed in a laboratory by this organization. If an offending ingredient is found boy will they go on a witch-hunt.

A simple warning label could have been implemented. Instead companies have to purchase expensive software programs that tells a nose how much of this or that can go into a formula. When a composition that creates a scent is completed does it comply with established use standards. This is censorship in an art form worse then news censorship as can happen on the www.

If one speaks out against this lunatic organization you can jeopardize ones career. Only those perfumers who are independent or highly placed speak out against this foolishness.

Profits and making more and more money are at the heart of all business decisions today. The big five want to control the entire market, and minimizing essential oils helps to increase their dominance in the arts with synthetically created materials.

Monopolies occur in many industries including perfume. The big five that includes Givaudan, Firmenich, IFF, Syrmise and Takasago gobble up smaller companies to increase their profits and market share. This helps to stifle creativity, and forces more and more natural business to go to natural artists that call themselves a nose with little or no education. Essential oils predominate these blends. However, most know that the major brokers adulterate their product to further profits.

The big five has slowly strangled the creative aspect of the fragrance art. As their domination grows they can create shortages, price fixing, and slowly control all aspects of the market. It's a shame what has happened to this art. Ad layers of uninformed personnel who are envious of a nose, but understand little of what they do it has to frustrate those who make it their profession to create a scent.

Marketing briefs are created, and a perfumer has to interpret meaningless drivel to create a fragrance. In my mind an uninformed person is one who works in a occupation, and has never read anything about the business that employs you.

In the not to distant future the noses who are held with low respect will eventually be replaced by artificial intelligence computers. This has happened to the graphic arts, photography, illustrators, commercial artists and many other occupations. Perfumers think that they are immune to this technological development.

Any finished fragrance has tens of thousands of permutations. Each fragrance house has hundreds of thousands of compositions in their library. Why do they try and create new ones when any old one is as good as something freshly created?

The woods are a separate fragrance family part of the reason why I created this book. When one considers the fact that three of the big five have their own perfumer schools very little attention is given to natural materials. It is my opinion that if a student doesn't understand the root of an art which are essential oils one will not fully understand a synthetic aromatic materials.

Three families that include Citrus, Chypre, and Fougere have been eliminated from a perfumer palette of possibilities due to a growing list of regulatory amendments.

Do I have something against this regulatory body? I am in the slow process of disclosing the industry secrets book by book. I happen to love the art, but hate the way candidates are selected for this prestigious occupation. Instead of selecting the best-qualified individuals those that are chosen are often the best connected. How can anything new be created when an artist is blending something new based on what his or her father did ten twenty or forty years ago with new twists.

Education in book reading should be encouraged. However, today it is estimated that those under 30 read on the average one to two books a year for pleasure. I read over a hundred fragrance books in two years before I created my first book of notes many years ago.

Once one becomes a perfumer the passion to teach the next generation of artists is gone. There is an end less game of trying to create the next best seller with a dwindling palette of materials to choose from at an ever-cheaper price. In fact I would estimate that it would be close to impossible to create anything new with all of the restrictions in place. If one comes up with something different it can be duplicated by a competitor within a week.

The books that I have created have helped me to deal with the stress of taking care of my much beloved elderly mother. She is the love of my life, and when she unfortunately passes away I will deeply miss her. All of my books are dedicated to my father Ray who has passed away, and Roberta my mother.

Many thanks to the folks at Wikipedia for the free use of the enclosed material. Although incomplete, and its accuracy is anyone's guess it is free. Google on the other hand can't separate the wheat from the shaft or rank information based on pertinence versus irrelevance. A single page article can be ranked higher then a web site that contains over 10,000 pages of information.

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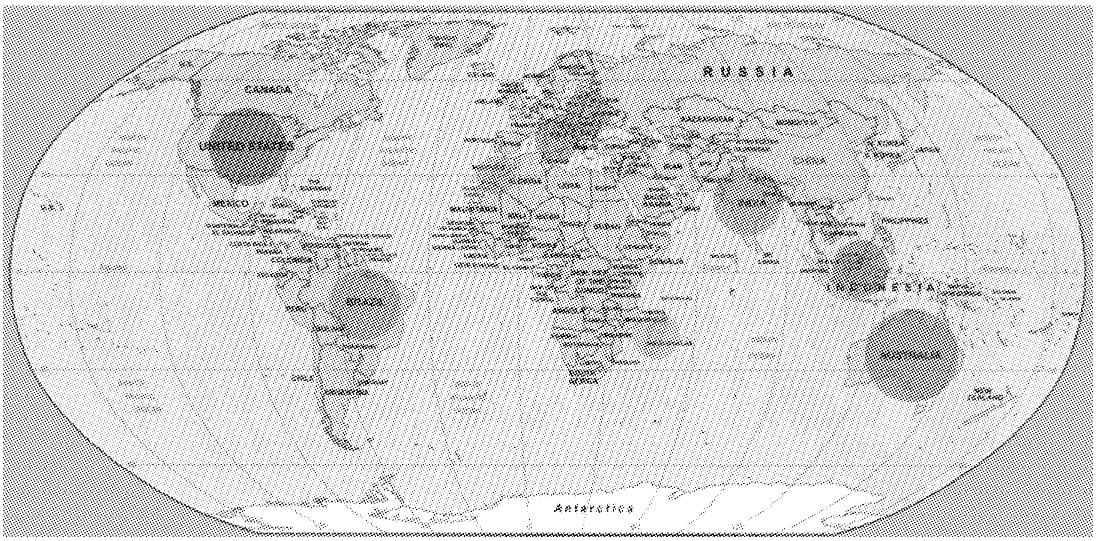

A World of Fragrances

International Directory by Country & House

Continent/Country/Fragrance House

Manuscript # 1 (A - H)

Manuscript # 2 (I - Z)

North America

Canada

The Spice Trader

United States

Alfa Chem
American Society of Perfumers
Aromatic International LLC
Artiste Flavor / Essence
Astral Extracts

Bedoukian Research, Inc.
Bell Flavors & Fragrances
Berje Inc.

Carrubba Inc.
Central States Chemical Marketing
Champon Vanilla
Citrus & Allied
Cookson & Hunt International Co.
Creative Fragrances Ltd.

DMH Ingredients

Continent/Country/Fragrance House

Fiveash Data Management
Fleurchem, Inc.
Fleurin, Inc.
Flexitral, Inc.
Florachem Corporation
Florida Chemical Company, Inc.
Florida Worldwide Citrus
Frencharoma Imports Co., Inc.

Good Scents Company
Gorlin & Company
Graham Chemical Corporation

I.P. Callison & Sons
Innospec Inc.
International Flavors & Fragrances

J & E Sozio, Inc.
Joint American Ventures in China

MelChem Distribution
Millennium Chemicals

Natural Resourcing
Norwest Ingredients

Oliganic

Penta Manufacturing
Phoenix Aromas & Essential Oils
Polarome International

Prima Fleur

Rosetta Enterprises LLC

Sarcom Inc.
Science Lab
Sensient Technologies Corporation
Sigma Aldrich
Spectrum Chemicals
Sundial Fragrances & Flavors
Sunrose Aromatics

Texarome
Treatt USA Inc.
Trisenx, Inc.

Uhe Company, Inc.
Ungerer & Company

Vigon International, Inc.

Walsh, John D., Company, Inc.

Central America

Mexico

Esencias y Materiales Lozmat

Tecnaal Group

South America

Argentina

Esarco
Euma

Fritzsche SAICA

San Miguel Agici y F

Brazil

Citral Oleos Essenciais Ltda.

J. Piltz & Cia. Ltda.

Petit Marie

Rai Ingredients

Europe

Belgium

Synaco Group

Bulgaria

Vesselino Trading Company

Denmark

Wambesco Gmbh

France

A.N.E.C.
Adrian Industries SAS
Albert Vielle SA
Aromatic Collection
Aromax
Axxence SARL

BFA Laboratories
Barosyl S.A.
Biolandes Parfumerie

Charabot & Company Inc.
Clos D'Aguzon

Diffusions Aromatiques
Dulcos Trading

Exaflor

H.Reynaud & Fils

IPRA Fragrances
Interchim

Laboratoire Monique Remy

Mane SA
Moraflor Produits Aromatiques
Muller & Koster

PCAS
Payan Bertrand SA
Prodarom
Prodasynth

Rhodia Organics
Robertet SA

SIPA A. Ch. Berthier
Sovimpex
Symarome

Germany

Basf

Dullberg Konzentra Gmbh

Eramex Aromatics Gmbh

Frey & Lau Gmbh

Lothar-Streck

Paul Kaders GmbH

Sensient Essential Oils Gmbh
Symrise GmbH & Co. KG

Th. Gyer Gmbh & Co. KG

Hungary

Silvestris & Szilas Ltd.

Italy

Baller s.r.l.

Capua s.r.l.
Citroflor di G.

Espira S.p.A

Farotti Essences srl

Moelhausen S.P.A.

Portugal

Kruetz Helmut

Spain

Bordas Destilaciones Chinchurreta

Cami de Fontainilles

Destilerias Munoz Galvez, s.a.

Lluche Essence

Ventos, Ernesto S.A.

Switzerland

Essencia, Aetherische Oele AG

Firmenich

Givaudan Fragrance Corporation

Puressence Wuresten Inc.

The Netherlands

Brighten Colorchem, B.V.

Flavodor

PFW Aroma Chemicals

United Kingdom

A & E Connock Ltd.
Augustus OIls. Ld.

British Society of Perfumers
Buckton Home Page Ltd.

De Monchy Aromatics, Inc.

Earth Oil Plantations Ltd.

FD Copeland & Sons Ltd.
Fine Chemical Trading
Furest Day Lawson

Global Essence Ltd.

Handa Fine Chemicals Ltd.

JC Buck Ltd.

Lionel Hitchen Ltd.

Quality Analysis

SRS Aromatics Ltd.

Venus Enterprises

Mediterranean

Israel

Agan Aroma & Fine Chemicals
Aromor Flavors & Fragrances Ltd.

Fruitarom Industries

Nardev

Asia

China

China Aroma Chemical Co., Ltd.
China Perfumer
Chinessence Ltd.

HC Biochem
Hangzhou Aroma Chemical Co.

Shanghai M & U International

Tianjin Jiete Fine Chemical Co.

Hong Kong

Naradev

O'Laughlin Industries

India

Amen Organics
Anthea Aromatics Pvt. Ltd.
Anupam Industries

B.S. Industries
Bansal Aroma

FFC Aroma
Flowersynth

GMPCT
Gyran Flavours

Hermani Ex-Imp Corporation
Hindustan Mint & Agro Products

Indian Spices

Kanta House
Katyani Exorts
Krupa Scientific
Kuber Impex Ltd.

Narain Terpene & Allied Chemical

Organica Aromatics Pvt. Ltd.

P.P. Sheth & Co.
Petitgara Chemicals
Premier Chemical Corporation
Privi Organics Ld.

Raj Aromatics Aroma Corporation

SAT Group
Seema International
Shreeji Aroma
Som Santi House
Some Extracts

Tadimetry Aromatics Pvt Ltd.
Thakker Group

Ultra International Limited
U.K. Aromatic & Chemicals

Indonesia

Djasula Wangi

Haldin

Indesso

Japan

Basf Japan Ltd.

Kao Corporation

Takasago International Corporation

Zeon Corporation

Korea

Castrading

M.X.D. Enterprise System

Nepal

Shambhala Herbal & Aromatics Pvt. Ltd.

Singapore

Taytonn Pte Ltd.

Sri Lanka

EOAS International

Thailand

Thailand Institute of Science

Turkey

Oregano

Viet Nam

Enter Oil

Australia

Australian Botanical Products

Cosmark

Perfume & Flavor Manufacturers
Peter Jarvis Cosmetic Develop.

W & W Australia Pty Ltd.

Africa

Africa Trade

Egypt

A.Fakhry & Company

Fayyum Gharbya Aromatic

Kato Aromatic S.A.E.

Woods

is a hard, fibrous tissue found in many trees. It has been used for hundreds of thousands of years for both fuel and as a construction material. It is an organic material, a natural composite of cellulose fibers (which are strong in tension) embedded in a matrix of lignin which resists compression. Wood is sometimes defined as only the secondary xylem in the stems of trees, or it is defined more broadly to include the same type of tissue elsewhere such as in tree roots or in other plants such as shrubs. In a living tree it performs a support function, enabling woody plants to grow large or to stand up for themselves. It also mediates the transfer of water and nutrients to the leaves and other growing tissues. Wood may also refer to other plant materials with comparable properties, and to material engineered from wood, or wood chips or fiber.

The earth contains about one trillion tonnes of wood, which grows at a rate of 10 billion tonnes per year. As an abundant, carbon-neutral renewable resource, woody materials have been of intense interest as a source of renewable energy. In 1991, approximately 3.5 billion cubic meters of wood were harvested. Dominant uses were for furniture and building construction.

History

A 2011 discovery in the Canadian province of New Brunswick uncovered the earliest known plants to have grown wood, approximately 395 to 400 million years ago.

People have used wood for millennia for many purposes, primarily as a fuel or as a construction material for making houses, tools, weapons, furniture, packaging, artworks, and paper.

Wood can be dated by carbon dating and in some species by dendrochronology to make inferences about when a wooden object was created.

The year-to-year variation in tree-ring widths and isotopic abundances gives clues to the prevailing climate at that time.

Growth Rings

Wood, in the strict sense, is yielded by trees, which increase in diameter by the formation, between the existing wood and the inner bark, of new woody layers which envelop the entire stem, living branches, and roots. This process is known as secondary growth; it is the result of cell division in the vascular cambium, a lateral meristem, and subsequent expansion of the new cells. Where there are clear seasons, growth can occur in a discrete annual or seasonal pattern, leading to growth rings; these can usually be most clearly seen on the end of a log, but are also visible on the other surfaces. If these seasons are annual these growth rings are referred to as annual rings. Where there is no seasonal difference growth rings are likely to be indistinct or absent.

If there are differences within a growth ring, then the part of a growth ring nearest the center of the tree, and formed early in the growing season when growth is rapid, is usually composed of wider elements. It is usually lighter in color than that near the outer portion of the ring, and is known as earlywood or springwood. The outer portion formed later in the season is then known as the latewood or summerwood. However, there are major differences, depending on the kind of wood

Knots

A knot is a particular type of imperfection in a piece of wood; it will affect the technical properties of the wood, usually for the worse, but may be exploited for visual effect. In a longitudinally sawn plank, a knot will appear as a roughly circular "solid" (usually darker) piece of wood around which the grain of the rest of the wood "flows" (parts and rejoins). Within a knot, the direction of the wood (grain direction) is up to 90 degrees different from the grain direction of the regular wood.

In the tree a knot is either the base of a side branch or a dormant bud. A knot (when the base of a side branch) is conical in shape (hence the roughly circular cross-section) with the inner tip at the point in stem diameter at which the plant's vascular cambium was located when the branch formed as a bud.

During the development of a tree, the lower limbs often die, but may remain attached for a time, sometimes years. Subsequent layers of growth of the attaching stem are no longer intimately joined with the dead limb, but are grown around it. Hence, dead branches produce knots which are not attached, and likely to drop out after the tree has been sawn into boards.

In grading lumber and structural timber, knots are classified according to their form, size, soundness, and the firmness with which they are held in place. This firmness is affected by, among other factors, the length of time for which the branch was dead while the attaching stem continued to grow.

Wood Knot

Knots materially affect cracking and warping, ease in working, and cleavability of timber. They are defects which weaken timber and lower its value for structural purposes where strength is an important consideration. The weakening effect is much more serious when timber is subjected to forces perpendicular to the grain and/or tension than where under load along the grain and/or compression. The extent to which knots affect the strength of a beam depends upon their position, size, number, and condition. A knot on the upper side is compressed, while one on the lower side is subjected to tension. If there is a season check in the knot, as is often the case, it will offer little resistance to this tensile stress. Small knots, however, may be located along the neutral plane of a beam and increase the strength by preventing longitudinal shearing. Knots in a board or plank are least injurious when they extend through it at right angles to its broadest surface. Knots which occur near the ends of a beam do not weaken it. Sound knots which occur in the central portion one-fourth the height of the beam from either edge are not serious defects.

Knots do not necessarily influence the stiffness of structural timber, this will depend on the size and location. Stiffness and elastic strength are more dependent upon the sound wood than upon localized defects. The breaking strength is very susceptible to defects. Sound knots do not weaken wood when subject to compression parallel to the grain.

In some decorative applications, wood with knots may be desirable to add visual interest. In applications where wood is painted, such as skirting boards, fascia boards, door frames and furniture, resins present in the timber may continue to 'bleed' through to the surface of a knot for months or even years after manufacture and show as a yellow or brownish stain. A knot primer paint or solution, correctly applied during preparation, may do much to reduce this problem but it is difficult to control completely, especially when using mass-produced kiln-dried timber stocks.

Hartwood & Sapwood

Or duramen is wood that as a result of a naturally occurring chemical transformation has become more resistant to decay. Heartwood formation occurs spontaneously (it is a genetically programmed process). Once heartwood formation is complete, the heartwood is dead. Some uncertainty still exists as to whether heartwood is truly dead, as it can still chemically react to decay organisms, but only once.

Usually heartwood looks different; in that case it can be seen on a cross-section, usually following the growth rings in shape. Heartwood may (or may not) be much darker than living wood. It may (or may not) be sharply distinct from the sapwood. However, other processes, such as decay, can discolor wood, even in woody plants that do not form heartwood, with a similar color difference, which may lead to confusion.

Sapwood (or alburnum) is the younger, outermost wood; in the growing tree it is living wood, and its principal functions are to conduct water from the roots to the leaves and to store up and give back according to the season the reserves prepared in the leaves. However, by the time they become competent to conduct water, all xylem tracheids and vessels have lost their cytoplasm and the cells are therefore functionally dead. All wood in a tree is first formed as sapwood. The more leaves a tree bears and the more vigorous its growth, the larger the volume of sapwood required. Hence trees making rapid growth in the open have thicker sapwood for their size than trees of the same species growing in dense forests. Sometimes trees (of species that do form heartwood) grown in the open may become of considerable size, 30 cm or more in diameter, before any heartwood begins to form, for example, in second-growth hickory, or open-grown pines.

The term heartwood derives solely from its position and not from any vital importance to the tree. This is evidenced by the fact that a tree can thrive with its heart completely decayed. Some species begin to form heartwood very early in life, so having only a thin layer of live sapwood, while in others the change comes slowly. Thin sapwood is characteristic of such species as chestnut, black locust, mulberry, osage-orange, and sassafras, while in maple, ash, hickory, hackberry, beech, and pine, thick sapwood is the rule. Others never form heartwood.

No definite relation exists between the annual rings of growth and the amount of sapwood. Within the same species the cross-sectional area of the sapwood is very roughly proportional to the size of the crown of the tree. If the rings are narrow, more of them are required than where they are wide. As the tree gets larger, the sapwood must necessarily become thinner or increase materially in volume. Sapwood is thicker in the upper portion of the trunk of a tree than near the base, because the age and the diameter of the upper sections are less.

When a tree is very young it is covered with limbs almost, if not entirely, to the ground, but as it grows older some or all of them will eventually die and are either broken off or fall off. Subsequent growth of wood may completely conceal the stubs which will however remain as knots. No matter how smooth and clear a log is on the outside, it is more or less knotty near the middle. Consequently the sapwood of an old tree, and particularly of a forest-grown tree, will be freer from knots than the inner heartwood. Since in most uses of wood, knots are defects that weaken the timber and interfere with its ease of working and other properties, it follows that a given piece of sapwood, because of its position in the tree, may well be stronger than a piece of heartwood from the same tree.

It is remarkable that the inner heartwood of old trees remains as sound as it usually does, since in many cases it is hundreds, and in a few instances thousands, of years old. Every broken limb or root, or deep wound from fire, insects, or falling timber, may afford an entrance for decay, which, once started, may penetrate to all parts of the trunk. The larvae of many insects bore into the trees and their tunnels remain indefinitely as sources of weakness. Whatever advantages, however, that sapwood may have in this connection are due solely to its relative age and position.

If a tree grows all its life in the open and the conditions of soil and site remain unchanged, it will make its most rapid growth in youth, and gradually decline. The annual rings of growth are for many years quite wide, but later they become narrower and narrower. Since each succeeding ring is laid down on the outside of the wood previously formed, it follows that unless a tree materially increases its production of wood from year to year, the rings must necessarily become thinner as the trunk gets wider. As a tree reaches maturity its crown becomes more open and the annual wood production is lessened, thereby reducing still more the width of the growth rings. In the case of forest-grown trees so much depends upon the competition of the trees in their struggle for light and nourishment that periods of rapid and slow growth may alternate. Some trees, such as southern oaks, maintain the same width of ring for hundreds of years. Upon the whole, however, as a tree gets larger in diameter the width of the growth rings decreases.

Different pieces of wood cut from a large tree may differ decidedly, particularly if the tree is big and mature. In some trees, the wood laid on late in the life of a tree is softer, lighter, weaker, and more even-textured than that produced earlier, but in other trees, the reverse applies. This may or may not correspond to heartwood and sapwood. In a large log the sapwood, because of the time in the life of the tree when it was grown, may be inferior in hardness, strength, and toughness to equally sound heartwood from the same log. In a smaller tree, the reverse may be true.

Color

In species which show a distinct difference between heartwood and sapwood the natural color of heartwood is usually darker than that of the sapwood, and very frequently the contrast is conspicuous (see section of yew log above). This is produced by deposits in the heartwood of chemical substances, so that a dramatic color difference does not mean a dramatic difference in the mechanical properties of heartwood and sapwood, although there may be a dramatic chemical difference.

Some experiments on very resinous Longleaf Pine specimens indicate an increase in strength, due to the resin which increases the strength when dry. Such resin-saturated heartwood is called "fat lighter". Structures built of fat lighter are almost impervious to rot and termites; however they are very flammable. Stumps of old longleaf pines are often dug, split into small pieces and sold as kindling for fires. Stumps thus dug may actually remain a century or more since being cut. Spruce impregnated with crude resin and dried is also greatly increased in strength thereby.

The wood of Coast Redwood is distinctively red in color

Since the latewood of a growth ring is usually darker in color than the earlywood, this fact may be used in judging the density, and therefore the hardness and strength of the material. This is particularly the case with coniferous woods. In ring-porous woods the vessels of the early wood not infrequently appear on a finished surface as darker than the denser latewood, though on cross sections of heartwood the reverse is commonly true. Except in the manner just stated the color of wood is no indication of strength.

Abnormal discoloration of wood often denotes a diseased condition, indicating unsoundness. The black check in western hemlock is the result of insect attacks. The reddish-brown streaks so common in hickory and certain other woods are mostly the result of injury by birds. The discoloration is merely an indication of an injury, and in all probability does not of itself affect the properties of the wood. Certain rot-producing fungi impart to wood characteristic colors which thus become symptomatic of weakness; however an attractive effect known as spalting produced by this process is often considered a desirable characteristic. Ordinary sap-staining is due to fungal growth, but does not necessarily produce a weakening effect.

Water Content

Water occurs in living wood in three conditions, namely: (1) in the cell walls, (2) in the protoplasmic contents of the cells, and (3) as free water in the cell cavities and spaces. In heartwood it occurs only in the first and last forms. Wood that is thoroughly air-dried retains 8–16% of the water in the cell walls, and none, or practically none, in the other forms. Even oven-dried wood retains a small percentage of moisture, but for all except chemical purposes, may be considered absolutely dry.

The general effect of the water content upon the wood substance is to render it softer and more pliable. A similar effect of common observation is in the softening action of water on paper or cloth. Within certain limits, the greater the water content, the greater its softening effect.

Drying produces a decided increase in the strength of wood, particularly in small specimens. An extreme example is the case of a completely dry spruce block 5 cm in section, which will sustain a permanent load four times as great as a green (undried) block of the same size will.

The greatest strength increase due to drying is in the ultimate crushing strength, and strength at elastic limit in endwise compression; these are followed by the modulus of rupture, and stress at elastic limit in cross-bending, while the modulus of elasticity is least affected.

Structure

Wood is a heterogeneous, hygroscopic, cellular and anisotropic material. It is composed of cells, and the cell walls are composed of micro-fibrils of cellulose (40% – 50%) and hemicellulose (15% – 25%) impregnated with lignin (15% – 30%).

Sections of tree trunk

A tree trunk as found at the Veluwe, Netherlands

In coniferous or softwood species the wood cells are mostly of one kind, tracheids, and as a result the material is much more uniform in structure than that of most hardwoods. There are no vessels ("pores") in coniferous wood such as one sees so prominently in oak and ash, for example.

The structure of hardwoods is more complex. The water conducting capability is mostly taken care of by vessels: in some cases (oak, chestnut, ash) these are quite large and distinct, in others (buckeye, poplar, willow) too small to be seen without a hand lens. In discussing such woods it is customary to divide them into two large classes, ring-porous and diffuse-porous. In ring-porous species, such as ash, black locust, catalpa, chestnut, elm, hickory, mulberry, and oak, the larger vessels or pores (as cross sections of vessels are called) are localised in the part of the growth ring formed in spring, thus forming a region of more or less open and porous tissue. The rest of the ring, produced in summer, is made up of smaller vessels and a much greater proportion of wood fibers. These fiber are the elements which give strength and toughness to wood, while the vessels are a source of weakness.

In diffuse-porous woods the pores are evenly sized so that the water conducting capability is scattered throughout the growth ring instead of being collected in a band or row. Examples of this kind of wood are basswood, birch, buckeye, maple, poplar, and willow. Some species, such as walnut and cherry, are on the border between the two classes, forming an intermediate group.

Earlywood and latewood in softwood

In temperate softwoods there often is a marked difference between latewood and earlywood. The latewood will be denser than that formed early in the season. When examined under a microscope the cells of dense latewood are seen to be very thick-walled and with very small cell cavities, while those formed first in the season have thin walls and large cell cavities. The strength is in the walls, not the cavities. Hence the greater the proportion of latewood the greater the density and strength. In choosing a piece of pine where strength or stiffness is the important consideration, the principal thing to observe is the comparative amounts of earlywood and latewood. The width of ring is not nearly so important as the proportion and nature of the latewood in the ring.

If a heavy piece of pine is compared with a lightweight piece it will be seen at once that the heavier one contains a larger proportion of latewood than the other, and is therefore showing more clearly demarcated growth rings. In white pines there is not much contrast between the different parts of the ring, and as a result the wood is very uniform in texture and is easy to work. In hard pines, on the other hand, the latewood is very dense and is deep-colored, presenting a very decided contrast to the soft, straw-colored earlywood.

It is not only the proportion of latewood, but also its quality, that counts. In specimens that show a very large proportion of latewood it may be noticeably more porous and weigh considerably less than the latewood in pieces that contain but little. One can judge comparative density, and therefore to some extent strength, by visual inspection.

No satisfactory explanation can as yet be given for the exact mechanisms determining the formation of earlywood and latewood. Several factors may be involved. In conifers, at least, rate of growth alone does not determine the proportion of the two portions of the ring, for in some cases the wood of slow growth is very hard and heavy, while in others the opposite is true. The quality of the site where the tree grows undoubtedly affects the character of the wood formed, though it is not possible to formulate a rule governing it. In general, however, it may be said that where strength or ease of working is essential, woods of moderate to slow growth should be chosen.

Earlywood and latewood in ring-porous woods

Earlywood and latewood in a ring-porous wood (ash) in a Fraxinus excelsior; tangential view, wide growth rings

In ring-porous woods each season's growth is always well defined, because the large pores formed early in the season abut on the denser tissue of the year before.

In the case of the ring-porous hardwoods there seems to exist a pretty definite relation between the rate of growth of timber and its properties. This may be briefly summed up in the general statement that the more rapid the growth or the wider the rings of growth, the heavier, harder, stronger, and stiffer the wood. This, it must be remembered, applies only to ring-porous woods such as oak, ash, hickory, and others of the same group, and is, of course, subject to some exceptions and limitations.

In ring-porous woods of good growth it is usually the latewood in which the thick-walled, strength-giving fibers are most abundant. As the breadth of ring diminishes, this latewood is reduced so that very slow growth produces comparatively light, porous wood composed of thin-walled vessels and wood parenchyma. In good oak these large vessels of the earlywood occupy from 6 to 10 percent of the volume of the log, while in inferior material they may make up 25% or more. The latewood of good oak is dark colored and firm, and consists mostly of thick-walled fibers which form one-half or more of the wood. In inferior oak, this latewood is much reduced both in quantity and quality. Such variation is very largely the result of rate of growth.

Wide-ringed wood is often called "second-growth", because the growth of the young timber in open stands after the old trees have been removed is more rapid than in trees in a closed forest, and in the manufacture of articles where strength is an important consideration such "second-growth" hardwood material is preferred. This is particularly the case in the choice of hickory for handles and spokes. Here not only strength, but toughness and resilience are important. The results of a series of tests on hickory by the U.S. Forest Service show that:

"The work or shock-resisting ability is greatest in wide-ringed wood that has from 5 to 14 rings per inch (rings 1.8-5 mm thick), is fairly constant from 14 to 38 rings per inch (rings 0.7–1.8 mm thick), and decreases rapidly from 38 to 47 rings per inch (rings 0.5–0.7 mm thick). The strength at maximum load is not so great with the most rapid-growing wood; it is maximum with from 14 to 20 rings per inch (rings 1.3–1.8 mm thick), and again becomes less as the wood becomes more closely ringed. The natural deduction is that wood of first-class mechanical value shows from 5 to 20 rings per inch (rings 1.3–5 mm thick) and that slower growth yields poorer stock. Thus the inspector or buyer of hickory should discriminate against timber that has more than 20 rings per inch (rings less than 1.3 mm thick). Exceptions exist, however, in the case of normal growth upon dry situations, in which the slow-growing material may be strong and tough."

The effect of rate of growth on the qualities of chestnut wood is summarised by the same authority as follows:

"When the rings are wide, the transition from spring wood to summer wood is gradual, while in the narrow rings the spring wood passes into summer wood abruptly. The width of the spring wood changes but little with the width of the annual ring, so that the narrowing or broadening of the annual ring is always at the expense of the summer wood. The narrow vessels of the summer wood make it richer in wood substance than the spring wood composed of wide vessels. Therefore, rapid-growing specimens with wide rings have more wood substance than slow-growing trees with narrow rings. Since the more the wood substance the greater the weight, and the greater the weight the stronger the wood, chestnuts with wide rings must have stronger wood than chestnuts with narrow rings. This agrees with the accepted view that sprouts (which always have wide rings) yield better and stronger wood than seedling chestnuts, which grow more slowly in diameter."

Earlywood and latewood in diffuse-porous woods

In the diffuse-porous woods, the demarcation between rings is not always so clear and in some cases is almost (if not entirely) invisible to the unaided eye. Conversely, when there is a clear demarcation there may not be a noticeable difference in structure within the growth ring.

In diffuse-porous woods, as has been stated, the vessels or pores are even-sized, so that the water conducting capability is scattered throughout the ring instead of collected in the earlywood. The effect of rate of growth is, therefore, not the same as in the ring-porous woods, approaching more nearly the conditions in the conifers. In general it may be stated that such woods of medium growth afford stronger material than when very rapidly or very slowly grown. In many uses of wood, total strength is not the main consideration. If ease of working is prized, wood should be chosen with regard to its uniformity of texture and straightness of grain, which will in most cases occur when there is little contrast between the latewood of one season's growth and the earlywood of the next.

Monocot Wood

Trunks of the Coconut palm, a monocot, in Java. From this perspective these look not much different from trunks of a dicot or conifer

Structural material that roughly (in its gross handling characteristics) resembles ordinary, "dicot" or conifer wood is produced by a number of monocot plants, and these also are colloquially called wood. Of these, bamboo, botanically a member of the grass family, has considerable economic importance, larger culms being widely used as a building and construction material in their own right and, these days, in the manufacture of engineered flooring, panels and veneer. Another major plant group that produce material that often is called wood are the palms. Of much less importance are plants such as Pandanus, Dracaena and Cordyline. With all this material, the structure and composition of the structural material is quite different from ordinary wood.

Hard & Soft Woods

There is a strong relationship between the properties of wood and the properties of the particular tree that yielded it. The density of wood varies with species. The density of a wood correlates with its strength (mechanical properties). For example, mahogany is a medium-dense hardwood that is excellent for fine furniture crafting, whereas balsa is light, making it useful for model building. One of the densest woods is black ironwood.

It is common to classify wood as either softwood or hardwood. The wood from conifers (e.g. pine) is called softwood, and the wood from dicotyledons (usually broad-leaved trees, e.g. oak) is called hardwood. These names are a bit misleading, as hardwoods are not necessarily hard, and softwoods are not necessarily soft. The well-known balsa (a hardwood) is actually softer than any commercial softwood. Conversely, some softwoods (e.g. yew) are harder than many hardwoods.

Chemistry of Wood

Aside from water, wood has three main components. Cellulose, a crystalline polymer derived from glucose, constitutes about 41–43%. Next in abundance is hemicellulose, which is around 20% in deciduous trees but near 30% in conifers. It is mainly five-carbon sugars that are linked in an irregular manner, in contrast to the cellulose. Lignin is the third component at around 27% in coniferous wood vs 23% in deciduous trees. Lignin confers the hydrophobic properties reflecting the fact that it is based on aromatic rings. These three components are interwoven, and direct covalent linkages exist between the lignin and the hemicellulose. A major focus of the paper industry is the separation of the lignin from the cellulose, from which paper is made.

Chemical structure of lignin, which comprises approximately 30% of wood and is responsible for many of its properties.

In chemical terms, the difference between hardwood and softwood is reflected in the composition of the constituent lignin. Hardwood lignin is primarily derived from sinapyl alcohol and coniferyl alcohol. Softwood lignin is mainly derived from coniferyl alcohol.

Extractives

Aside from the lignocellulose, wood consists of a variety of low molecular weight organic compounds, called extractives. The wood extractives are fatty acids, resin acids, waxes and terpenes. For example, rosin is exuded by conifers as protection from insects. The extraction of these organic materials from wood provides tall oil, terpentine, and rosin.

Uses

Fuel

Wood has a long history of being used as fuel, which continues to this day, mostly in rural areas of the world. Hardwood is preferred over softwood because it creates less smoke and burns longer. Adding a woodstove or fireplace to a home is often felt to add ambiance and warmth.

Construction

Wood has been an important construction material since humans began building shelters, houses and boats. Nearly all boats were made out of wood until the late 19th century, and wood remains in common use today in boat construction.

Wood to be used for construction work is commonly known as lumber in North America. Elsewhere, lumber usually refers to felled trees, and the word for sawn planks ready for use is timber.

New domestic housing in many parts of the world today is commonly made from timber-framed construction. Engineered wood products are becoming a bigger part of the construction industry. They may be used in both residential and commercial buildings as structural and aesthetic materials.

In buildings made of other materials, wood will still be found as a supporting material, especially in roof construction, in interior doors and their frames, and as exterior cladding.

Wood is also commonly used as shuttering material to form the mould into which concrete is poured during reinforced concrete construction.

Furniture and Utensils

Wood has always been used extensively for furniture, such as chairs and beds. Also for tool handles and cutlery, such as chopsticks, toothpicks, and other utensils, like the wooden spoon.

Engineered Wood

Products, glued building products "engineered" for application-specific performance requirements, are often used in construction and industrial applications. Glued engineered wood products are manufactured by bonding together wood strands, veneers, lumber or other forms of wood fiber with glue to form a larger, more efficient composite structural unit. These products include glued laminated timber (glulam), wood structural panels (including plywood, oriented strand board and composite panels), laminated veneer lumber (LVL) and other structural composite lumber (SCL) products, parallel strand lumber, and I-joists. Approximately 100 million cubic meters of wood was consumed for this purpose in 1991. The trends suggest that particle board and fiber board will overtake plywood.

Engineered wood products display highly predictable and reliable performance characteristics and provide enhanced design flexibility: on one hand, these products allow the use of smaller pieces, and on the other hand, they allow for bigger spans. They may also be selected for specific projects such as public swimming pools or ice rinks where the wood will not deteriorate in the presence of certain chemicals, and are less susceptible to the humidity changes commonly found in these environments.

Engineered wood products prove to be more environmentally friendly and, if used appropriately, are often less expensive than building materials such as steel or concrete. These products are extremely resource-efficient because they use more of the available resource with minimal waste. In most cases, engineered wood products are produced using faster growing and often underutilized wood species from managed forests and tree farms.

Wood unsuitable for construction in its native form may be broken down mechanically (into fibers or chips) or chemically (into cellulose) and used as a raw material for other building materials, such as engineered wood, as well as chipboard, hardboard, and medium-density fiberboard (MDF). Such wood derivatives are widely used: wood fibers are an important component of most paper, and cellulose is used as a component of some synthetic materials. Wood derivatives can also be used for kinds of flooring, for example laminate flooring.

Next Generation Wood Products

Further developments include new lignin glue applications, recyclable food packaging, rubber tire replacement applications, anti-bacterial medical agents, and high strength fabrics or composites. As scientists and engineers further learn and develop new techniques to extract various components from wood, or alternatively to modify wood, for example by adding components to wood, new more advanced products will appear on the marketplace.

In the Arts

Main article: Wood as a medium

Wood has long been used as an artistic medium. It has been used to make sculptures and carvings for millennia. Examples include the totem poles carved by North

American indigenous people from conifer trunks, often Western Red Cedar (Thuja plicata), and the Millennium clock tower, now housed in the National Museum of Scotland in Edinburgh.

It is also used in woodcut printmaking, and for engraving.

Certain types of musical instruments, such as those of the violin family, the guitar, the clarinet and recorder, the xylophone, and the marimba, are made mostly or entirely of wood. The choice of wood may make a significant difference to the tone and resonant qualities of the instrument, and tonewoods have widely differing properties, ranging from the hard and dense african blackwood (used for the bodies of clarinets) to the light but resonant European spruce (Picea abies) (traditionally used for the soundboards of violins). The most valuable tonewoods, such as the ripple sycamore (Acer pseudoplatanus), used for the backs of violins, combine acoustic properties with decorative color and grain which enhance the appearance of the finished instrument.

Despite their collective name, not all woodwind instruments are made entirely of wood. The reeds used to play them, however, are usually made from Arundo donax, a type of monocot cane plant.

Sports & Recreational Equipment

Many types of sports equipment are made of wood, or were constructed of wood in the past. For example, cricket bats are typically made of white willow. The baseball bats which are legal for use in Major League Baseball are frequently made of ash wood or hickory, and in recent years have been constructed from maple even though that wood is somewhat more fragile. In softball, however, bats are more commonly made of aluminium (this is especially true for fastpitch softball).

Many other types of sports and recreation equipment, such as skis, ice hockey sticks, lacrosse sticks and archery bows, were commonly made of wood in the past, but have since been replaced with more modern materials such as aluminium, fiberglass, carbon fiber, titanium, and composite materials. One noteworthy example of this trend is the golf club commonly known as the wood, the head of which was traditionally made of persimmon wood in the early days of the game of golf, but is now generally made of synthetic materials.

Medicine

In January 2010 Italian scientists announced that wood could be harnessed to become a bone substitute. It is likely to take at least five years until this technique will be applied for humans.

Woods:

Abies Alba
Agarwood (Oud)
Amber
Amyris

Balsam
Birch

Cade
Cedar

Fir

Guaiacwood

Mahogany

Oakmoss

Patchouli
Pine

Sandalwood
Silver Fir
Spruce

Teak
Tree Moss
Turpentine

Vetiver

Woody Notes - A Reference Book on Fragrance Ingredients

Abalyn
Allyl Ionone
Aloe Vera Lupo Quinon Extract
Alpha Pinene
Ambergris T Oliffac
Amphermate
Amyris Acetate
Amyris Oil W.I.

Bacdanol
Beachwood Cresote
Benteine
Beta Pinene
Birch Leaf Oil
Birch Tar Oil
Bois Ambrene Forte
Brahmanol

Cabreuva Oil
Cade Oil
Cadinene
Calamus
Cedarwood Alcohol
Cedarwood Oil Terpeneless
Cedarwood Oil Texas Crude
Cedarwood Oil Virginia
Cedramber
Cedrene
Cedrenol
Cedrol Crystals
Cedrenyl Acetate
Cedryl Acetate
Citronella Oil Ceylon
Cortex Aldehyde
Costus Oil
Cubeb Oil
Cypress Oil

Di Hydro Cuminyl Alcohol

Fir Needle Balsam Resin
Fir Needle Siberian
Fixolide
Fleuroxene

Ginger Oil
Guaicol
Guaicwood Acetate
Gurjan Balsam Oil

Heptavert

Ionone Beta
Ionones
Iraldeine Beta
Iris Resin
Iso Bornyl Acetate
Iso Cyclomene E
Iso E Super
Iso Longifolanone
Iso Methyl Cedryl Ketone A

Kephalis LRG - 1182
Koavone
Kohinool

Linalool Oxide

Madrox
Menthanyl Acetate
Menthol Racemic
Merion
Methyl Cedryl Ketone
Methyl Ionone Beta
Methyl Ionone Beta Coeur
Methyl Ionone Gamma A
Methyl Ionone Gamma Supreme
Methyl Ionone Tails
Methyl Ionone Terpenes
Methyl Ionones
Mousse De Chenne Abs.
Mousse De Metra
Moussyl 1055

Nerolidyl Acetate
Nopol
Nopyl Acetate
Norsdandyl 81157

Orivone
Ortho Methyl Cinnamic Aldehyde
Osyrol

Parsley Seed Oil
Patchone
Patchouli Dark
Petitgrainol
Phenyl Acetaldehyde
Pine Oil Yarmor # 302
Polarsan

Rosemary
Rose Nitrile

Sandalore
Sandela
Sandalwood Essence
Sandalwood 77.125B
Sandalwood Oil East Indies
Sandalwood Oil Australian
Sandranol
Santalol
Santalum Citrinum
Santalyl Acetate

Thiazyl
Tree Moss Abs.
Trimofix
Turpentine SDW

Unipine 85
Unipine 90
Unitene D

Valanone B
Vanoris
Vertenex
Vertofix Coeur
Vetiverol
Vetivert Oil Bourbon
Vetiveryl Acetate

Woodine

Abies Alba

Abies alba, the silver fir or European silver fir, is a fir native to the mountains of Europe, from the Pyrenees north to Normandy, east to the Alps and the Carpathians, and south to southern Italy and northern Serbia

A. alba is a large evergreen coniferous tree growing to 40–50 m (exceptionally 60 m) tall and with a trunk diameter of up to 1.5 m. The largest measured tree was 68 m tall and had a trunk diameter of 3.8 m. It occurs at altitudes of 300-1,700 m (mainly over 500 m), on mountains with a rainfall of over 1,000 mm.

The leaves are needle-like, flattened, 1.8–3 cm long and 2 mm wide by 0.5 mm thick, glossy dark green above, and with two greenish-white bands of stomata below. The tip of the leaf is usually slightly notched at the tip. The cones are 9–17 cm long and 3–4 cm broad, with about 150-200 scales, each scale with an exserted bract and two winged seeds; they disintegrate when mature to release the seeds.[citation needed] The wood is white, leading to the species name "alba".

It tends to forms woods with other firs and beeches. It is closely related to Bulgarian Fir (Abies borisiiregis) further to the southeast in the Balkan Peninsula, and Sicilian Fir (A. nebrodensis) in Sicily, differing from these and other related Euro-Mediterranean firs in the sparser foliage, with the leaves spread either side of the shoot, leaving the shoot readily visible from above. Some botanists treat Bulgarian Fir and Sicilian Fir as varieties of Silver Fir, as A. alba var. acutifolia and A. alba var. nebrodensis respectively.

Ecology and Uses

Silver Fir is an important component species in the Dinaric calcareous Silver Fir forest in the western Balkan Peninsula.

Its cone scales are used as food by the caterpillars of the tortrix moth Cydia illutana, while C. duplicana feeds on the bark around injuries or canker.

A resinous essential oil can be extracted. This pine-scented oil has soothing qualities, and is used in perfumes, bath products, and aerosol inhalants.

Silver Fir is the species first used as a Christmas tree, but has been largely replaced by Nordmann Fir (which has denser, more attractive foliage), Norway Spruce (which is much cheaper to grow), and other species. The wood is moderately soft and white, used for general construction and paper manufacture.

Agarwood (Oud)

Agarwood or oodh (or just agar) is a dark resinous heartwood that forms in Aquilaria and Gyrinops trees (large evergreens native to southeast Asia) when they become infected with a type of mold. Prior to infection, the heartwood is relatively light and pale coloured; however, as the infection progresses, the tree produces a dark aromatic resin in response to the attack, which results in a very dense, dark, resin embedded heartwood. The resin embedded wood is commonly called gaharu, jinko, aloeswood, agarwood, or oud (not to be confused with 'Bakhoor') and is valued in many cultures for its distinctive fragrance, and thus is used for incense and perfumes.

One of the reasons for the relative rarity and high cost of agarwood is the depletion of the wild resource. Since 1995 Aquilaria malaccensis, the primary source, has been listed in Appendix II (potentially threatened species) by the Convention on International Trade in Endangered Species of Wild Fauna and Flora. In 2004 all Aquilaria species were listed in Appendix II; however, a number of countries have outstanding reservations regarding that listing.

History

The odour of agarwood is complex and pleasing, with few or no similar natural analogues. As a result, agarwood and its essential oil gained great cultural and religious significance in ancient civilizations around the world, being mentioned throughout one of the world's oldest written texts - the Sanskrit Vedas from India.

As early as the third century AD in ancient China, the chronicle Nan zhou yi wu zhi (Strange things from the South) written by Wa Zhen of the Eastern Wu Dynasty mentioned agarwood produced in the Rinan commandery, now Central Vietnam, and how people collected it in the mountains.

Starting in 1580 after Nguye^~n Hoàng took control over the central provinces of modern Vietnam, he encouraged trade with other countries, specifically China and Japan. Agarwood was exported in three varieties: Calambac (ky` nam in Vietnamese), tra^`m hu+o+ng (very similar but slightly harder and slightly more abundant), and agarwood proper. A pound of Calambac bought in Ho^.i An for 15 taels could be sold in Nagasaki for 600 taels. The Nguye^~n Lords soon established a Royal Monopoly over the sale of Calambac. This monopoly helped fund the Nguye^~n state finances during the early years of the Nguyen rule.

Xuanzang's travelogues and the Harshacharita, written in seventh century AD in Northern India, mentions use of agarwood products such as 'Xasipat' (writing-material) and 'aloe-oil' in ancient Assam (Kamarupa). The tradition of making writing materials from its bark still exists in Assam.

Etymology

Agarwood is known under many names in different cultures:

In Hindi (India), it is known as agar, which is originally Sanskrit aguru (in Bengali, also aguru).

It is known by the same Sanskrit name in Telugu and Kannada as

Aguru.

It is known as chénxia-ng in Chinese, tra^`m hu + o + ng in Vietnamese, and jinko - in Japanese; all meaning "sinking incense" and alluding to its high density. In Japan, there are several grades of jinko-, the highest of which is known as kyara.

Both agarwood and its resin distillate/extracts are known as oud in Arabic (literally "rod/stick") and used to describe agarwood in nations and areas in Arabic countries. Western perfumers may also use agarwood essential oil under the name "oud" or "oude".

In Europe it was referred to as Lignum aquila (eagle-wood) or Agilawood, because of the similarity in sound of agila to gaharu.

Another name is Lignum aloes or Aloeswood. This is potentially confusing, since a genus Aloe exists (unrelated), which has medicinal uses.

In Tibetan it is known as (a-ga-ru). There are several varieties used in Tibetan Medicine: unique eaglewood: (ar-ba-zhig); yellow eaglewood: (a-ga-ru ser-po), white eaglewood: (ar-skya), and black eaglewood: (ar-nag).

In Assamese it is called as "sasi" or "sashi".

The Indonesian and Malay name is "gaharu".

In Papua New Guinea it is called "ghara" or eaglewood.

In Thai language it is known as "Mai Kritsana".

In Tamil it is called "akil" though what was referred in ancient Tamil literature could well be Excoecaria agallocha.

In Laos it is known as "Mai Ketsana".

Formation

There are fifteen species in the genus Aquilaria and eight are known to produce agarwood. In theory agarwood can be produced from all members; however, until recently it was primarily produced from A. malaccensis. A. agallocha and A. secundaria are synonyms for A. malaccensis. A. crassna and A. sinensis are the other two members of the genus that are usually harvested.

Formation of agarwood occurs in the trunk and roots of trees that have been infected by a parasitc ascomycetous mold, Phae-oacremonium parasitica, a dematiaceous (dark-walled) fungus. As a response, the tree produces a resin high in volatile organic compounds that aids in suppressing or retarding the fungal growth, a process called tylosis. While the unaffected wood of the tree is relatively light in colour, the resin dramatically increases the mass and density of the affected wood, changing its colour from a pale beige to dark brown or black. In natural forest only about 7% of the trees are infected by the fungus. A common method in artificial forestry is to inoculate all the trees with the fungus.

Aquilaria species that produce agarwood

Aquilaria khasiana, found in India

Aquilaria apiculina, found in Philippines

Aquilaria acuminata, found in Papua New Guinea, Indonesia & Philippines

Aquilaria baillonil, found in Thailand and Cambodia

Aquilaria baneonsis, found in Vietnam

Aquilaria beccariana, found in Indonesia

Aquilaria brachyantha, found in Malaysia

Aquilaria crassna found in Cambodia, Malaysia, Thailand, and Vietnam

Aquilaria cumingiana, found in Indonesia and Malaysia

Aquilaria filaria, found in New

Guinea, the Moluccas, and Mindanao (Philippines).

Aquilaria grandiflora, found in China

Aquilaria hirta, found in Thailand, Indonesia and Malaysia

Aquilaria malaccensis, found in Malaysia, Thailand, and India

Aquilaria microcapa, found in Indonesia and Malaysia

Aquilaria rostrata, found in Malaysia

Aquilaria sinensis, found in China

Aquilaria subintegra, found in Thailand

Conservation of agarwood-producing species

Overharvesting and habitat loss threatens some populations of agarwood-producing species. Concern over the impact of the global demand for agarwood has thus led to the inclusion of the main taxa on Cites Appendix II, which requires that international trade in agarwood is subject to controls designed to ensure that harvest and exports are not to the detriment of the survival of the species in the wild.

In addition, agarwood plantations have been established in a number of countries. The success of these plantation depends on the stimulation of agarwood production in the trees. Numerous inoculation techniques have been developed, with varying degrees of success

Amber

Is fossilized tree resin (not sap), which has been appreciated for its color and natural beauty since Neolithic times. Amber is used as an ingredient in perfumes, as a healing agent in folk medicine, and as jewelry. There are five classes of amber, defined on the basis of their chemical constituents. Because it originates as a soft, sticky tree resin, amber sometimes contains animal and plant material as inclusions. Amber occurring in coal seams is also called resinite, and the term ambrite is applied to that found specifically within New Zealand coal seams.

History & Etymology

The English word amber derives from the Arabic anbar, via Medieval Latin ambar and Old French ambre. The word originally referred to a precious oil derived from the Sperm whale (now called ambergris). The sense was extended to fossil resin circa 1400, and this became the main sense, as the use of ambergris waned. The two substances were confused, because they both were found washed up on beaches. Ambergris is less dense than water and floats, whereas amber is less dense than stone, but too dense to float. The word ambar was brought to Europe by the Crusaders. In French ambre gris (lit. gray amber), became used for ambergris, while ambre jaune (yellow amber), denoted the fossil resin we now call amber.

Amber is discussed by Theophrastus, possibly the first historical mention of the material, in the 4th century BC. The Greek name for amber was (elektron), "formed by the sun", and it was connected to the sun god (Helios), one of whose titles was Elector or the Awakener. According to the myth, when Helios' son Phaëton was killed, his mourning sisters became poplars, and their tears became the origin of elektron, amber.

Another early reference to Amber was Pytheas (330 BC) whose work "On the Ocean" is lost, but was referenced by Pliny. According to The Natural History" by Pliny the Elder:

Pytheas says that the Gutones, a people of Germany, inhabit the shores of an estuary of the Ocean called Mentonomon, their territory extending a distance of six thousand stadia; that, at one day's sail from this territory, is the Isle of Abalus, upon the shores of which, amber is thrown up by the waves in spring, it being an excretion of the sea in a concrete form; as, also, that the inhabitants use this amber by way of fuel, and sell it to their neighbors, the Teutones.

While amber is not actually named, it is called the concreti maris purgamentum, "the leavings of the frozen sea" after the spring melt. Diodorus uses e-lektron, the Greek word for amber, the object that gave its name to electricity through its ability to acquire a charge. Pliny is presenting an archaic view, as in his time amber was a precious stone brought from the Baltic at great expense, but the Germans, he says, use it for firewood, according to Pytheas.

Earlier Pliny says that a large island of three days' sail from the Scythian coast called Balcia by Xenophon of Lampsacus is called Basilia by Pytheas. It is generally understood to be the same as Abalus. Based on the amber, the island could have been Heligoland, Zealand, the shores of Bay of Gdansk, Sambia or the Curonian Lagoon, which were historically the richest sources of amber in northern Europe. This is the earliest use of Germania.

The modern terms "electricity" and "electron" derive from the Greek word for amber, and come from William Gilbert's research showing that amber could attract other substances. The word "electron" was coined in 1891 by the Irish physicist George Stoney whilst analyzing elementary charges for the first time.

The presence of insects in amber was noticed by Pliny the Elder in his Naturalis Historia, and led him to theorize correctly that, at some point, amber had to be in a liquid state to cover the bodies of insects. Hence he gave it the expressive name of succinum or gum-stone, a name that is still in use today to describe succinic acid as well as succinite, a term given to a particular type of amber by James Dwight Dana (see below under Baltic Amber).

Heating amber will soften it and eventually it will burn, which is why in Germanic languages the word for amber is a literal translation of burn-Stone (nl. barnsteen, de. Bernstein, the latter of which the Polish word bursztyn or the Hungarian borostyán derives from). Heated above 200 °C, amber suffers decomposition, yielding an "oil of amber", and leaving a black residue which is known as "amber colophony", or "amber pitch"; when dissolved in oil of turpentine or in linseed oil this forms "amber varnish" or "amber lac".

Amber from the Baltic Sea has been extensively traded along the Amber Road since antiquity; and in the mainland, from where amber was traded 2000 years ago, the natives called it glaes (referring to its see-through quality similar to glass).

The Baltic Lithuanian term for amber is Gintaras and Latvian Dzintars. They, and the Slavic jantar or Hungarian gyanta ('resin'), are thought to originate from Phoenician jainitar (sea-resin). While most Slavic languages, including Russian and Czech, retain the old Slavic word, in the Polish language, jantar, while correct, is used very rarely (even considered archaic) and was replaced by the word bursztyn, deriving from the German term, Bernstein.

Composition and Formation

Amber is heterogeneous in composition, but consists of several resinous bodies more or less soluble in alcohol, ether and chloroform, associated with an insoluble bituminous substance. Amber is a macromolecule by free radical polymerization of several precursors in the labdane family, e.g. communic acid, cummunol, and biformene. These labdanes are diterpenes (C20H32) and trienes, equipping the organic skeleton with three alkene groups for polymerization. As amber matures over the years, more polymerization takes place as well as isomerization reactions, crosslinking and cyclization.

The average composition of amber leads to the general formula C10H16O.

Formation

Molecular polymerization, resulting from high pressures and temperatures produced by overlying sediment, transforms the resin first into copal. Sustained heat and pressure drives off terpenes and results in the formation of amber.

Botanical Origin

Fossil resins from Europe fall into two categories, the famous Baltic ambers and another that resembles the Agathis group. Fossil resins from the Americas and Africa are closely related to the modern genus Hymenaea, while Baltic ambers are thought to be fossil resins from Sciadopityaceae family plants that used to live in north Europe.

Inclusions

The abnormal development of resin has been called succinosis. Impurities are quite often present, especially when the resin dropped on to the ground, so that the material may be useless except for varnish-making, whence the impure amber is called firniss. Enclosures of pyrites may give a bluish color to amber. The so-called black amber is only a kind of jet. Bony amber owes its cloudy opacity to minute bubbles in the interior of the resin.

In darkly clouded and even opaque amber, inclusions can be imaged using high-energy, high-contrast, high-resolution X-rays.

Extraction and Processing

Distribution and Mining

Amber is globally distributed, mainly in rocks of Cretaceous age or younger. Historically, the coast around Königsberg in Prussia was the world's leading source of amber. About 90% of the world's extractable amber is still located in the Kaliningrad Oblast of Russia on the Baltic Sea (which was previously Königsberg in Prussia, before World War II).

Pieces of amber torn from the seafloor are cast up by the waves, and collected by hand, dredging, or diving. Elsewhere, amber is mined, both in open works and underground galleries. Then nodules of blue earth have to be removed and an opaque crust must be cleaned off, which can be done in revolving barrels containing sand and water. Erosion removes this crust from sea-worn amber.

Dominican amber, especially Dominican blue amber, is mined through bell pitting, which is dangerous due to the risk of tunnel collapse.

Treatment

This unreferenced section requires citations to ensure verifiability.

The Vienna amber factories, which use pale amber to manufacture pipes and other smoking tools, turn it on a lathe and polish it with whitening and water or with rotten stone and oil. The final lustre is given by friction with flannel.

When gradually heated in an oil-bath, amber becomes soft and flexible. Two pieces of amber may be united by smearing the surfaces with linseed oil, heating them, and then pressing them together while hot. Cloudy amber may be clarified in an oil-bath, as the oil fills the numerous pores to which the turbidity is due. Small fragments, formerly thrown away or used only for varnish, are now used on a large scale in the formation of "amberoid" or "pressed amber". The pieces are carefully heated with exclusion of air and then compressed into a uniform mass by intense hydraulic pressure; the softened amber being forced through holes in a metal plate. The product is extensively used for the production of cheap jewelry and articles for smoking. This pressed amber yields brilliant interference colors in polarized light. Amber has often been imitated by other resins like copal and kauri, as well as by celluloid and even glass. Baltic amber is sometimes colored artificially, but also called "true amber".

Appearance

Amber occurs in a range of different colors. As well as the usual yellow-orange-brown that is associated with the color "amber", amber itself can range from a whitish color through a pale lemon yellow, to brown and almost black. Other more uncommon colors include red amber (sometimes known as "cherry amber"), green amber, and even blue amber, which is rare and highly sought after.

Much of the most highly-prized amber is transparent, in contrast to the very common cloudy amber and opaque amber. Opaque amber contains numerous minute bubbles. This kind of amber is known as "bony amber".

Although all Dominican amber is fluorescent, the rarest Dominican amber is blue amber. It turns blue in natural sunlight and any other partially or wholly ultraviolet light source. In long-wave UV light it has a very strong reflection, almost white. Only about 100 kg is found per year, which makes it valuable and expensive.

Sometimes amber retains the form of drops and stalactites, just as it exuded from the ducts and receptacles of the injured trees. It is thought that, in addition to exuding onto the surface of the tree, amber resin also originally flowed into hollow cavities or cracks within trees, thereby leading to the development of large lumps of amber of irregular form.

Classification

Amber can be classified into several forms. Most fundamentally, there are two types of plant resin with the potential for fossilization. Terpenoids, produced by conifers and angiosperms, consist of ring structures formed of isoprene (C_5H_8) units. Phenolic resins are today only produced by angiosperms, and tend to serve functional uses. The extinct medullosans produced a third type of resin, which is often found as amber within their veins. The composition of resins is highly variable; each species produces a unique blend of chemicals which can be identified by the use of pyrolysis–gas chromatography–mass spectrometry. The overall chemical and structural composition is used to divide ambers into five classes.There is also a separate classifications of amber gemstones, according to the way of production.

Class I

This class is by far the most abundant. It comprises labdatriene carboxylic acids such as communic or ozic acids. It is further split into three sub-classes. Classes Ia and Ib utilise regular labdanoid diterpenes (e.g. communic acid, communol, biformenes), whilst Ic uses enantio labdanoids (ozic acid, ozol, enantio biformenes).

Ia

Includes Succinite (= 'normal' Baltic amber) and Glessite. Have a communic acid base. They also include much succinic acid.

Baltic amber yields on dry distillation succinic acid, the proportion varying from about 3% to 8%, and being greatest in the pale opaque or bony varieties. The aromatic and irritating fumes emitted by burning amber are mainly due to this acid. Baltic amber is distinguished by its yield of succinic acid, hence the name succinite. Succinite has a hardness between 2 and 3, which is rather greater than that of many other fossil resins. Its specific gravity varies from 1.05 to 1.10. It can be distinguished from other ambers via IR spectroscopy due to a specific carbonyl absorption peak. IR spectroscopy can detect the relative age of an amber sample.Succinic acid may not be an original component of amber, but rather a degradation product of abietic acid.

Ib

Like class Ia ambers, these are based on communic acid; however, they lack succinic acid.

Ic

This class is mainly based on enantio-labdatrienonic acids, such as ozic and zanzibaric acids. Its most familiar representative is Dominican amber.

Dominican amber differentiates itself from Baltic amber by being mostly transparent and often containing a higher number of fossil inclusions. This has enabled the detailed reconstruction of the ecosystem of a long-vanished tropical forest. Resin from the extinct species Hymenaea protera is the source of Dominican amber and probably of most amber found in the tropics. It is not "succinite" but "retinite".

Class II

These ambers are formed from resins with a sesquiterpenoid base, such as cadinene.

Class III

These ambers are polystyrenes.

Class IV

This class is something of a wastebasket; its ambers are not polymerized, but mainly consist of cedrane-based sesquiterpenoids.

Class V

Resins are considered to be produced by a pine or pine relative. They comprise a mixture of diterpinoid resins and n-alkyl compounds. Their type mineral is highgate copalite.

Classification of Baltic amber (succinite) gemstones by the International Amber Association
Typical amber specimen with a number of indistinct inclusions

Natural Baltic amber gemstone which has undergone mechanical treatment only (for instance: grinding, cutting, turning or polishing) without any change to its natural properties

Modified Baltic amber – gemstone subjected only to thermal or high-pressure treatment, which changed its physical properties, including the degree of transparency and color, or shaped under similar conditions out of one nugget, previously cut to the required size.

Reconstructed (pressed) Baltic amber gemstone made of Baltic amber pieces pressed in high temperature and under high pressure without additional components.

Bonded Baltic amber – gemstone consisting of two or more parts of natural, modified or reconstructed Baltic amber bonded together with the use of the smallest possible amount of a colorless binding agent necessary to join the pieces.

Geological Record

The oldest amber recovered dates to the Upper Carboniferous period (320 million years ago). Its chemical composition makes it difficult to match the amber to its producers it is most similar to the resins produced by flowering plants. Amber becomes abundant long afterwards, in the Early Cretaceous, 150 million years ago, when it is found in association with insects. The oldest amber with arthropod inclusions comes from the Middle East from Lebanon and Jordan. This amber is roughly 125–135 million years old and is considered of high scientific value. In Lebanon more than 450 outcrops of Lower Cretaceous amber were discovered between the 1960s and 1990s, among which about 20 outcrops have led to intensive biological inclusions comprising the oldest representatives of several recent families of terrestrial arthropods. Jurassic amber has been found recently in Lebanon as well. Many remarkable insects and spiders were recently discovered in the amber of Jordan including the oldest zorapterans, clerid beetles, umenocoleid roaches, and achiliid planthoppers.

Baltic amber or succinite (historically documented as Prussian amber) is found as irregular nodules in marine glauconitic sand, known as blue earth, occurring in the Lower Oligocene strata of Samland in Prussia (Latin: Sambia), in historical sources also referred to as Glaesaria. After 1945 this territory around Königsberg was turned into Kaliningrad Oblast, Russia, where it is now systematically mined. It appears, however, to have been partly derived from older Eocene deposits and it occurs also as a derivative phase in later formations, such as glacial drift. Relics of an abundant flora occur as inclusions trapped within the amber while the resin was yet fresh, suggesting relations with the flora of Eastern Asia and the southern part of North America. Heinrich Göppert named the common amber-yielding pine of the Baltic forests Pinites succiniter, but as the wood does not seem to differ from that of the existing genus it has been also called Pinus succinifera. It is improbable, however, that the production of amber was limited to a single species; and indeed a large number of conifers belonging to different genera are represented in the amber-flora.

Paleontological Significance

Amber is a unique preservational mode, preserving otherwise unfossilizable parts of organisms; as such it is helpful in the reconstruction of ecosystems and organisms.

The chemical composition of the resin is of limited utility in reconstructing the phylogenetic affinity of the resin producer.

Amber sometimes contains animals or plant matter that became caught in the resin as it was secreted. Insects, spiders and their webs, annelids, frogs, crustaceans, bacteria and amoebae, marine microfossils, wood, flowers and fruit, hair, feathers and other small organisms have been recovered in ambers dating to 130 million years ago.

Use

Amber has been used since antiquity in the manufacture of jewelry and ornaments, and also in folk medicine. Amber also forms the flavoring for akvavit liquor. Amber has been used as an ingredient in perfumes.

Jewelry

Amber has been used since the stone age, from 13,000 years ago. Amber ornaments have been found in Mycenaean tombs and elsewhere across Europe.To this day it is used in the manufacture of smoking and glassblowing mouthpieces.Amber's place in culture and tradition lends it a tourism value; Palanga Amber Museum is dedicated to the mineral.

Historic Medicinal Uses

Amber has long been used in folk medicine for its purported healing properties. Amber and extracts were used from the time of Hippocrates in ancient Greece for a wide variety of treatments through the Middle Ages and up until the early twentieth century.

Scent of Amber and Amber Pperfumery

In ancient China it was customary to burn amber during large festivities. If amber is heated under the right conditions, oil of amber is produced, and in past times this was combined carefully with nitric acid to create "artificial musk" a resin with a peculiar musky odor. Although when burned, amber does give off a characteristic "pinewood" fragrance, modern products, such as perfume, do not normally use actual amber. This is due to the fact that fossilized amber produces very little scent. In perfumery, scents referred to as “amber” are often created and patented to emulate the opulent golden warmth of the fossil. The modern name for amber is thought to come from the Arabic word, ambar, meaning ambergris. Ambergris is the waxy aromatic substance created in the intestines of sperm whales and was used in making perfumes both in ancient times as well as modern. The scent of amber was originally derived from emulating the scent of ambergris and/or labdanum but due to the endangered status of the sperm whale the scent of amber is now largely derived from labdanum. The term “amber” is loosely used to describe a scent that is warm, musky, rich and honey-like, and also somewhat oriental and earthy. It can be synthetically created or derived from natural resins. When derived from natural resins it is most often created out of labdanum. Benzoin is usually part of the recipe. Vanilla and cloves are sometimes used to enhance the aroma.

"Amber" perfumes may be created using combinations of labdanum, benzoin resin, copal (itself a type of tree resin used in incense manufacture), vanilla, Dammara resin and/or synthetic materials.

Amyris

Is a genus of flowering plants in the citrus family, Rutaceae. The generic name is derived from the Greek word (amyron), which means "intensely scented" and refers to the strong odor of the resin. Members of the genus are commonly known as Torchwoods because of their highly flammable wood.

Uses

The trunks of Amyris species exude elemi, a type of balsam (oleoresin) that contains elemic acids, liquid sesquiterpenes, and triterpenes such as - and -amyrin among other components. It is used medicinally[citation needed] and in lacquers. The wood is often used for torches and firewood. Its high resin content causes it to burn brightly, and it will burn well even when green. In addition, the wood is hard, heavy, close-grained, can take a high polish, and repels dry wood termites. Essential oils containing caryophyllene, cadinene, and cadinol are extracted from A. balsamifera and A. elemifera. These are used in varnishes, perfumes, medicines, cosmetics, soaps, and incense.

Chemical compounds known as chromenylated amides isolated from Amyris plumieri have shown some inhibition of the cytochrome P450 enzymes.

Selected Species

Amyris balsamifera L. – Balsam Torchwood

Amyris diatrypa Spreng. – Hairy Torchwood

Amyris elemifera L. – Sea Torchwood (Florida, the Caribbean, Central America)

Amyris madrensis S.Watson – Mountain Torchwood

Amyris polymorpha Urb. (Cuba)

Amyris texana (Buckley) P.Wilson Texas Torchwood, Chapotillo

Formerly placed here

Atalantia simplicifolia (Roxb.) Engl. (as A. simplicifolia Roxb.)

Boswellia papyrifera (Delile ex Caill.) Hochst. (as A. papyrifera Delile ex Caill.)

Canarium zeylanicum (Retz.) Blume (as A. zeylanica Retz.)

Clausena anisata (Willd.) Hook.f. (as A. anisata Willd. or A. dentata Willd.)

Clausena heptaphylla (Roxb. ex DC.) Wight & Arn. ex Steud. (as A. heptaphylla Roxb. ex DC.)

Commiphora gileadensis (L.) C.Chr. (as A. gileadensis L. or A. opobalsamum L.)

Commiphora kataf (Forssk.) Engl. (as A. kataf Forssk.)

Metopium toxiferum (L.) Krug & Urb. (as A. toxifera L.)

Schinus polygama (Cav.) Cabrera (as A. polygama Cav.)

Balsam

Balsam is a term used for various pleasantly scented plant products, and the plants which produce them. Balsams are oily or gummy oleoresins, usually containing benzoic acid or cinnamic acid, obtained from the exudates of various trees and shrubs and used as a base for some botanical medicines. They may be obtained from:

Balsam fir (Abies balsamea), producing Canada balsam

Balsam poplars (Populus section Tacamahaca), producing Balm of Gilead

Commiphora gileadensis, producing Balsam of Mecca

Myroxylon, producing Tolu balsam and Peru balsam

Copaifera langsdorfii, producing copaiba balsam

Balsam may also refer to:

the balsam family of flowering plants, Balsaminaceae

the plant genus Impatiens

Balsam (drink), an herbal liqueur

Riga Black Balsam (Ri-gas Melnais balzams), a traditional Latvian herbal liqueur

Friar's balsam, or Tincture of benzoin

Balsam - Copaifera Langsdorffii

The tropical rainforest tree Copaifera langsdorffii is known as the diesel tree and kerosene tree. It has many names in local languages, including kupa'y, cabismo, and copaúva.

Biological Description

It is a medium-sized tree usually reaching 12 meters in height, with white flowers and small, oily fruits. The wood is light due to its porosity. And, it is honeycombed with capillaries filled with oil. Tapping the tree involves cutting a well into which the oil seeps and where it can be easily collected. Despite its vigorous production of oil, the tree does not grow well outside of the tropics, and does not show promise as a reliable source of biodiesel in temperate climates.

Uses

Biodiesel Use

It produces a large amount of terpene hydrocarbons in its wood and leaves. One tree can produce 30 to 53 liters of hydrocarbons per year, en masse producing 10,000 - 12,000 litres/hectare/year which is incredibly high. The oil is collected by tree tapping. The main compound in the oil is copaiba, an oleoresin which is useful in the production of oil products such as lacquers and can be used as biodiesel. The tree is also the main source of copaene, another terpene.

Wood Uses

The wood can be burned for firewood or used in carpentry.

Pollen Collector

Bees utilize the tree for pollen collection.

Medicinal Uses

The plant has a great number of historical medicinal uses.

Balsam - Fir

Balsam Fir (Abies balsamea) is a North American fir, native to most of eastern and central Canada (Newfoundland west to central Alberta) and the northeastern United States (Minnesota east to Maine, and south in the Appalachian Mountains to West Virginia)

Balsam Fir is a small to medium-size evergreen tree typically 14–20 metres (46–66 ft) tall, rarely to 27 metres (89 ft) tall, with a narrow conic crown. The bark on young trees is smooth, grey, and with resin blisters (which tend to spray when ruptured), becoming rough and fissured or scaly on old trees. The leaves are flat needle-like, 15 to 30 millimetres (½–1 in) long, dark green above often with a small patch of stomata near the tip, and two white stomatal bands below, and a slightly notched tip. They are arranged spirally on the shoot, but with the leaf bases twisted to appear in two more-or-less horizontal rows. The cones are erect, 40 to 80 millimetres (1½–3 in) long, dark purple, ripening brown and disintegrating to release the winged seeds in September.

Variety

Abies balsamea var. balsamea (balsam fir) - bracts subtending seed scales short, not visible on the closed cones. Most of the species' range.

Abies balsamea var. phanerolepis (bracted balsam fir or Canaan fir) - bracts subtending seed scales longer, visible on the closed cone. The southeast of the species' range, from southernmost Quebec to West Virginia. The name 'Canaan Fir' derives from one of its native localities, the Canaan Valley in West Virginia. Some botanists regard this variety as a natural hybrid between balsam fir and Fraser fir (Abies fraseri), which occurs further south in the Appalachian mountains.

Ecology

On mountain tops, stands of Balsam Fir occasionally develop fir waves. Often found in association with Black Spruce, White Spruce and trembling aspen.

This tree provides food for moose, American red squirrels, crossbills and chickadees, as well as shelter for moose, snowshoe hares, white-tailed deer, ruffed grouse and other small mammals and songbirds. The needles are eaten by some lepidopteran caterpillars, for example the Io moth (Automeris io).

Uses

Both varieties of the species are very popular as Christmas trees, particularly in the northeastern United states. The resin is used to produce Canada balsam, and was traditionally used as a cold remedy and as a glue for glasses, optical instrument components, and for preparing permanent mounts of microscope specimens. The wood is milled for framing lumber, siding and pulped for paper manufacture. Balsam fir oil is an EPA approved nontoxic rodent repellent. The balsam fir is also used as an air freshener and as incense.

Tree Emblem

Balsam Fir is the Provincial tree of New Brunswick.

Balsam - Mecca

Balsam of Mecca (also called the balsam of Gilead or balm of Gilead) is a resinous gum of the tree Commiphora gileadensis (syn. Commiphora opobalsamum), native to southern Arabia and also naturalized, in ancient and again in modern times, in ancient Judea/Palestine/Israel. The most famous site of balsam production in the region was the Jewish town of Ein Gedi. The resin was valued in medicine and perfume in ancient Greece and the Roman Empire. Thus Pliny the Elder mentions it as one of the ingredients of the "Royal Perfume" of the Parthians in his Naturalis Historia. In Latin the resin was technically known as opobalsamum; the dried fruit was called carpobalsamum, and the wood xylobalsamum.

When "balm" or "balsam" is mentioned in translations of the Bible this is probably the product that is intended. Its literary connection with Gilead comes from Genesis chapter 37 and from Jeremiah chapters 8 and 46 (quoted below).

Literary occurrence and symbolism

The Book of Genesis alludes to the balm of Gilead in one passage, and the Book of Jeremiah alludes to it in two passages.

Translations excerpted from the JPS Tanakh:

“And they sat down to eat bread; and they lifted up their eyes and looked, and, behold, a caravan of Ishmaelites came from Gilead, with their camels bearing spicery and balm and ladanum, going to carry it down to Egypt." Genesis 37:25

"Go up into Gilead, and take balm, O virgin daughter of Egypt; in vain dost thou use many medicines; there is no cure for thee." Jeremiah 46:11

"Is there no balm in Gilead? Is there no physician there? Why then is not the health of the daughter of my people recovered? Jeremiah 8:22

The obvious understanding for both; "my people" and "the daughter of my people" in Jeremiah 8:22 refers to the Jewish people living in the land of Israel. Rabbinic commentators like Rashi interpreted the balm as a metaphor for teachers, as if to say "Did they not have any righteous men from whom to learn so that they should improve their ways?"

Some Christians interpret this same passage as a prophetic allusion to Jesus. This symbol recurs in some Christian hymns and popular song lyrics. In the refrain to the gospel song "Healing" (1999), Richard Smallwood and his choir ensemble sing the assertion "There is a balm in Gilead".

The speaker in Edgar Allan Poe's poem "The Raven" (1845) professes a belief that the "balm in Gilead" can heal his broken heart, because he laments the death of his love (Lenore).

In Act I of Richard Wagner's opera Parsifal (1882), King Amfortas bears a wound that will not heal because it was inflicted with his own holy spear. A wild woman called Kundry bursts in, and presents the king with an Arabian "balsam". She informs the Knights of the Grail present there that if the balsam does not stimulate the

Balsam - Myrosylon

Myroxylon is a genus of two species of Central American and South American trees in the Fabaceae (Leguminosae). The tree is well known in the western world as the source for Peru balsam and Tolu balsam. The tree is often called Quina or Balsamo. Other names include Tolu in Colombia, Quina quina in Argentina; in lumber trade, sometimes named Santos Mahogany.

Its sweetish scent, reminiscent of vanilla and green olives, has caused it to be used in the manufacture of perfumes as a source for Balsam. Balsam of Peru is used as a flavoring and fragrance in many products and can cause allergic reactions.

They are large trees growing to 40 m tall, with evergreen pinnate leaves 15 cm long with 5-13 leaflets. The flowers are white with yellow stamens, produced in racemes. The fruit is a pod 7–11 cm long, containing a single seed.

The wood is dark brown with a deep red heartwood. Natural oils grant it excellent decay resistance. In fact, it is also resistant to preservative treatment. Its specific gravity is 0.74 to 0.81.

As regards woodworking, this tree is regarded as moderately difficult to work but can be finished with a high natural polish; some tool dulling.

Peru Balsam

Aromatic resin is extracted from the variant Myroxylon balsamum pereirae, native from Central America farther north. The name is a misinterpretation of its origin, since it was originally assembled and shipped to Europe from the ports of Callao and Lima, in Peru, even though the species is not indigenous to Peru. The indigenous use of Peru Balsam led to its export to Europe in the seventeenth century, where it was first documented in the German Pharmacopedia. Today El Salvador is the main exporter of Peru Balsam where it is extracted under a plainly handicraft process.

Peru balsam has uses in medicine, pharmaceutical, in the food industry and in perfumery. It has been used as a cough supressant, in the treatment of dry socket in dentistry, in suppositories for hemorrhoids, the plants have been reported to inhibit Mycobacterium tuberculosis as well as the common ulcer-causing bacteria, H. pylori in test-tube studies, so it is used topically as a treatment of wounds and ulcers, as an antiseptic and used as an anal muscle relaxant. Peru Balsam can be found in diaper rash ointments, hair tonics, antidandruff preparations, and feminine hygiene sprays and as a natural fragrance in soaps, detergents, creams, lotions, and perfumes.

Invasive Species

The balsam tree can become a highly invasive species when introduced into tropical countries where it is not native. In Sri Lanka it has overgrown several hectares of the Udawatta Kele Sanctuary and is rapidly spreading there. In this Sri Lankan rain forest, Myroxylon seeds sprout in very high numbers due to tolerating more diverse light conditions than native species and due to the absence of natural enemies such as diseases and insects. This has given rise to dense stands of young trees where no other vegetation can grow, causing severe ecological disruption, i.e., the disappearance of local, native plant species and consequently of the animals and insects that feed on these.

The tree has also been introduced to several Pacific islands such as Fiji and to Indonesia and is a potential ecological threat there.

Balsam - Poplar

Populus balsamifera, commonly called balsam poplar,bamtree, eastern balsam poplar, hackmatack, tacamahac poplar, tacamahaca, is a tree species in the balsam poplar species group in the poplar genus, Populus. The genus name Populus is from the Latin for poplar, and the specific epithet balsamifera from Latin for "balsam-bearing". Other common names for the species include heartleaf balsam poplar, and Ontario balsam poplar. The black cottonwood, Populus trichocarpa, is sometimes considered a supspecies of P. balsamifera and may lend its common name to this species, although the black poplars and cottonwoods of Populus sect. Aigeiros are not closely related.

Populus balsamifera is the northernmost American hardwood, growing transcontinentally on boreal and montane upland and flood plain sites, and attaining its best development on flood plains. It is a hardy, fast-growing tree which is generally short lived, but some trees as old as 200 years have been found.

The Balm of Gilead (Populus × jackii), also known as P. × gileadensis, is the hybrid between P. balsamifera and the eastern cottonwood (P. deltoides), occurring occasionally where the two parental species' ranges overlap. This hybrid is also sometimes planted as a shade tree, and sometimes escapes from cultivation. The name Populus candicans has been variously used for either P. balsamifera or P. × jackii; it is currently considered a synonym of P. balsamifera.

Balm of Gilead is a balm (healing compound) made from the resinous gum of this species or related species such as Populus × jackii. However, despite the name, this tree is not the source of the terpentine Canada balsam, derived instead from the balsam fir (Abies balsamea).

The light, soft wood of Populus balsamifera is used for pulp and construction.

Many kinds of animals use the twigs of Populus balsamifera for food. The leaves of the tree serve as food for caterpillars of various Lepidoptera. See List of Lepidoptera that feed on poplars.

king's recovery, "Arabia does not hide anything more that might heal him."

Balm in Gilead is also the title of an early play by Lanford Wilson.

External Links

The Columbia Encyclopedia, Sixth Edition. 2001-05.

Patrick O'Brian makes reference to it in the Aubrey/Maturin canon, book 14, "The Nutmeg of Consolation". At one point Dr. Stephen Maturin is quite sick, presumably from food poisoning. Rather vehemently, he tells his Scottish assistant Macmillan "No" when alcoholic tincture of opium (laudanum) is offered to him. Instead, he says: " our best course is no doubt bark, steel, saline enemata, rest and above all quiet. True quietness, as you know very well, is not to be expected in a camp full of sailors; but balls of wax provide something not unlike it. They are behind the "Balm of Gilead.”

Birch

Birch is a broadleaved deciduous hardwood tree of the genus Betula , in the family Betulaceae which also includes alders, hazels and hornbeams and is closely related to the beech/oak family, Fagaceae. The genus Betula contains from 30 to 60 known taxa of which 11 are on the IUCN 2011 Red List of Threatened Species. They are typically rather short-lived pioneer species widespread in the Northern Hemisphere particularly in northern temperate and boreal climates.

Etymology

The common name "birch" is derived from an old Germanic root, birka, with the Proto-Indo-European root "white, bright; to shine." The Proto-Germanic rune berkanan is named after the birch. The generic name Betula is from Latin.

Description

Birch species are generally small to medium-sized trees or shrubs, mostly of temperate climates. The simple leaves are alternate, singly or doubly serrate, feather-veined, petiolate and stipulate. They often appear in pairs, but these pairs are really borne on spur-like, two-leaved, lateral branchlets. The fruit is a small samara, although the wings may be obscure in some species. They differ from the alders (Alnus, other genus in the family) in that the female catkins are not woody and disintegrate at maturity, falling apart to release the seeds, unlike the woody, cone-like female alder catkins.

The bark of all birches is characteristically marked with long, horizontal lenticels, and often separates into thin, papery plates, especially upon the paper birch. It is resistant to decay, due to the resinous oil it contains. Its decided color gives the common names gray, white, black, silver and yellow birch to different species.

The buds form early and are full grown by midsummer, all are lateral, no terminal bud is formed; the branch is prolonged by the upper lateral bud. The wood of all the species is close-grained with satiny texture and capable of taking a fine polish; its fuel value is fair.

Flower and Fruit

The flowers are monoecious, opening with or before the leaves and borne on three-flowered clusters in the axils of the scales of drooping or erect catkins or aments. Staminate aments are pendulous, clustered or solitary in the axils of the last leaves of the branch of the year or near the ends of the short lateral branchlets of the year. They form in early autumn and remain rigid during the winter. The scales of the staminate aments when mature are broadly ovate, rounded, yellow or orange color below the middle, dark chestnut brown at apex. Each scale bears two bractlets and three sterile flowers, each flower consisting of a sessile, membranaceous, usually two-lobed, calyx. Each calyx bears four short filaments with one-celled anthers or strictly, two filaments divided into two branches, each bearing a half-anther. Anther cells open longitudinally. The pistillate aments are erect or pendulous, solitary; terminal on the two-leaved lateral spur-like branchlets of the year. The pistillate scales are oblong-ovate, three-lobed, pale yellow green often tinged with red, becoming brown at maturity. These scales bear two or three fertile flowers, each flower consisting of a naked ovary. The ovary is compressed, two-celled, and crowned with two slender styles; the ovule is solitary.

Ecology

Birches often form even-aged stands on light, well-drained, particularly acidic soils. They are regarded as pioneer species, rapidly colonising open ground especially in secondary successional sequences following a disturbance or fire. Birches are early tree species to establish in primary successions and can become a threat to heathland if the seedlings and saplings are not suppressed by grazing or periodic burning. Birches are generally lowland species, but some species, such as Betula nana, have a montane distribution. In the British Isles there is some difference between the environments of Betula pendula and Betula pubescens, and some hybridization, though both are "opportunists in steady-state woodland systems". Mycorrhizal fungi, including sheathing (ecto)myccorhizas, are found in some cases to be beneficial to tree growth.

Birch foliage is used as a food plant by the larvae of a large number of Lepidoptera (butterflies and moths) species; see List of Lepidoptera that feed on birches.

Species

Birches native to Europe and Asia include

Betula aetniensis - Sicilian birch

Betula albosinensis - Chinese red birch

Betula albosinensis var. septentrionalis - north Chinese red birch

Betula alnoides - alder-leaf birch

Betula austrosinensis - South China birch

Betula carpatica - Carpathian birch

Betula chinensis - Chinese dwarf birch

Betula dalecarlica

Betula ermanii - Erman's birch

Betula grossa - Japanese cherry birch

Betula jacquemontii (Betula utilis subsp. jacquemontii) - white-barked Himalayan birch

Betula kamtschatica - Kamchatka birch platyphylla

Betula litvinovii

Betula mandschurica - Manchurian birch

Betula mandschurica var. japonica - Japanese birch

Betula maximowiczii - monarch birch

Betula medwediewii - Caucasian birch

Betula nana - dwarf birch (also in northern North America)

Betula pendula - silver birch

Betula platyphylla (Betula pendula var. platyphylla) - Siberian silver birch

Betula pubescens - downy birch, also known as white, European white or hairy birch (Europe and northern Asia)

Betula pubescens subspecies tortuosa - arctic downy birch (subarctic Eurasia)

Betula szechuanica (Betula pendula var. szechuanica) - Sichuan birch

Betula tianshanica

Betula utilis - Himalayan birch

Note:

many American texts have B. pendula and B. pubescens confused, though they are distinct species with different chromosome numbers.

Birches native to North America include

Betula alleghaniensis - yellow birch (B. lutea)

Betula cordifolia - mountain paper birch

Betula glandulosa - American dwarf birch

Betula kenaica - Kenai birch

Betula lenta - sweet birch, cherry birch, or black birch

Betula lenta subsp. uber - Virginia round-leaf birch (endemic, Cressy Creek, Smyth County, Virginia)

Betula michauxii - Newfoundland dwarf birch

Betula minor - dwarf white birch

Betula nana - dwarf birch or bog birch (also in northern Europe and Asia)

Betula neoalaskana - Alaska birch or Yukon birch

Betula nigra - river birch or black birch

Betula occidentalis - water birch or red birch (B. fontinalis)

Betula papyrifera - paper birch, canoe birch or American white birch

Betula populifolia - gray birch

Betula pumila - swamp birch

Uses

Birch wood is fine-grained and pale in colour, often with an attractive satin-like sheen. Ripple figuring may occur, increasing the value of the timber for veneer and furniture-making. The highly decorative Masur (or Karelian) birch, from Betula verrucosa var. carelica, has ripple textures combined with attractive dark streaks and lines. Birch wood is suitable for veneer, and birch plywood is among the strongest and most dimensionally stable plywoods, although it is unsuitable for exterior use.

Birch plywood is made from laminations of birch veneer. It is light but strong, and has many other good properties. Birch plywood is used to make longboards (skateboard), giving it a strong yet flexible ride. It is also used (often in very thin grades with many laminations) for making model aircraft.

Extracts of birch are used for flavoring or leather oil, and in cosmetics such as soap or shampoo. In the past, commercial oil of wintergreen (methyl salicylate) was made from the sweet birch (Betula lenta).

Birch-tar or Russian oil extracted from birch bark is thermoplastic and waterproof; it was used as a glue on, for example, arrows, and also for medicinal purposes.

Fragrant twigs of silver birch are used in saunas to relax the muscles.

Birch Leaves

Birch is also associated with the feast of Pentecost in Germany, Central and Eastern Europe, and Russia, where its branches are used as decoration for churches and homes on this day.

Birch leaves are used to make a diuretic tea and extracts for dyes and cosmetics.

Ground birch bark, fermented in sea water, is used for seasoning the woolen, hemp or linen sails and hemp rope of traditional Norwegian boats.

Birch twigs bound in a bundle, also called birch, were used for birching, a form of corporal punishment.

Many of the First Nations of North America prized the birch for its bark, which due to its light weight, flexibility, and the ease with which it could be stripped from fallen trees, was often used for the construction of strong, waterproof but lightweight canoes, bowls, and wigwams.

The Hughes H-4 Hercules was made mostly of birch wood, despite its better-known moniker, "The Spruce Goose".

Birch is used as firewood due to its high calorific value per unit weight and unit volume. It burns well, without popping, even when frozen and freshly hewn. The bark will burn very well even when wet because of the oils it contains. With care, it can be split into very thin sheets that will ignite from even the smallest of sparks.

Birch sap is a traditional drink in Northern Europe, Russia, and Northern China. The sap is also bottled and sold commercially. In the British Isles, the sap is often used to make a wine.

Birch seeds are used as leaf litter in miniature terrain models.

"Birch flowers" is the English marketing name for the catkins of the Broussonetia luzonica tree. Known in the Philippines as himbabao or alukon, these flowers are commonly used in the cuisine of northeastern Luzon. However, despite their English name and the similar appearance of their flowers, B. luzonica is not in any way related to the birch tree.

Medical

Birch bark is high in betulin and betulinic acid, phytochemicals which have potential as pharmaceuticals, and other chemicals which show promise as industrial lubricants.

Birch bark can be soaked until moist in water, and then formed into a cast for a broken arm.

The inner bark of birch can be ingested safely.

In northern latitudes, birch is considered to be the most important allergenic tree pollen, with an estimated 15-20% of hay fever sufferers sensitive to birch pollen grains. The major allergen is a protein called Bet v I.

Paper

Wood pulp made from birch gives relatively long and slender fibres for a hardwood. The thin walls cause the fibre to collapse upon drying, giving a paper with low bulk and low opacity. The birch fibres are, however, easily fibrillated and give about 75 % of the tensile strength of softwood. The low opacity makes it suitable for making glassine.

In India, the birch (Sanskrit) holds great historical significance in the culture of North India, where the thin bark coming off in winter was extensively used as writing paper. Birch paper (Sanskrit: is exceptionally durable and was the material used for many ancient Indian texts. This bark also has been used widely in ancient Russia as note paper (beresta) and for decorative purposes and even making footwear.

Tonewood

Baltic birch is among the most sought-after wood in the manufacture of speaker cabinets. Birch has a natural resonance that peaks in the high and low frequencies, which are also the hardest for speakers to reproduce. This resonance compensates for the roll-off of low and high frequencies in the speakers, and evens the tone. Birch is known for having "natural EQ".

Drums are often made from birch. Prior to the 1970s, it was one of the most popular drum woods. Because of the need for greater volume and midrange clarity, drums were made almost entirely from maple until recently, when advances in live sound reinforcement and drum microphones have allowed the use of birch in high-volume situations. Birch drums have a natural boost in the high and low frequencies, which allows the drums to sound fuller.

Birch wood is sometimes used as a tonewood for semiacoustic and acoustic guitar bodies, and occasionally for solid-body guitar bodies. It is also a common material used in mallets for keyboard percussion.

Culture

Birches have spiritual importance in several religions, both modern and historical.

They are associated with the Tír na nÓg, the land of the dead and the Sidhe, in Gaelic folklore, and as such frequently appear in Scottish, Irish, and English folksongs and ballads in association with death, or fairies, or returning from the grave.

It is also New Hampshire's state tree.

In the Swedish city of Umeå, the silver birch tree has a special place. In 1888, the city was ravaged by fires that spread all over the city and nearly burnt it down to the ground, but some birches, supposedly, halted the spread of the fire. To protect the city against future fires, it was decided to plant silver birch trees all over the city. Umeå later adopted the unofficial name of "City of the Birches (Björkarnas stad)". Also, the ice hockey team of Umeå is called Björklöven, translated to English "The Birch Leaves".

In parts of Germany, young men erect decorated birch trees in front of the houses of their love interests on the night of May 1, to show their feelings.

Cade

Juniperus oxycedrus (Prickly Juniper, Prickly Cedar, Cade Juniper and Cade (from the French genévrier cade), Sharp Cedar) is a species of juniper, native across the Mediterranean region from Morocco and Portugal, north to southern France, east to westernmost Iran, and south to Lebanon and Israel, growing on a variety of rocky sites from sea level up to 1600 m altitude. The specific epithet oxycedrus means "sharp cedar" and this species may have been the original cedar or cedrus of the ancient Greeks

Description

The 'Juniperus oxycedrus tree is very variable in shape, forming a spreading shrub 2–3 m tall to a small erect tree 10–15 m tall. It has needle-like leaves in whorls of three; the leaves are green, 5–20 mm long and 1–2 mm broad, with a double white stomatal band (split by a green midrib) on the inner surface. It is usually dioecious, with separate male and female plants. The seed cones are berry-like, green ripening in 18 months to orange-red with a variable pink waxy coating; they are spherical, 7–12 mm diameter, and have three or six fused scales in 1-2 whorls, three of the scales with a single seed. The seeds are dispersed when birds eat the cones, digesting the fleshy scales and passing the hard seeds in their droppings. The pollen cones are yellow, 2–3 mm long, and fall soon after shedding their pollen in late winter or early spring.

As to be expected from the wide range, 'Juniperus oxycedrus is very variable. One recent study splits it into three species, though other authorities do not accept this:

Juniperus oxycedrus L. - Western Prickly Juniper. Southwest Europe, in eastern Portugal and Spain east to southern France, northwest Italy, Corsica, and Sardinia, and northwest Africa from Morocco east to Tunisia. Leaves long (10–20 mm), narrow-based; cones smooth.

Juniperus navicularis Gand. (syn. J. oxycedrus subsp. transtagana) - Portuguese Prickly Juniper. Coastal southwest Portugal. Leaves short (5–12 mm); cones smooth.

Juniperus deltoides R.P.Adams - Eastern Prickly Juniper. Central Italy east to Iran and Israel. Leaves long (10–20 mm), broad-based; cones with raised scale edges.

Subspecies

An additional variety or subspecies J. oxycedrus var. badia H.Gay (syn. J. oxycedrus subsp. badia (H.Gay) Debeaux) is distinguished on the basis of larger cones (10–13 mm diameter), tinged purple when mature; it is described from northern Algeria, and also reported from Portugal and Spain.

A further species Juniperus macrocarpa, confined to Mediterranean coastal sands, is more distinct but has also often been treated as a subspecies of Prickly Juniper, as J. oxycedrus subsp. macrocarpa; it differs in the broader leaves 2–3 mm wide, and larger cones 12–18 mm diameter.

Other close relatives of J. oxycedrus include Juniperus brevifolia on the Azores, Juniperus cedrus on the Canary Islands and Juniperus formosana in eastern Asia.

Uses

Cade oil is the essential oil obtained through destructive distillation of the wood of this shrub. It is a dark, aromatic oil with a strong smoky smell which is used in some cosmetics and (traditional) skin treatment drugs, as well as incense.

Cedar

Cedar wood comes from several different trees that grow in different parts of the world, and may have different uses.

California incense-cedar, from Calocedrus decurrens, is the primary type of wood used for making pencils

Taiwan incense-cedar, comes from Calocedrus formosana, an endangered species that has been overharvested for its fragrant decay-resistant wood

Chinese incense-cedar, comes from Calocedrus macrolepis, which has been over-harvested for its fragrant decay-resistant wood

Cigar-box cedar or Spanish cedar, from Cedrela odorata, is fragrant, insect-repellent, and light-weight, primarily used to protect clothing from insects

Cedar from Cedrus, was once an important timber in the Mediterranean area, used for building and shipbuilding, but severely overexploited for thousands of years.

Port Orford cedar, from the western North American tree Chamaecyparis lawsoniana, is light-weight and durable, and particularly valued in east Asia

Japanese cedar, from Cryptomeria japonica, is a light-weight wood used in house-building

Mexican white cedar from Cupressus lusitanica, comes from a drought-resistant tree that has been widely cultivated for its timber for centuries

Eastern red cedar from Juniperus virginiana, is soft, red, fine-grained, fragrant, and decay-resistant, often used for fence posts

Ceylon cedar from Melia azedarach, is a high-quality timber that resembles teak

Western red cedar from Thuja plicata, is soft red-brown, aromatic, decay-resistant, used for outdoor construction, shingles, and guitar-making,

Northern white cedar from Thuja occidentalis, comes from a relatively small tree, and is used for canoe-making, log cabins, fences, and shingles

Australian red cedar from Toona ciliata, is red, highly valued, and easy to work, used for furniture-making and shipbuilding

Cedarwood - Atlas

Cedrus atlantica, the Atlas Cedar, is a cedar native to the Atlas Mountains of Algeria (Tell Atlas) and Morocco (in the Rif and Middle Atlas, and locally in the High Atlas). A majority of the modern sourcestreat it as a distinct species Cedrus atlantica, but some sources consider it a subspecies of Lebanon Cedar (C. libani subsp. atlantica).

Fully grown, Cedrus atlantica is a large tree, 30–35 m (rarely 40m) tall, with a trunk diameter of 1.5–2 m.It is very similar in all characters to the other varieties of Lebanon Cedar; differences are hard to discern. The mean cone size tends to be somewhat smaller (although recorded to 12 cm, only rarely over 9 cm long, compared to up to 10 cm in C. brevifolia, and 12 cm in C. libani, though with considerable overlap (all can be as short as 6 cm). The Cedrus atlantica leaf length (10–25 mm) is similar that of C. libani subsp. stenocoma, on average longer than C. brevifolia and shorter than C. libani subsp. libani, but again with considerable overlap.

Ecology

Atlas Cedar forms forests on mountain sides at 1,370 to 2,200 m, often in pure forests, or mixed with Algerian Fir - Abies numidica, Juniperus oxycedrus, Holm oak Quercus ilex, and Acer opalus. These forests can provide habitat for the endangered Barbary Macaque, Macaca sylvanus, a primate that had a prehistorically much wider distribution in northern Morocco and Algeria.

Cultivation and Uses

Cedrus atlantica: Foliage and mature female cone

Landscape

Cedrus atlantica is common in cultivation as an ornamental tree in temperate climates. In garden settings, often the glaucous forms are planted as ornamental trees, distinguished as the Glauca Group, a Cultivar Group. There are also fastigiate, pendulous, and golden-leaf forms in cultivation. The Atlas Cedar is useful in cultivation because it is more tolerant of dry and hot conditions than most conifers.

Many (but far from all) of the cultivated trees have glaucous (bluish) foliage, more downy shoots, and can have more leaves in each whorl; young trees in cultivation often have more ascending branches than many cultivated Cedrus atlantica.

An Atlas Cedar is planted at the White House South Lawn in Washington, DC. President Carter ordered a tree house built within the Cedar for his daughter Amy. The wooden structure was designed by the President himself, and is self supporting so as not to cause damage to the tree.

Forestry

Male cones beginning to shed pollen

Cedar plantations, mainly with Cedrus atlantica, have been established in southern France for timber production.

Cultural References

George Harrison references the species in his song "Beware of Darkness."

Cedarwood - Australian Red

Australian red cedar from Toona ciliata, is red, highly valued, and easy to work, used for furniture-making and shipbuilding

Australian Red Cedar (called also Toon, Suren or Indian Mahogany), Toona ciliata is a forest tree in the family Meliaceae which grows throughout southern Asia from Afghanistan to Papua New Guinea and Australia. In Australia its natural habitat is now extensively cleared subtropical rainforests of New South Wales and Queensland. The Australian population was formerly treated as distinct species under the name T. australis. The species can grow to around 60m in height and its trunk can reach 3m in girth. The largest recorded T. ciliata tree in Australia grew near Nulla Nulla Creek, west of Kempsey, New South Wales and was felled in 1883.

The southern most limit of natural distribution is on basaltic soils, growing west of the Princes Highway near the village of Turmeil, south of Ulladulla, southern Illawarra, NSW. It also naturally occurs at Norfolk Island.

It is one of Australia's few native deciduous trees. The timber is red in colour, easy to work and very highly valued. It was used extensively for furniture, wood panelling and construction, including shipbuilding, and was referred to as "Red Gold" by Australian settlers. Heavily and unsustainably exploited in the 19th Century and early 20th Century, almost all the large trees have been cut out and the species is essentially commercially extinct. However, the timber is relatively fast growing and following on from a wave of tree cutting in the 1950s, regrowth and timber from forestry sources currently provides trees up to 1 metre in diameter for the furniture trade in Australia and timber is not difficult to source.

Timber is currently also harvested in New Guinea. Although it is not generally a viable plantation species, trees are regularly harvested by Forestry in the Atherton region of Queensland. It grows best in an environment with high light levels, however in the relative darkness of the rainforest understory, it is less susceptible to attack by the Cedar Tip Moth. Also referred to as Surian Cedar.

Other Areas

The Red cedar is widely planted in subtropical and tropical parts of the world as a shade tree and for its fast-growing aspect. It is grown in the Hawaiian Islands and southern and eastern Africa. In parts of Zimbabwe and South Africa, it has naturalised; growing to maturity and spreading from seed.

Cedar - Calocedrus Formosana

Taiwan incense-cedar, comes from Calocedrus formosana, an endangered species that has been over-harvested for its fragrant decay-resistant wood.

Calocedrus formosana (syn. C. macrolepis var. formosana (Florin) W.C.Cheng & L.K.Fu; Taiwan Incense-cedar; Chinese: tái wa-n xiao nan) is a conifer endemic to Taiwan

Descriptions

t is a medium-size tree to 20-25 m tall, with a trunk up to 3 m diameter. The bark is orange-brown weathering greyish, smooth at first, becoming fissured and exfoliating in long strips on the lower trunk on old trees. The foliage is produced in flattened sprays with scale-like leaves 1.5–8 mm long; they are arranged in opposite decussate pairs, with the successive pairs closely then distantly spaced, so forming apparent whorls of four; the facial pairs are flat, with the lateral pairs folded over their bases. The upper side of the foliage sprays is green without stomata, the underside is marked with dense patches of white stomata.

The seed cones are 10–15 mm long, pale purple with a whitish wax coating, with four (rarely six) scales arranged in opposite decussate pairs; the outer pair of scales each bears two winged seeds, the inner pair(s) usually being sterile; the cones are borne on a 4–6 mm long peduncle covered in small (2 mm) scale leaves. The cones turn brown when mature about 8 months after pollination. The pollen cones are 4–5 mm long.

Variety Species

It is very similar to Calocedrus macrolepis, and some botanists treat it as a variety of that, C. macrolepis var. formosana. They differ most obviously in the longer cone stem, 10–20 mm long, of C. macrolepis.

Threats

The species has a very limited native range of less than 5,000 km², and is threatened by over-harvesting for its valuable wood and conversion of natural forest to plantations of faster-growing exotic species. Some areas are now protected in reserves, and a limited amount of replanting is taking place, but an overall decline continues. It is categorised by the IUCN as Endangered.

Cedar - Calocedrus Macrolepis

Chinese incense-cedar, comes from Calocedrus macrolepis, which has been over-harvested for its fragrant decay-resistant wood.

Alocedrus Macrolepis (Chinese Incense-cedar; Chinese: cui bai) is a conifer native to southwest China (Guangdong west to Yunnan), northern Vietnam, northern Laos, extreme northern Thailand and northeastern Myanmar.

It is a medium-size tree to 25-35 m tall, with a trunk up to 2 m diameter. The bark is orange-brown weathering greyish, smooth at first, becoming fissured and exfoliating in long strips on the lower trunk on old trees. The foliage is produced in flattened sprays with scale-like leaves 1.5–8 mm long; they are arranged in opposite decussate pairs, with the successive pairs closely then distantly spaced, so forming apparent whorls of four; the facial pairs are flat, with the lateral pairs folded over their bases. The upper side of the foliage sprays is glossy green without stomata, the underside is white with dense stomata.

The seed cones are 10–20 mm long, pale purple with a whitish wax coating, with four (rarely six) scales arranged in opposite decussate pairs; the outer pair of scales each bears two winged seeds, the inner pair(s) usually being sterile; the cones are borne on a 1–2 cm long peduncle covered in very small (1 mm) scale leaves. The cones turn brown when mature about 8 months after pollination. The pollen cones are 4–8 mm long.

Foliage

It is closely related to Calocedrus formosana, with the latter often treated as a variety of C. macrolepis. They differ most obviously in the shorter cone stem, only 5 mm long, of C. formosana.

The species is still fairly widespread and frequent in the wild, though threatened by over-harvesting for its valuable wood; it is also extensively planted within its native range for wood production. It is categorised by the IUCN as Vulnerable.

Cedar - California Incense

California incense-cedar, from Calocedrus decurrens, is the primary type of wood used for making pencils.

Calocedrus decurrens (California incense-cedar; syn. Libocedrus decurrens Torr.) is a species of conifer native to western North America, with the bulk of the range in the United States, from central western Oregon through most of California and the extreme west of Nevada, and also a short distance into northwest Mexico in northern Baja California. It grows at altitudes of 50–2900 m. It is the most widely-known species in the genus, and is often simply called incense-cedar without the regional qualifier.

It is a large tree, typically reaching heights of 40–60 m and a trunk diameter of up to 3 m (maxima, 69 m tall and 4.5 m diameter), and with a broad conic crown of spreading branches. The bark is orange-brown weathering grayish, smooth at first, becoming fissured and exfoliating in long strips on the lower trunk on old trees. The foliage is produced in flattened sprays with scale-like leaves 2–15 mm long; they are arranged in opposite decussate pairs, with the successive pairs closely then distantly spaced, so forming apparent whorls of four; the facial pairs are flat, with the lateral pairs folded over their bases. The leaves are bright green on both sides of the shoots with only inconspicuous stomata.

The seed cones are 20–35 mm long, pale green to yellow, with four (rarely six) scales arranged in opposite decussate pairs; the outer pair of scales each bears two winged seeds, the inner pair(s) usually being sterile and fused together in a flat plate. The cones turn orange to yellow-brown when mature about 8 months after pollination. The pollen cones are 6–8 mm long.

This tree is the preferred host of a wood wasp, Syntexis libocedrii a living fossil species which lays its eggs in the smoldering wood immediately after a forest fire. The tree is also host to Incense-cedar mistletoe (Phoradendron libocedri), a parasitic plant which can often be found hanging from its branches.

Cultivation & Uses

The wood is the primary material for wooden pencils, because it is soft and tends to sharpen easily without forming splinters.

It is also a popular ornamental tree, valued for its drought tolerance. It is also grown particularly in cool summer climates (notably eastern Britain and elsewhere in northern Europe, and in parts of the northern Pacific Northwest of North America) for its very narrow columnar crown. This narrow crown is not restricted to selected cultivars but is an unexplained consequence of the climatic conditions in these areas, and is not shown by trees in the wild; many other species in the Cupressaceae show similar effects to a smaller degree

Cedar - Cedrela Odorata

Cigar-box cedar or Spanish cedar, from Cedrela odorata, is fragrant, insect-repellent, and light-weight, primarily used to protect clothing from insects.

(Spanish cedar, Mexican cedar, Cigar-box cedar, Cedro-cheiroso). The genus Cedrela has undergone two major systematic revisions since 1960. The most recent revision reduced the number of species in the genus to seven (Styles, 1981). The common cedro, Cedrela odorata L., embraces 28 other named species, including C. mexicana M. J. Roem. The taxon "C. angustifolia," a very vigorous type now in demand because of its apparent resistance to the shootborer, was left in an indeterminate status due to insufficient herbarium material. The result is that C. odorata as now constituted is a species showing a high degree of population variation.

Cedro is a tree of the New World tropics, appearing in forests of moist and seasonally dry Subtropical or Tropical life zones (24) from latitude 26°N. on the Pacific coast of Mexico, throughout Central America and the Caribbean, to the lowlands and foothills of most of South America up to 1200 m (about 4,000 ft) altitude, finding its southern limit at about latitude 28°S. in Argentina. Cedro is always found naturally on well-drained soils, often but not exclusively on limestone; it tolerates a long dry season but does not flourish in areas of rainfall greater than about 3000 mm (120 in) or on sites with heavy or waterlogged soils. Individual trees are generally scattered in mixed semi-evergreen or semi-deciduous forests dominated by other species. Mahogany, a close relative, is often found with cedro and both suffer damage from the same pest, the mahogany shootborer (Hypsipyla grandella).

The tree is monoecious semi-deciduous ranging in height from 10 meters to 30 meters. The trunk has a thick gray - brown colored bark, with longitudinal irregular grain. Pinnately compound leaves, grouped towards the end of the branches, ranging from 15 cm to 50 cm long, with pairs of scythe-shaped leaflets, lanceolate to oblong, 7-15 x 3-5 cm, with the base obliquely truncated and asymmetric.

Cedrela odorata is the most commercially important and widely distributed species in the genus Cedrela. Known as Spanish-cedar in English commerce, the aromatic wood is in high demand in the American tropics because it is naturally termite- and rot-resistant. An attractive, moderately lightweight wood (specific gravity 0.4), its primary use is in household articles used to store clothing. Cedro heartwood contains an aromatic and insect-repelling resin that is the source of its popular name, Spanish-cedar (it resembles the aroma of true cedars (Cedrus spp.) Cedro works easily and makes excellent plywood and veneer and would be more widely used if it could be successfully plantation grown. This plant is often used for honey production (beekeeping) and humidor construction. It is occasionally used for tops or veneers on some kinds of electric guitars. The wood is the traditional choice for making the neck of flamenco and classical guitars.

Cedar - Cedrus

Cedar from Cedrus, was once an important timber in the Mediterranean area, used for building and shipbuilding, but severely overexploited for thousands of years.

Occasionally 60 m) tall with spicy-resinous scented wood, thick ridged or square-cracked bark, and broad, level branches. The shoots are dimorphic, with long shoots, which form the framework of the branches, and short shoots, which carry most of the leaves. The leaves are evergreen and needle-like, 8–60 mm long, arranged in an open spiral phyllotaxis on long shoots, and in dense spiral clusters of 15–45 together on short shoots; they vary from bright grass-green to dark green to strongly glaucous pale blue-green, depending on the thickness of the white wax layer which protects the leaves from desiccation. The seed cones are barrel-shaped, 6–12 cm long and 3–8 cm broad, green maturing grey-brown, and, as in Abies, disintegrate at maturity to release the winged seeds. The seeds are 10–15 mm long, with a 20–30 mm wing; as in Abies, the seeds have 2–3 resin blisters, containing an unpleasant-tasting resin, thought to be a defence against squirrel predation. Cone maturation takes one year, with pollination in autumn and the seeds maturing the same time a year later. The pollen cones are slender ovoid, 3–8 cm long, produced in late summer and shedding pollen in autumn.

Taxonomy

Cedar forest in Algeria

Cedars share a very similar cone structure with the firs (Abies) and were traditionally thought to be most closely related to them, but molecular evidence supports a basal position in the family.

There are five taxa of Cedrus, assigned according to taxonomic opinion to between one and four different species.:

Deodar or Deodar Cedar, C. deodara (syn. C. libani subsp. deodara). Western Himalaya. Leaves bright green to pale glaucous green, 25–60 mm; cones with slightly ridged scales.

Lebanon Cedar or Cedar of Lebanon C. libani. Cones with smooth scales; two (or up to four) subspecies:

Lebanon Cedar C. libani subsp. libani. Mountains of Lebanon, western Syria and south-central Turkey. Leaves dark green to glaucous blue-green, 10–25 mm.

Turkish Cedar C. libani subsp. stenocoma. Mountains of south-west Turkey. Leaves glaucous blue-green, 8–25 mm.

Cyprus Cedar C. brevifolia (syn. C. libani subsp. brevifolia, C. libani var. brevifolia). Mountains of Cyprus. Leaves glaucous blue-green, 8–20 mm.

Atlas Cedar C. atlantica (syn. C. libani subsp. atlantica). Atlas mountains in Morocco & Algeria. Leaves dark green to glaucous blue-green, 10–25 mm.

A cedar in Lebanon

Ecology

Cedars are adapted to mountainous

climates; in the Mediterranean they receive winter precipitation, mainly as snow, and summer drought, while in the western Himalaya, they receive primarily summer monsoon rainfall.

Cedars are used as food plants by the larvae of some Lepidoptera species including Pine Processionary and Turnip Moth (recorded on Deodar Cedar).

Uses

ornamental trees, widely used in horticulture in temperate climates where winter temperatures do not fall below about -25 °C. The Turkish Cedar is slightly hardier, to -30 °C or just below. Extensive mortality of planted specimens can occur in severe winters where temperatures do drop lower. Areas with successful long-term cultivation include the entire Mediterranean region, western Europe north to the British Isles, southern Australia and New Zealand, and southern and western North America.

Cedar wood and cedar oil are known to be a natural repellent to moths, hence cedar is a popular lining for modern-day cedar chests and closets in which woolens are stored. This specific use of cedar is mentioned in The Iliad (Book 24), referring to the cedar-roofed or lined storage chamber where Priam goes to fetch treasures to be used as ransom. Cedar is also commonly used to make shoe trees as it can absorb moisture and de-odorise.

Timber of trees with similar names such as Western Red Cedar is frequently confused with genuine cedar.

The Cedar of Lebanon and to a lesser extent the Deodar have local cultural importance.

Etymology

Both the Latin words cedrus and the generic name cedrus are derived from the Greek 'kedros'. Ancient Greek and Latin used the same word, kedros and cedrus respectively, for different species of plants now classified in the genera Cedrus and Juniperus (juniper). Species of both genera are native to the area where Greek language and culture originated, though as the word "kedros" does not seem to be derived from any of the languages of the Middle East, it has been suggested the word may originally have applied to Greek species of juniper and was later adopted for species now classified in the genus Cedrus because of the similarity of their aromatic woods. The name was similarly applied to citron and the word citrus is derived from the same root. However, as a loan word in English, cedar had become fixed to its biblical sense of Cedrus by the time of its first recorded usage in AD 1000.

The name "cedar" has more recently (since about 1700) been applied to many other trees (such as Western redcedar; in some cases the botanical name alludes to this usage, such as the genus Calocedrus (meaning "beautiful cedar"), also known as Incense-cedar). Such usage is regarded by some authorities as a misapplication of the name to be discouraged.

Cedarwood - Ceylon

Ceylon cedar from Melia azedarach, is a high-quality timber that resembles teak

Melia azedarach, commonly known as bead-tree or Cape lilac, is a species of deciduous tree in the mahogany family, Meliaceae, that is native to Pakistan, India, Indochina, Southeast Asia and Australia. The genus Melia includes four other species, occurring from southeast Asia to northern Australia. They are all deciduous or semi-evergreen trees.

The adult tree has a rounded crown, and commonly measures attains a height of 7-12 metres, however in exceptional circumstances M. azedarach can attain a height of 45 metres. The flowers are small and fragrant, with five pale purple or lilac petals, growing in clusters. The fruit is a drupe, marble-sized, light yellow at maturity, hanging on the tree all winter, and gradually becoming wrinkled and almost white.

The leaves are up to 50 cm long, alternate, long-petioled, 2 or 3 times compound (odd-pinnate); the leaflets are dark green above and lighter green below, with serrate margins.

Nomenclature

Common names of Melia azedarach include chinaberry, Persian lilac, white cedar, Texas umbrella, bead-tree, Cape lilac, Ceylon cedar, pride of India, malai vembu, bakain, zanzalakht and dharek or dhraik. In South Africa it is commonly but erroneously called syringa, which is in fact a different lilac genus.

Uses & Ecology

The main utility of chinaberry is its timber. This is of medium density, and ranges in colour from light brown to dark red. In appearance it is readily confused with the unrelated Burmese Teak (Tectona grandis). Melia azedarach in keeping with other members of the family Meliaceae has a timber of high quality, but as opposed to many almost-extinct species of mahogany it is under-utilised. Seasoning is relatively simple in that planks dry without cracking or warping and are resistant to fungal infection. The taste of the leaves is not as bitter as Neem (Azadirachta indica).

The hard, 5-grooved seeds were widely used for making rosaries and other products requiring beads, before their replacement by modern plastics.

The flowers are unattractive to bees and butterflies[citation needed]. Though some hummingbirds like Sapphire-spangled Emerald (Amazilia lactea), Glittering-bellied Emerald (Chlorostilbon lucidus) and Planalto Hermit (Phaethornis pretrei) have been recorded to feed on and pollinate the flowers, these too only take it opportunistically.

Toxicity

Fruits are poisonous to humans if eaten in quantity. However, like the Yew tree, these toxins are not harmful to birds, who gorge themselves on the fruit, eventually reaching a "drunken" state. The toxins are neurotoxins and unidentified resins, found mainly in the fruits. Some birds are able to eat the fruit, spreading the seeds in their droppings. The first symptoms of poisoning appear a few hours after ingestion. They may include loss of appetite, vomiting, constipation or diarrhea, bloody faeces, stomach pain, pulmonary congestion, cardiac arrest, rigidity, lack of coordination and general weakness. Death may take place after about 24 hours. Like in relatives, tetranortriterpenoids consititute an important toxic principle. These are chemically related to Azadirachtin, the primary insecticidal compound in the commercially important Neem oil. These compounds are probably related to the wood and seed's resistance to pest infestation, and maybe to the unattractiveness of the flowers to animals.

Leaves have been used as a natural insecticide to keep with stored food, but must not be eaten as they are highly poisonous. A diluted infusion of leaves and trees has been used in the past to induce uterus relaxation.

As Invasive Species

The plant was introduced around 1830 as an ornamental in the United States (South Carolina and Georgia) and widely planted in southern states. Today it is considered an invasive species by some groups as far north as Virginia and Oklahoma. But nurseries continue to sell the trees, and seeds are also widely available. It has become naturalized to tropical and warm temperate regions of the Americas and is planted in similar climates around the world. Besides the problem of toxicity, its usefulness as a shade tree in the United States is diminished by its tendency to sprout where unwanted and to turn sidewalks into dangerously slippery surfaces when the fruits fall, though this is not a problem where songbird populations are in good shape. As noted above, the possibility of commercially profitable harvesting of feral stands remains largely unexplored.

Common Names

Other common names include Ghoda neem (Ghoda meaning horse) in Bengali and Vilayati (foreign) neem in Bundelkhand region, and Bakain in East Uttar Pradesh and Jharkhand region of India. It has been naturalized in Madagascar where it is called vaondelaka.

Cedarwood - Cyprus

Cyprus Cedar C. brevifolia (syn. C. libani subsp. brevifolia, C. libani var. brevifolia). Mountains of Cyprus. Leaves glaucous blue-green, 8–20 mm.

The Cyprus Cedar (Cedrus brevifolia) is a species of conifer in the genus Cedrus. It is native to the Troödos Mountains of central Cyprus. It grows in the Pafos State Forest.

Cedarwood - Eastern Red

Eastern red cedar from Juniperus virginiana, is soft, red, fine-grained, fragrant, and decay-resistant, often used for fence posts

uniperus virginiana (Eastern Red-cedar, Red Cedar, Eastern Juniper, Red Juniper, Pencil Cedar) is a species of juniper native to eastern North America from southeastern Canada to the Gulf of Mexico and east of the Great Plains. Further west it is replaced by the related Juniperus scopulorum (Rocky Mountain Juniper) and to the south-west by Juniperus ashei (Ashe Juniper).

The Lakota Native American name is Chansha, "redwood" or Hante'. In its native range it is commonly called "cedar" or "red cedar," names rejected by the American Joint Committee on Horticultural Nomenclature as it is a juniper, not a true cedar. However, "Red Cedar" is the most used common name.

Description

Juniperus virginiana is a dense slow-growing tree that may never become more than a bush on poor soil, but is ordinarily from 5–20 m/16–66 ft (rarely to 27 m/89 ft) tall, with a short trunk 30–100 cm/12–39 in (rarely 170 cm/67 in) diameter. The oldest tree reported, from Missouri, was 795 years old. The bark is reddish-brown, fibrous, and peels off in narrow strips. The leaves are of two types; sharp, spreading needle-like juvenile leaves 5–10 cm (2.0–3.9 in) long, and tightly adpressed scale-like adult leaves 2–4 mm (0.079–0.16 in) long; they are arranged in opposite decussate pairs or occasionally whorls of three. The juvenile leaves are found on young plants up to 3 years old, and as scattered shoots on adult trees, usually in shade. The seed cones are 3–7 mm (0.12–0.28 in) long, berry-like with fleshy scales, dark purple-blue with a white wax cover giving an overall sky-blue color (though the wax often rubs off); they contain one or two (rarely up to four) seeds, and are mature in 6–8 months from pollination. They are an important winter food for many birds, which disperse the wingless seeds. The pollen cones are 2–3 mm (0.079–0.12 in) long and 1.5 mm (0.059 in) broad, shedding pollen in late winter or early spring. The trees are usually dioecious, with pollen and seed cones on separate trees.

There are two varieties, which intergrade where they meet:

Juniperus virginiana var. virginiana is called eastern juniper / redcedar. It is found in eastern North America, from Maine, west to southern Ontario and South Dakota, south to northernmost Florida and southwest into the post oak savannah of east-central Texas. Cones are larger, 4–7 mm; scale leaves are acute at apex and bark is red-brown.

Juniperus virginiana var. silicicola (Small) E.Murray (syn. Sabina silicicola Small, Juniperus silicicola (Small) L.H.Bailey) is known as southern or sand juniper / redcedar. Habitat is along the Atlantic and Gulf coasts from North Carolina, south to central Florida and west to southeast Texas. Cones are smaller, 3–4 mm; scale leaves are blunt at apex and the bark is orange-brown. It is treated by some authors at the lower rank of variety, while others treat it as a distinct species.

Ecology

t is a pioneer invader, which means that it is one of the first trees to repopulate cleared, eroded, or otherwise damaged land. It is unusually long lived among pioneer species, with the potential to live over 850 years. The tree is commonly found in prairies or oak barrens, old pastures, or limestone hills, often along highways and near recent construction sites. It is an alternate host for cedar-apple rust disease, an economically important disease of apples, and some management strategies recommend the removal of J. virginiana near apple orchards.

In many areas the trees are considered an invasive species, even if native. The fire intolerant J. virginiana was previously controlled by periodic wildfires. Low branches near the ground burn and provide a ladder that allows fire to engulf the whole tree. Grasses recover quickly from low severity fires that are characteristic of prairies that kept the trees at bay. With the urbanization of prairies, the fires have been stopped with roads, plowed fields, and other fire breaks, allowing J. virginiana and other trees to invade. Trees are destructive to grasslands if left unchecked, and are actively being eliminated by cutting and prescribed burning. The trees also burn very readily, and dense populations were blamed for the rapid spread of wildfires in drought stricken Oklahoma and Texas in 2005 and 2006.

Junipers also benefit from the increased CO2 levels unlike the grasses with which they compete. Many grasses are C4 plants that concentrate CO2 levels in their bundle sheaths to increase the efficiency of RuBisCO, the enzyme responsible for photosynthesis. Junipers are C3 plants that rely on the natural CO2 concentrations of the environment, and are less efficient at fixing CO2. However, the trees will benefit from increased CO2 levels, unlike grasses.

Damage done by J. virginiana includes outcompeting forage species in pastureland. The low branches and wide base occupy a significant portion of land area. The thick foliage blocks out most light, so few plants can live under the canopy. The needles that fall raise the pH of the soil, making it alkaline, which holds nutrients such as phosphorus, making it harder for plants to absorb them. Juniperus virginiana has been shown to remove nitrogen from the soil after invading prairie. It has also been found to reduce carbon stores in the soil. This reduction in soil nutrients also reduces the amount and diversity of microbial activity in the soil.

Cedar waxwings are fond of the berries of these junipers. It takes about 12 minutes for their seeds to pass through the birds' guts, and seeds that have been consumed by this bird have levels of germination roughly three times higher than those of seeds the birds did not eat. Many other birds (from bluebirds to turkeys) and many mammals also enjoy these berries.

Uses

A log sawn in two and turned on a lathe, exposing the pale sapwood and the reddish heartwood

'Corcorcor' Berries

The fine-grained, soft brittle pinkish- to brownish-red heartwood is fragrant, very light and very durable, even in contact with soil. Because of its rot resistance, the wood is used for fence posts. The aromatic wood is avoided by moths, so it is in demand as lining for clothes chests and closets, often referred to as cedar closets and cedar chests. If correctly prepared, it makes excellent English longbows, flatbows, and Native American sinew-backed bows. The wood is marketed as "eastern redcedar" or "aromatic cedar". The best portions of the heartwood are one of the few woods good for making pencils, but the supply had diminished sufficiently by the 1940s that it was largely replaced by incense-cedar.

Juniper oil is distilled from the wood, twigs and leaves. The cones are used to flavor gin and as a kidney medicine.

Native American tribes used juniper wood poles to mark out agreed tribal hunting territories. French traders named Baton Rouge, Louisiana (meaning "red stick") from the reddish color of these poles.

During the Dust Bowl drought of the 1930s, the Prairie States Forest Project encouraged farmers to plant shelterbelts (wind breaks) made of eastern juniper throughout the Great Plains. They grow well under adverse conditions. Both drought tolerant and cold tolerant, they grow well in rocky, sandy, and clay substrate. Competition between trees is minimal, so they can be planted in tightly spaced rows, and the trees still grow to full height, creating a solid windbreak in a short time.

A number of cultivars have been selected for garden planting, including 'Canaertii' (narrow conical; female) 'Corcorcor' (with a dense, erect crown; female), 'Goldspire' (narrow conical with yellow foliage), and 'Kobold' (dwarf). Some cultivars previously listed under this species, notably 'Skyrocket', are actually cultivars of J. scopulorum.

In the Missouri and Arkansas Ozarks, eastern juniper is commonly used as a Christmas tree.

Allergen

The pollen is a known allergen, although not as potent as that of the related Juniperus ashei (Ashe juniper), which sheds pollen a month earlier. People allergic to one are usually allergic to both. J. virginiana sheds pollen as early as late winter and through early spring. Consequently, what begins as an allergy to Ashe juniper in the winter, may extend into spring, since the pollination of the eastern juniper follows after that of the Ashe juniper.

Contact with the leaves or wood can produce a mild skin rash in some individuals.

Cedarwood - Japanese

Cryptomeria is a monotypic genus of conifer in the cypress family Cupressaceae formerly belonging to the family Taxodiaceae; it includes only one species, Cryptomeria japonica (syn.: Cupressus japonica L.f.). It is endemic to Japan, where it is known as Sugi, Japanese: . The tree is often called Japanese Cedar in English, though the tree is not related to the cedars (Cedrus).

It is a very large evergreen tree, reaching up to 70 m (230 ft) tall and 4 m (13 ft) trunk diameter, with red-brown bark which peels in vertical strips. The leaves are arranged spirally, needle-like, 0.5–1 cm (0.20–0.39 in) long; and the seed cones globular, 1–2 cm (0.39–0.79 in) diameter with about 20–40 scales. It is superficially similar to the related Giant Sequoia (Sequoiadendron giganteum), from which it can be differentiated by the longer leaves (under 0.5 cm in the Giant Sequoia) and smaller cones (4–6 cm in the Giant Sequoia), and the harder bark on the trunk (thick, soft and spongy in Giant Sequoia).

Sugi has been so long-cultivated in China that it is thought by some to be native there. Forms selected for ornament and timber production long ago in China have been described as a distinct variety Cryptomeria japonica var. sinensis (or even a distinct species, Cryptomeria fortunei), but they do not differ from the full range of variation found in the wild in Japan, and there is no definite evidence the species ever occurred wild in China. Genetic analysis of the most famous Chinese population of Cryptomeria japonica var. sinensis in Tianmu Mountain, containing trees estimated to be nearly 1000 years old, supports the hypothesis that the population originates from an introduction.

Biology

Cryptomeria grow in forests on deep, well-drained soils subject to warm, moist conditions, and it is fast-growing under these conditions. It is intolerant of poor soils and cold, drier climates.

Cryptomeria is used as a food plant by the larvae of some moths of the genus Endoclita including E. auratus, E. punctimargo and E. undulifer.

Sugi (and Hinoki) pollen is a major cause of hay fever in Japan.

Mechanical Pproperties

In dry air conditions, the initial density of Japanese cedar has been determined to be about 300–420 kg/m3. It also displays a Young's modulus of 8017 MPa, 753 MPa and 275 MPa in the longitudinal, radial and tangential direction in relation to the wood fibers.

Symbolism and Uses

Sugi is the national tree of Japan, commonly planted around temples and shrines, with many hugely impressive trees planted centuries ago. Sargent (1894; The Forest Flora of Japan) recorded the instance of a daimyo- (feudal lord) who was too poor to donate a stone lantern at the funeral of the Shogun Tokugawa Ieyasu (1543–1616) at Nikko- To-sho--gu-, but requested instead to be allowed to plant an avenue of Sugi, "that future visitors might be protected from the heat of the sun". The offer was accepted; the avenue, which still exists, is over 65 km (40 mi) long, and "has not its equal in stately grandeur".

It is also extensively used in forestry plantations in Japan, China and the Azores islands, and is widely cultivated as an ornamental tree in other temperate areas, including Britain, Europe, North America and eastern Himalaya regions of Nepal and India.

One very popular ornamental form is the cultivar "Elegans", which is notable for retaining juvenile foliage throughout its life, instead of developing normal adult foliage when one year old (see the picture with different shoots). It makes a small, shrubby tree 5–10m tall. There are numerous dwarf cultivars that are widely used in rock gardens and for bonsai, including 'tansu', 'koshyi', 'little diamond', 'yokohama' and 'kilmacurragh.'

The wood is scented, reddish-pink in colour, lightweight but strong, waterproof and resistant to decay. It is favoured in Japan for all types of construction work as well as interior panelling, etc. In Darjeeling district and Sikkim in India, where it is one of the most widely growing trees, Cryptomeria japonica is called Dhuppi and is favoured for its light wood, extensively used in house building.

Its introduction in the Azores islands to be used commercially, resulted in the destruction of much of the original, now threatened, native laurel forest which affected an entire complex environment threatening many other species such as the priolo.

Cedarwood - Lebanon

Lebanon Cedar or Cedar of Lebanon C. libani. Cones with smooth scales; two (or up to four) subspecies:

Lebanon Cedar C. libani subsp. libani. Mountains of Lebanon, western Syria and south-central Turkey. Leaves dark green to glaucous blue-green, 10–25 mm.

Turkish Cedar C. libani subsp. stenocoma. Mountains of southwest Turkey. Leaves glaucous blue-green, 8–25 mm.

Description

Cedrus libani is an evergreen coniferous tree growing up to 40 m (130 ft) tall, with a trunk up to 2.5 m (8 ft 2 in) in diameter. The crown is conic when young, becoming broadly tabular with age with fairly level branches.

The shoots are dimorphic, with long shoots and short shoots. The leaves are needle-like, spaced out on the long shoots, and in clusters of 15-45 on the short shoots; they are 5–30 mm (1?4–13?16 in) in length, quadrangular in cross-section, and vary from green to glaucous blue-green with stomatal bands on all four sides. The seed cones are produced often every second year, and mature in 12 months from pollination; mature cones in late autumn are 8–12 cm (3–43?4 in) long and 4–6 cm (11?2–23?8 in) wide.

Taxonomy

Cedrus libani was first classified by the French botanist Achille Richard. There are two distinct types that are considered either as subspecies or varieties:

Cedrus libani var. libani (Lebanon Cedar):

Cedrus libani var. stenocoma (Turkish Cedar):

Some botanists also classify the Cyprus Cedar (Cedrus brevifolia) and Atlas Cedar (Cedrus atlantica) as subspecies of C. libani. However, a majority of the modern sources consider them distinct species.

Ecology

In Lebanon and Turkey it occurs most abundantly at altitudes of 1,000-2,000 m (3,300–6,500 ft), where it forms pure forests or mixed forests with Cilician Fir (Abies cilicica), European Black Pine (Pinus nigra), and several juniper (Juniperus) species. On Cyprus, it occurs at 1,000-1,525 m (3,300–5,000 ft) (reaching the summit of Mount Paphos). In the Atlas Mountains of Morocco, it occurs at 1,370–2,200 m (4,500–7,200 ft) in pure forests or mixed with Abies species and Juniperus thurifera.

History, Symbolism and Uses

The Cedar of Lebanon was important to various ancient civilizations. The trees were used by the Phoenicians for building commercial and military ships, as well as houses, palaces, and temples. The ancient Egyptians used its resin in mummification, and its sawdust has been found in the tombs of Egyptian Pharaohs. The Sumerian Epic of Gilgamesh designates the cedar groves of Lebanon as the dwelling of the gods to which

Gilgamesh, the hero, ventured.

Hebrew priests were ordered by Moses to use the bark of the Lebanon Cedar in circumcision[citation needed]and the treatment of leprosy. The Hebrew prophet Isaiah used the Lebanon Cedar as a metaphor for the pride of the world. According to the Talmud, Jews once burned Lebanese cedar wood on the Mount of Olives to celebrate the new year. Foreign rulers from both near and far would order the wood for religious and civil constructs, the most famous of which are King Solomon's Temple in Jerusalem and David's and Solomon's Palaces. Because of its significance the word Cedar is mentioned 75 times (Cedar 51 times, Cedars 24 times) in the Bible, and played a pivotal role in the cementing of the Phoenician-Hebrew relationship.[clarification needed] Beyond that, it was also used by Romans, Greeks, Persians, Assyrians and Babylonians.

Over the centuries, extensive deforestation has occurred, with only small remnants of the original forests surviving. Deforestation has been particularly severe in Lebanon and on Cyprus; on Cyprus, only small trees up to 25 m (82 ft) tall survive, though Pliny the Elder recorded cedars 40 m (130 ft) tall there.[15] Extensive reforestation of cedar is carried out in the Mediterranean region, particularly Turkey, where over 50 million young cedars are being planted annually. The Lebanese populations are also now expanding through a combination of replanting and protection of natural regeneration from browsing by goats, hunting, forest fires, and woodworms.

Historically, there were various attempts at conserving the Lebanon Cedars. The first was made by the Roman Emperor Hadrian, who issued a decree protecting parts of the Cedars of Lebanon in CE 118. In the Middle Ages, the Mamluk Caliphs also made an attempt at conserving the Cedars and regulating their use, followed by the Maronite Patriarch Yusuf Hbaych, who placed them under his protection in 1832. In 1876, Britain's Queen Victoria financed a wall to protect the Cedars of God (near Bsharri) from the ravages of goat herding.

National and Regional Significance

The Lebanese flag, with the Lebanon Cedar in the middle

The Lebanon Cedar is the national emblem of Lebanon, and is displayed on the Lebanese flag and coat of arms. It is also the logo of Middle East Airlines (MEA), which is Lebanon's national carrier. Beyond that, it is also the main symbol of Lebanon's "Cedar Revolution", along with many Lebanese political parties and movements, such as the Kataeb (Phalange), the Lebanese Forces, the National Liberal Party, and the Future Movement. Finally, Lebanon is sometimes metonymically referred to as the Land of the Cedars. As a result of long exploitation, few old trees remain in Lebanon, but there is now an active program to conserve and regenerate the forests. The Lebanese approach has emphasized natural regeneration rather than planting, and this by creating the right conditions. The Lebanese state has created several Cedar Reserves or nature reserves that contain cedars, including the Chouf Cedar Reserves, the Jaj Cedar Reserve, the Tannourine Reserve, the Ammouaa and Karm Shbat Reserves in the Akkar district, and the Forest of the Cedars of God near Bcharri. Extensive replanting is taking place in Turkey, where approximately 300 square kilometres (74,000 acres) of cedar are planted annually.

Horticultural Use

The Lebanon Cedar is widely planted as an ornamental tree in parks and large gardens, often being planted in landscape avenues, and as focal point trees in large landscapes. The most prominent landscaping feature in London's historic Highgate Cemetery is its "Circle of Lebanon", where a Lebanon Cedar stands in the centre of a circular trench cut into the ground and lined with mausoleums.

Cedarwood - Mexican White

Mexican white cedar from Cupressus lusitanica, comes from a drought-resistant tree that has been widely cultivated for its timber for centuries.

Cupressus lusitanica, (Cedro Blanco; Teotlate, distinctive names used in Mexico); Cedro Blanco means White Cedar and is also known as Mexican White Cedar, is a species of cypress native to Mexico and Central America (Guatemala, El Salvador and Honduras). It has also been introduced to Belize, Costa Rica and Nicaragua, growing at 1,200–3,000 metres (3,900–9,800 ft) altitude.

The scientific name lusitanica (of Portugal) refers to its very early cultivation there, with plants imported from Mexico to the monastery at Buçaco, near Coimbra in Portugal in about 1634; these trees were already over 130 years old when the species was botanically described by Miller in 1768.

Description

Cupressus lusitanica is an evergreen conifer tree with a conic to ovoid-conic crown, growing to 40 m tall. The foliage grows in dense sprays, dark green to somewhat yellow-green in colour. The leaves are scale-like, 2–5 mm long, and produced on rounded (not flattened) shoots. The seed cones are globose to oblong, 10–20 mm long, with four to 10 scales, green at first, maturing brown or grey-brown about 25 months after pollination.

The cones may either open at maturity to release the seeds, or remain closed for several years, only opening after the parent tree is killed in a wildfire, allowing the seeds to colonise the bare ground exposed by the fire. The male cones are 3–4 mm long, and release pollen in February–March. In most of its natural environment rainfall occurs with more quantity in summer.

Varieties

There are two varieties, treated as distinct species by some botanists:

Cupressus lusitanica var. lusitanica (syn. C. lindleyi) - Mexican Cypress - Foliage in three-dimensional sprays, with small shoots in two planes. Occurs in lower rainfall areas.

Cupressus lusitanica var. benthamii (syn. C. benthamii) - Bentham's Cypress - Foliage in flattened sprays, with small shoots all in one plane. Occurs in higher rainfall areas. (Near Threatened species)

Cultivation and Uses

Fast-growing and drought tolerant, Cupressus lusitanica has been introduced from Mexico's provenances to different parts of the world. It is widely cultivated, both as an ornamental tree and for timber production, in warm, temperate and subtropical regions around the world. Trees have been selected for cultivation from northern Mexico populations, which have a heavy drought endurance.

Locations

Its cultivation and subsequent naturalisation in parts of southern Asia has caused a degree of confusion with native Cupressus species in that region; plants sold by nurseries under the names of Asian species such as Cupressus torulosa often prove to be this species. It has been planted widely for commercial production: at high altitudes in Colombia (3300 m), Bolivia and South Africa, and near sea level in New Zealand where is fully naturalized. In Colombia trees are planted to form windbreak curtains and for fighting soil erosion on slopes.

It has been planted as an ornamental tree near sea level in temperate climates and has done very well: Portugal (its name's source, after becoming popular there), Buenos Aires Province, Argentina; Austin, Texas and the British Isles where it can reach a height of 30 m-90 feet.

It is being planted in the province of Argentine province of San Luis, Argentina at 1500 m above sea level with forestation purposes for creating artificial forests in a land originally lacking of them in a very similar climate to that of its origin site.

Cedarwood - Northern White

Northern white cedar from Thuja occidentalis, comes from a relatively small tree, and is used for canoe-making, log cabins, fences, and shingles

Thuja occidentalis (Eastern Arborvitae, Northern Whitecedar) is an evergreen coniferous tree, in the cypress family Cupressaceae, which is widely cultivated for use as an ornamental plant known as American Arbor Vitae. The endemic occurrence of this species is a northeastern distribution in North America. It is thought to be the first tree of that region to be cultivated in the area in and around Europe.

Common names include: Tree of Life, Yellow Cedar, American Arborvitae, Arbor Vitae, Atlantic White Cedar, Cedrus Lycea, Eastern White Cedar, False White Cedar, Hackmatack, Lebensbaum, Thuia du Canada, Thuja.

Description

An evergreen tree with fan-like branches and scaly leaves. Unlike the closely related species, Thuja plicata (Western Redcedar), it is only a small tree. Growing to a height of 10–20 metres (33–66 ft) tall with a 0.4 metres (1.3 ft) trunk diameter, exceptionally to 30 metres (98 ft) tall and 1.6 metres (5.2 ft) diameter, the tree is often stunted or prostrate. The bark is red-brown, furrowed and peels in narrow, longitudinal strips. The foliage forms in flat sprays with scale-like leaves 3–5 millimetres (0.12–0.20 in) long. The cones are slender, yellow-green ripening brown, 10–15 millimetres (0.39–0.59 in) long and 4–5 millimetres (0.16–0.20 in) broad, with 6-8 overlapping scales. The branches may take root if the tree falls.

Northern whitecedars found to be growing on cliff faces in southern Ontario are the oldest trees in Eastern North America and all of Canada, growing to ages in excess of 1,653 years old.

Distribution

Thuja occidentalis is native to Manitoba east throughout the Great Lakes Region and into Québec, Vermont, New Hampshire, Maine, Prince Edward Island, New Brunswick, and Nova Scotia. Isolated populations exist to the south in Massachusetts, Connecticut, Ohio, Kentucky, Tennessee, North Carolina, Pennsylvania, Maryland, Virginia, and West Virginia.

Naming and Taxonomy

The species was first described by Carolus Linnaeus in 1753, and the name remains current. Common names include Eastern Arborvitae, American Arborvitae, Techny Arborvitae, or just Arborvitae, the last particularly in the horticultural trade. This name, arbor vitae, is derived from the tree of life motif - for the supposed medicinal properties of the sap, bark and twigs.[3] Other names by which it is known include Northern Whitecedar, Eastern Whitecedar or White Cedar, and Swamp Cedar. Thuja occidentalis trees are unrelated to cedars, or to the Australian tree, Melia azedarach, also known as White Cedar. A large number of names for cultivars are used by horticulturalists.

Ecology

Thuja occidentalis grows naturally in wet forests, being particularly abundant in coniferous swamps where other larger and faster-growing trees cannot compete successfully. It also occurs on other sites with reduced tree competition such as cliffs. Although not currently listed as endangered, wild Thuja occidentalis populations are threatened in many areas by high deer numbers; deer find the soft evergreen foliage a very attractive winter food, and strip it rapidly. The largest known specimen is 34 m tall and 175 cm diameter, on South Manitou Island within Leelanau County, Michigan.

It can be a very long-lived tree in certain conditions, with notably old specimens growing on cliffs where they are inaccessible to deer and wildfire; the oldest known living specimen is just over 1,100 years old, but a dead specimen with over 1,650 growth rings has been found. These very old trees are, despite their age, small and stunted due to the difficult growing conditions. The Witch Tree, a T. occidentalis growing out of a cliff face on Lake Superior in Minnesota, was described by a French explorer as being a mature tree in 1731; it is still alive today.

Uses

Grown as an ornamental specimen, Powsin Botanical Garden, Warsaw,

Poland

White Cedar is a tree with important uses in traditional Ojibwe culture. Honoured with the name Nookomis Giizhik ("Grandmother Cedar"), the tree is the subject of sacred legends and is considered a gift to humanity for its myriad uses. It is used in craft, construction and medicine. It is one of the four plants of the Ojibwe medicine wheel, associated with the south. The foliage of Thuja occidentalis is rich in Vitamin C and is believed to be the annedda which cured the scurvy of Jacques Cartier and his party in the winter of 1535–1536. Due to the neurotoxic compound thujone, internal use can be harmful if used for prolonged periods or while pregnant.

Thuja occidentalis is widely used as an ornamental tree, particularly for screens and hedges. Over 300 cultivars exist, with some of the more common ones being: 'Degroot's Spire', 'Ellwangeriana', 'Hetz Wintergreen', 'Lutea', 'Rheingold', 'Smaragd' (a.k.a. 'Emerald Green'), 'Techny', and 'Wareana'. It was introduced into Europe as early as 1540 and is widely cultivated now, especially in parks and cemeteries.

Northern white cedar is commercially used for rustic fencing and posts, lumber, poles, shingles and in the construction of log cabins, White cedar is the preferred wood for the structural elements, such as ribs and planking, of birchbark canoes and the planking of wooden canoes.

The essential oil within the plant has been used for cleansers, disinfectants, hair preparations, insecticides, liniment, room sprays, and soft soaps. There are some reports that the Ojibwa made a soup from the inner bark of the soft twigs. Others have used the twigs to make teas to relieve constipation and headache.

In the 19th century Thuja was in common use as an externally applied tincture or ointment for the treatment of warts, ringworm and thrush. "An injection of the tincture into venereal warts is said to cause them to disappear."

Cedarwood - Port Orford

Port Orford cedar, from the western North American tree Chamaecyparis lawsoniana, is light-weight and durable, and particularly valued in east Asia

Chamaecyparis lawsoniana is a cypress in the genus Chamaecyparis, family Cupressaceae, known by the name Lawson's Cypress in the horticultural trade, or Port Orford-cedar in its native range (although not a true cedar). C. lawsoniana is native to the southwest of Oregon and the far northwest of California in the United States, occurring from sea level up to 1,500 m (4,900 ft) altitude in the Klamath Mountains valleys, often along streams.

It is a large evergreen coniferous tree, maturing up to 200 feet tall or more, with trunks 4–6 feet in diameter, with feathery foliage in flat sprays, usually somewhat glaucous blue-green in color. The leaves are scale-like, 3–5 mm long, with narrow white markings on the underside, and produced on somewhat flattened shoots. The seed cones are globose, 7–14 mm diameter, with 6-10 scales, green at first, maturing brown in early fall, 6–8 months after pollination. The male cones are 3–4 mm long, dark red, turning brown after pollen release in early spring. The bark is reddish-brown, and fibrous to scaly in vertical strips.

It was first discovered (by Euro-Americans) near Port Orford in Oregon and introduced into cultivation in 1854, by collectors working for the Lawson & Son nursery in Edinburgh, Scotland, after whom it was named as Lawson's Cypress by the describing botanist Andrew Murray. The USDA officially calls it by the name Port Orford Cedar, as do most people in its native area, but as it is not a cedar, many botanists prefer to avoid the name, using Lawson's Cypress, or in very rare instances Port Orford Cypress, instead to stop confusion. The horticultural industry, in which the species is very important, mostly uses the name Lawson's Cypress.

The extinct Eocene species Chamaecyparis eureka, known from fossils found on Axel Heiberg Island in Canada, is noted to be very similar to Chamaecyparis pisifera and C. lawsoniana.

Cultivation & Uses

t is of great importance in horticulture, with several hundred named cultivars of varying crown shape, growth rates and foliage colour having been selected for garden planting. It thrives best in well-drained but moist soils. The wood is light yet has great strength and rot resistance, and is particularly highly valued in east Asia, with large amounts being exported to Japan where it is in high demand for making coffins, and for shrines and temples. Its lumber is also known for its highly fragrant ginger aroma. Due to the straightness of its grain, it is also one of the preferred woods for the manufacture of arrow shafts. It is also considered an acceptable, though not ideal, wood for construction of aircraft.

However, it is considered more than acceptable for use in stringed instruments. It's fine grain, good strength and tonal quality are highly regarded for soundboards in guitar making.

Disease

In the wild, the species is seriously threatened by a root disease caused by the introduced fungal pathogen, Phytophthora lateralis. This disease is also a problem for horticultural plantings in some parts of North America. The tree is sometimes killed, though less often, by other species of Phytophthora.

Phytophthora lateralis infection begins when mycelium, from a germinated spore, invade the roots. The infection then spreads through the inner bark and cambium around the base of the tree. Spread up the trunk is generally limited. Infected tissue dies and effectively girdles the tree. Large trees are more likely to be infected than small trees due to larger root areas (although all trees at the edges of infected streams will eventually succumb). However, large trees can often live with the infections for a longer duration (up to several years).

Port Orford "Cedar" in streamside populations are highly susceptible to Phytophthora lateralis infection. However, the rate of Phytophthora spread through populations in dry upland areas appears to be slow. Phytophthora lateralis spreads through water via mobile spores (zoospores). The fungus also produces resting spores (chlamydospores) that can persist in soil for a long period of time. New infections generally begin when soil is transferred from an infected population to a non-infected population via human or animal movement. After initial infection in streamside populations, secondary spread via zoospores quickly infects all downstream individuals.

Human facilitated spread is thought to be responsible for most new, and all long-distance, infections. Soil on vehicle tires, especially logging trucks and other off road vehicles, is considered the most pressing problem due to the volume of soil that can be carried and the traffic rate in and between susceptible areas. Spread on boots and mountain bike tires has also been suggested and probably contributes to new infections locally. Animal facilitated spread is thought to occur, but is localized.

The Bureau of Land Management (BLM) and United States Forest Service (USFS) attempt to prevent Phytophthora spread through road closures, monitoring, research and education. Research has focused on determining the dynamics and mechanisms of spread, as well as attempts to breed resistant trees.

Cedarwood - Western Himalaya

Deodar or Deodar Cedar, C. deodara (syn. C. libani subsp. deodara). Western Himalaya. Leaves bright green to pale glaucous green, 25–60 mm; cones with slightly ridged scales.

Cedrus deodara (Deodar Cedar, Himalayan Cedar, or Deodar; Sanskrit, Hindi: devada-ru; Urdu: deoda-r; Chinese: xue song) is a species of cedar native to the western Himalayas in eastern Afghanistan, northern Pakistan, north-central India (Himachal Pradesh and Uttarakhand), southwesternmost Tibet and western Nepal, occurring at 1500–3200 m altitude. It is a large evergreen coniferous tree reaching 40–50 m tall, exceptionally 60 m, with a trunk up to 3 m diameter. It has a conic crown with level branches and drooping branchlets.

The leaves are needle-like, mostly 2.5–5 cm long, occasionally up to 7 cm long, slender (1 mm thick), borne singly on long shoots, and in dense clusters of 20-30 on short shoots; they vary from bright green to glaucous blue-green in colour. The female cones are barrel-shaped, 7–13 cm long and 5–9 cm broad, and disintegrate when mature (in 12 months) to release the winged seeds. The male cones are 4–6 cm long, and shed their pollen in autumn.

The specific epithet, which is also the English vernacular name, derives from the Sanskrit term devada-ru, which means "wood of the gods", a compound of deva (god) and da-ru (wood, etym. tree). This tree is also the national tree of the country Pakistan

Cultural importance in the Indian subcontinent

Among Hindus, as the etymology of deodar suggests, it is worshiped as a divine tree. Deva, the first half of the Sanskrit term, means divine, deity, or deus. Da-ru, he second part, connotes durum, druid, tree, true.

Several Hindu legends refer to this tree.

That means “In the stands of Lodhra trees, Padmaka trees and in the woods of Devadaru, or Deodar trees, Ravana is to be searched there and there, together with Seetha. [4-43-13]”

Forests full of deodar or devada-ru trees were the favorite living place of ancient Indian sages and their families who were devoted to the Hindu god Shiva. To please Lord Shiva, the sages used to perform very difficult tapasya (meditation) practices in deodar forests. Also the ancient Hindu epics and Shaivite texts regularly mention Darukavana, meaning a forest of deodars, as a sacred place.

The deodar tree is the national tree of Pakistan.

Cultivation and Uses

It is widely grown as an ornamental tree, often planted in parks and large gardens for its drooping foliage. General cultivation is limited to areas with mild winters, with trees frequently killed by temperatures below about - 25 °C, limiting it to hardiness zones 7 and warmer for reliable growth. It is commonly grown in western Europe (north to Scotland), in the Mediterranean region, around the Black Sea, in southern and central China, on the west coast of North America as far north as Vancouver, British Columbia, in the southeastern United States from Texas to Maryland, South Africa also in some parts of Australia .

The most cold-tolerant trees originate in the northwest of the species' range in Kashmir and Paktia Province, Afghanistan. Selected cultivars from this region are hardy to zone 7 or even zone 6, tolerating temperatures down to about -30 °C. Named cultivars from this region include 'Eisregen', 'Eiswinter', 'Karl Fuchs', 'Kashmir', 'Polar Winter', and 'Shalimar'. Of these, 'Eisregen', 'Eiswinter', 'Karl Fuchs', and 'Polar Winter' were selected in Germany from seed collected in Paktia; 'Kashmir' was a selection of the nursery trade, whereas 'Shalimar' originated from seeds collected in 1964 from Shalimar Gardens, Pakistan (in the Kashmir region) and propagated at the Arnold Arboretum.

Construction Material

Deodar is in great demand as building material because of its durability, rot-resistant character and fine, close grain, which is capable of taking a high polish. Its historical use to construct religious temples and in landscaping around temples is well recorded. Its rot-resistant character also makes it an ideal wood for constructing the well-known houseboats of Srinagar, Kashmir. In Pakistan and India, during the British colonial period, deodar wood was used extensively for construction of barracks, public buildings, bridges, canals and railway cars. Despite its durability, it is not a strong timber, and its brittle nature makes it unsuitable for delicate work where strength is required, such as chair-making.

Herbal Ayurveda

The curative properties of Deodar are well recorded in Pakistani and Indian Ayurvedic medicines, which are indicated below.

The inner wood is aromatic and used to make incense. Inner wood is distilled into essential oil. As insects avoid this tree, the essential oil is used as insect repellent on the feet of horses, cattle and camels. It also has antifungal properties and has some potential for control of fungal deterioration of spices during storage. The outer bark and stem are astringent.

Cedar oil is often used for its aromatic properties, especially in aromatherapy. It has a characteristic woody odour which may change somewhat in the course of drying out. The crude oils are often yellowish or darker in colour. Its applications cover soap perfumes, household sprays, floor polishes and insecticides and is also used in microscope work as a clearing oil.

Chemistry

Cedrus deodara contains large amounts of taxifolin.

Cedarwood - Western Red Cedar

Western red cedar from Thuja plicata, is soft red-brown, aromatic, decay-resistant, used for outdoor construction, shingles, and guitar-making,

Thuja plicata, commonly called Western or pacific redcedar, giant or western arborvitae, giant cedar,[1] or shinglewood, is a species of Thuja, an evergreen coniferous tree in the cypress family Cupressaceae native to western North America. Though commonly called a cedar, it does not belong to the scientific family of trees that are classified as "true cedars". It is the Provincial tree of British Columbia, and has extensive applications for the indigenous First Nations of the Pacific Northwest.

Description

It is a large to very large tree, ranging up to 65–70 metres (213–230 ft) tall and 3–4 metres (9.8–13 ft) in trunk diameter, exceptionally even larger.[2][3] Trees growing in the open may have a crown that reaches the ground, whereas trees densely spaced together will only exhibit a crown at the top, where light can reach the leaves. It is long-lived; some individuals can live well over a thousand years, with the oldest verified being 1,460 years.

The foliage forms flat sprays with scale-like leaves in opposite pairs, with successive pairs at 90° to each other. The foliage sprays are green above, and green marked with whitish stomatal bands below; they are strongly aromatic, with a scent reminiscent of pineapple when crushed. The individual leaves are 1–4 mm long and 1–2 mm broad on most foliage sprays, but up to 12 mm long on strong-growing lead shoots.

The cones are slender, 10–18 mm long and 4–5 mm broad, with 8–12 (rarely 14) thin, overlapping scales; they are green to yellow-green, ripening brown in fall about six months after pollination, and open at maturity to shed the seeds. The seeds are 4–5 mm long and 1 mm broad, with a narrow papery wing down each side. The pollen cones are 3–4 mm long, red or purple at first, shedding yellow pollen in spring.

Distribution and Habitat

Western Redcedar is native to the northwestern United States and southwestern Canada, from southeastern Alaska and British Columbia southeast through Washington and Oregon to the far northwest of California, primarily in coastal forests but with a disjunct inland population in the southeast of British Columbia, the extreme southwest of Alberta, northern Idaho and westernmost Montana. Pollen analysis and carbon-14 dating indicates postglacial colonization around the lower Fraser Valley around 6600 years ago. There it prospers and accounted for nearly half the vegetation in the area 500 years ago. Currently, Western Redcedar comprises about twenty percent of the region's forests.

Western Redcedar is among the most widespread trees in the Pacific Northwest, and is associated with Douglas-fir and western hemlock in most places where it grows. It is found at the elevation range of sea level to a maximum of 2290 m above sea level at Crater Lake in Oregon. In addition to growing in lush forests and mountainsides, Western Redcedar is also a riparian tree, and grows in many forested swamps and streambanks in its range. The tree is shade-tolerant, and able to reproduce under dense shade.

It has been introduced to other temperate zones, including western Europe, Australia (at least as far north as Sydney), New Zealand, the eastern United States (at least as far north as Central New York), and higher elevations of Hawaii.

The species is naturalized in Britain.

Taxonomy and Name

Thuja plicata is one of two Thuja species native to North America, the other being Thuja occidentalis. The species name plicata derives from a Greek word meaning "folded in plaits", a reference to the pattern of its small leaves.

Most authorities, both in Canada and the United States cite the English name in two words as western redcedar, or occasionally hyphenated as western red-cedar, to indicate is not a cedar (Cedrus), but it is also confusingly cited as western red cedar in some popular works. In the American horticultural trade, it is also known as the giant arborvitae, by comparison with arborvitae for its close relative Thuja occidentalis. Other names include giant redcedar, Pacific redcedar, shinglewood, British Columbia cedar, canoe cedar, and red cedar. Arborvitae comes from the Latin for "tree of life"; coincidentally, native Americans of the West coast also address the species as "long life maker".

Notable Specimens

The "Quinault Lake Redcedar" is the largest Western Redcedar in the world

The "Quinault Lake Redcedar" is the largest known specimen in the world with a wood volume of 500 cubic metres (17,700 cu ft). It is located near the northwest shore of Lake Quinault north of Aberdeen, Washington, about 34 km from the Pacific Ocean, it is 55 m tall with a diameter of 6.04 m By way of comparison, the largest known tree, a Giant Sequoia named "General Sherman", has a volume of 1,480 cubic metres (52,300 cu ft).

The second largest is the Cheewhat Lake Cedar, in the West Coast Vancouver Island-Pacific Rim National Park, at 449 cubic meters, and then the Kalaloch Cedar in the Olympic National Park, at 350 cubic meters.

A redcedar over 71m tall, 4.5m in diameter and over 700 years old stood in Cathedral Grove on Vancouver Island, British Columbia, before it was set on fire and destroyed by vandals in 1972. That tree now lies in "Giant's Grave", a self dug grave created by the force of its own impact.

A giant stump of a Western Redcedar tree is on display outside of the Tree House exhibit at the Jardin botanique de Montréal in Quebec, Canada. Visitors are welcome to pose next to it for dramatic photographs showing the tree's giant scale.

The soft red-brown timber has a tight, straight grain and few knots. It is valued for its distinct appearance, aroma, and its high natural resistance to decay, being extensively used for outdoor construction in the form of posts, decking, shingles and siding. It is also widely used throughout Europe and America for making beehives. It is cultivated as an ornamental tree, to a limited extent in forestry plantations and for screens and hedges. It is commonly used for the framing and longwood in lightweight sail boats and kayaks. In larger boats it is often used in sandwich construction between two layers of epoxy resin and/or fibreglass or similar products. Due to its light weight (390-400 kg per m3 dried)it is about 30% lighter than common boat building woods, such as mahogony. For its weight it is quite strong but can be brittle. It glues well with epoxy resin or resorcinol adhesive. It is also used to line closets and chests, for its pungent aromatic oils are believed to discourage moth and carpet beetle larvae, which can damage cloth by eating wool and similar fibres. This is more effective in a properly constructed redcedar chest (sometimes made entirely of redcedar), since the oils are confined by shellac and leather seals. A well-sealed redcedar chest will retain its pungent odour for many decades, sometimes for over a century. Its light weight, strength and dark warm sound make it a popular choice for guitar soundboards.

Thujaplicin, a chemical substance, is found in mature trees and serves as a natural fungicide,thereby preventing the wood from rotting. This effect lasts around a century even after the tree is felled. However, thujaplicin is only found in older trees, and saplings that do not produce the chemical often rot at an early stage, causing some trees to grow with a somewhat hollow, rotten trunk.

Role in Indigenous Societies

Klallam people and canoe, ca. 1914

Western Redcedar has an extensive history of use by the indigenous peoples of the Pacific Northwest Coast, from Oregon to southeast Alaska. Some northwest coast tribes refer to themselves as "people of the redcedar" because of their extensive dependence on the tree for basic materials. The wood has been used for constructing housing, totem poles, and crafted into many objects, including masks, utensils, boxes, boards, instruments, canoes, vessels, and ceremonial objects. Roots and bark were used for baskets, ropes, clothing, blankets and rings.

History

A huge number of archeological finds point to the continuous use of redcedar wood in native societies. Woodworking tools dating between 5000–8000 years ago, such as carved antlers, were discovered in shell middens at the Glenrose site, near Vancouver, British Columbia. In Yuquot, on the west coast of Vancouver, tools dating 3000–4000 years old have been found. The Musqueam site, also near Vancouver, yielded bark baskets woven in five different styles, along with ropes and ships dated to 3000 years ago. At Pitt River, adzes and baskets were dated around 2900 years ago. 1000 year old wooden artifacts were unearthed on the east coast of Vancouver Island.

A legend amongst the Coast Salish peoples describes the origins of the Western Redcedar. In this legend, there was a generous man who gave the people whatever they needed. When the Great Spirit saw this, he declared that when the generous man died, a great redcedar tree will grow where he is buried, and that the cedar will be useful to all the people; providing its roots for baskets, bark for clothing, and wood for shelter.

Tools

The wood was worked primarily with the adze, which was preferred over all other tools, even ones introduced by European settlers. Alexander Walker, an ensign on the fur trade ship Captain Cook reported that the indigenous peoples used an elbow adze, which they valued over new tools brought by the Europeans, such as the saw or the axe, going so far as to modify traded tools back into an adze.[21] Tools were generally made from stone, bone, obsidian, or a harder wood such as hemlock. A variety of hand mauls, wedges, chisels and knives were used. Excavations done at Ozette, Washington, turned up iron tools nearly 800 years old, far before European contact. When James Cook passed the area, he observed that almost all tools were made of iron. There has been speculation on the origin of these iron tools, some theories include shipwrecks from East Asia, or possible contact with iron-using cultures from Siberia, as hinted in the more advanced woodworking found in northern tribes such as the Tlingit.

Wood

Harvesting redcedars required some ceremony, and included propitiation of the tree's spirits as well as those of the surrounding trees. In particular, many people specifically requested the tree and its brethren not to fall or drop heavy branches on the harvester, a situation which is mentioned in a number of different stories of people who were not sufficiently careful. Some professional loggers of Native American descent have mentioned that they offer quiet or silent propitiations to trees which they fell, following in this tradition.

Felling of large trees such as redcedar before the introduction of steel tools was a complex and time-consuming art. Typically the bark was removed around the base of the tree above the buttresses, and then some amount of cutting and splitting with stone adzes and mauls would be done, creating a wide triangular cut. The area above and below the cut would be covered with a mixture of wet moss and clay as a firebreak, and then the cut would be packed with tinder and small kindling and slowly burned. The process of cutting and burning would alternate until the tree was mostly penetrated through, and then careful tending of the fire would fell the tree in the best direction for handling. This process could take many days, and constant rotation of workers was involved to keep the fires burning through night and day, often in a remote and forbidding location.

A pole outside a six-post house at the University of British Columbia.

Once the tree was felled the work had only just begun, as it then had to be stripped and dragged down to shore. If the tree was to become canoes then it would often be divided into sections and worked into rough canoe shapes before transport, but if it were to be used for a totem pole or building materials it would be towed in the round to the village. Many trees are still felled in this traditional manner for use as totem poles and canoes, particularly by artists who feel that using modern tools is detrimental to the traditional spirit of the art. Non-traditionalists simply buy redcedar logs or lumber at mills or lumber yards, a practice that is commonly followed by most working in smaller sizes such as for masks and staves.

Because felling required such an extraordinary amount of work, if only planks for housing were needed, these would be split from the living tree. The bark was stripped and saved, and two cuts were made at the ends of the planking. Then wedges would be pounded in along the sides and the planks slowly split off the side of the tree. Trees which have been so harvested are still visible in some places in the rainforest, with obvious chunks taken off of their sides. Such trees usually continue to grow perfectly well, since redcedar wood is resistant to decay. Planks are straightened by a variety of methods, including weighing them down with stones, lashing them together with rope, or forcing them between a line of stakes.

Redcedar wood is used to make huge monoxyla canoes in which the men went out to high sea to harpoon whales and conduct trade. One of those canoes (a 38-foot craft dug out about a century ago), was bought in 1901 by Captain John Voss, an adventurer. He gave her the name of Tilikum ("Friend" in Chinook jargon), rigged her, and led her in a hectic three-year voyage from British Columbia to London.

Redcedar branches are very flexible and have good tensile strength. They were stripped and used as strong cords for fishing line, rope cores, twine, and other purposes where bark cord was not strong enough or might fray. Both the branches and bark rope have been replaced by modern fiber and nylon cordage among the aboriginal northwest coast peoples, though the bark is still in use for the other purposes mentioned above.

Bark

Illustration of women pulling bark from a tree, from Indian Legends of Vancouver Island by Alfred Carmichael

The bark is easily removed from live trees in long strips, and is harvested for use in making mats, rope and cordage, basketry, rain hats, clothing, and other soft goods. The harvesting of bark must be done with care because if the tree is completely stripped it will die. To prevent this, the harvester usually only harvests from trees which have not been stripped before. After harvesting the tree is not used for bark again, although it may later be felled for wood. Stripping bark is usually started with a series of cuts at the base of the tree above any buttresses, and the bark is peeled upwards. To remove bark high up, a pair of platforms strung on rope around the tree are used, and the harvester climbs by alternating between them for support. Since redcedars lose their lower branches as all tall trees do in the rainforest, the harvester may climb 10 m or more into the tree by this method. The harvested bark is folded and carried in backpacks. It can be stored for quite some time as mold does not grow on it, and is moistened before unfolding and working. It is then split lengthwise into the required width and woven or twisted into shape. Bark harvesting was mostly done by women, despite the danger of climbing 10 m in the air, because they were the primary makers of bark goods. Today bark rope making is a lost art in many communities, although it is still practiced for decoration or art in a few places. Other uses of bark are still common for artistic or practical purposes.

Fir

(Abies) are a genus of 48–55 species of evergreen conifers in the family Pinaceae. They are found through much of North and Central America, Europe, Asia, and North Africa, occurring in mountains over most of the range. Firs are most closely related to the cedars (Cedrus); Douglas-firs are not true firs, being of the genus Pseudotsuga.

All are trees, reaching heights of 10–80 m (30–260 ft) tall and trunk diameters of 0.5–4 m (2–12 ft) when mature. Firs can be distinguished from other members of the pine family by their needle-like leaves, attached to the twig by a base that resembles a small suction cup; and by erect, cylindrical cones 5–25 cm (2–10 in) long that disintegrate at maturity to release the winged seeds. Identification of the species is based on the size and arrangement of the leaves, the size and shape of the cones, and whether the bract scales of the cones are long and exserted, or short and hidden inside the cone.

Species

Section Abies (central, south & east Europe, Asia Minor)
Abies alba - Silver Fir

Abies nebrodensis - Sicilian Fir

Abies borisii-regis - Bulgarian Fir

Abies cephalonica - Greek Fir

Abies nordmanniana - Nordmann Fir or Caucasian Fir

Abies nordmanniana subsp. equi-trojani - Kazdag(? Fir, Turkish Fir

Abies nordmanniana subsp. bornmülleriana - Uludag(Fir

Abies pinsapo - Spanish Fir

Abies pinsapo var. marocana - Moroccan Fir

Abies numidica - Algerian Fir

Abies cilicica - Syrian Fir

Section Balsamea (Taiga|boreal Asia and North America, and high mountains further south)

Abies fraseri - Fraser Fir

Abies balsamea - Balsam Fir
Abies balsamea var. phanerolepis - Bracted Balsam Fir

Abies lasiocarpa - Subalpine Fir

Abies lasiocarpa var. arizonica - Corkbark Fir

Abies lasiocarpa var. bifolia - Rocky Mountains Subalpine Fir

Abies sibirica - Siberian Fir

Abies sibirica var. semenovii

Abies sachalinensis—Sakhalin Fir

Abies koreana - Korean Fir

Abies nephrolepis - Khinghan Fir

Abies veitchii - Veitch's Fir

Abies veitchii var. sikokiana - Shikoku Fir

A. grandis foliage

Intact and disintegrated Bulgarian Fir cones

A. alba foliage from Dinaric calcareous fir forests on Mt. Orjen

Section Grandis (western North America to Mexico and Guatemala, lowlands in north, moderate altitudes in south)

Abies grandis - Grand Fir or Giant Fir

Abies grandis var. idahoensis - Interior Grand Fir or Giant Fir

Abies concolor - White Fir

Abies concolor subsp. lowiana - Low's White Fir

Abies durangensis—Durango Fir

Abies durangensis var. coahuilensis - Coahuila Fir

Abies flinckii - Jalisco Fir

Abies guatemalensis - Guatemalan Fir

Section Momi (east & central Asia, Himalaya, generally at low to moderate altitudes)

Abies kawakamii - Taiwan Fir

Abies homolepis - Nikko Fir

Abies recurvata - Min Fir

Abies recurvata var. ernestii - Min Fir

Abies firma - Momi Fir

Abies beshanzuensis - Baishanzu Fir

Abies holophylla - Manchurian Fir

Abies chensiensis - Shensi Fir

Abies chensiensis subsp. salouenensis—Salween Fir

Abies pindrow - Pindrow Fir

Abies ziyuanensis - Ziyuan Fir

Section Amabilis (Pacific coast mountains, North America and Japan, in high rainfall mountains)

Abies amabilis - Pacific Silver Fir

Abies mariesii - Maries' Fir

A. fabri, Sichuan, China

Section Pseudopicea (Sino-Himalayan mountains, at high altitude)

Abies delavayi - Delavay's Fir

Abies delavayi var. nukiangensis

Abies delavayi var. motuoensis

Abies delavayi subsp. fansipanensis

Abies fabri - Faber's Fir

Abies fabri subsp. minensis

Abies forrestii - Forrest's Fir

Abies chengii - Cheng's Fir

Abies densa - Bhutan Fir

Abies spectabilis - East Himalayan Fir

Abies fargesii - Farges' Fir

Abies fanjingshanensis - Fan jingshan Fir

Abies yuanbaoshanensis - Yuanbaoshan Fir

Abies squamata - Flaky Fir

Abies webbiana -Talispatra

Section Oiamel (Central Mexico, at high altitude)

Abies religiosa - Sacred Fir

Abies hickelii - Hickel's Fir

Abies hickelii var. oaxacana - Oaxaca Fir

A. magnifica, California, USA

Section Nobilis (western U.S., high altitudes)

Abies procera - Noble Fir

Abies magnifica - Red Fir

Abies magnifica var. shastensis - Shasta Red Fir

Section Bracteata (California coast)

Abies bracteata - Bristlecone Fir

Section Incertae sedis

Abies milleri - (Extinct) Early Eocene

Uses & Ecology

The wood of most firs is considered unsuitable for general timber use, and is often used as pulp or for the manufacture of plywood and rough timber. Because this genus has no insect or decay resistance qualities after logging, it is generally recommended for construction purposes as indoor use only (e.g. indoor drywall framing). This wood left outside cannot be expected to last more than 12 to 18 months, depending on the type of climate it is exposed to. It is commonly referred to by several different names, including North American timber, SPF (spruce, pine, fir) and whitewood.

Nordmann Fir, Noble Fir, Fraser Fir and Balsam Fir are popular Christmas trees, generally considered to be the best for this purpose, with aromatic foliage that does not shed many needles on drying out. Many are also decorative garden trees, notably Korean Fir and Fraser Fir, which produce brightly coloured cones even when very young, still only 1–2 m (3–6 ft) tall. Other firs can grow anywhere between 30 and 236 feet tall. Fir Tree Appreciation Day is June 18.

Firs are used as food plants by the caterpillars of some Lepidoptera species, including Chionodes abella (recorded on White Fir), Autumnal Moth, Conifer Swift (a pest of Balsam Fir), The Engrailed, Grey Pug, Mottled Umber, Pine Beauty and the tortrix moths Cydia illutana (whose caterpillars are recorded to feed on European Silver Fir cone scales) and C. duplicana (on European Silver Fir bark around injuries or canker).

Guaiacwood

Oil of guaiac is a fragrance used in soap. It comes from the palo santo tree (Bulnesia sarmientoi).

Oil of guaiac is produced through steam distillation of a mixture of wood and sawdust from palo santo. It is sometimes incorrectly called guaiac wood concrete. It is a yellow to greenish yellow semi-solid mass which melts around 40-50 ºC. Once melted, it can be cooled back to room temperature yet remain liquid for a long time. Oil of guaiac has a soft roselike odour, similar to the odour of Hybrid Tea roses or violets. Because of this similarity, it has sometimes been used as an adulterant for rose oil.

Oil of guaiac is primarily composed of 42-72% guaiol, bulnesol, ?-bulnesene, ?-bulnesene, ?-guaiene, guaioxide and ?-patchoulene. It is considered non-irritating, non-sensitizing, and non phototoxic to human skin.

Oil of guaiac was also a pre-Renaissance remedy to syphilis.

Mahogany

The name mahogany is commonly applied to many different kinds of tropical hardwood, most of which are reddish-brown in colour and widely employed in furniture-making, boat building and other high specification uses. However, there are only three species of true mahogany, all of which are indigenous to the Americas. These are Swietenia mahagoni (L.) Jacq., S. macrophylla King, and S. humilis Zucc. The natural distribution of these species within the Americas is geographically distinct. S. mahagoni grows on the West Indian islands as far north as the Bahamas, the Florida Keys and parts of Florida; S. humilis grows in the dry regions of the Pacific coast of Central America from south-western Mexico to Costa Rica; S. macrophylla grows in Central America from Yucatan southwards and into South America, extending as far as Peru, Bolivia and extreme western Brazil. In the 20th century various botanists attempted to further to define S. macrophylla in South America as a new species, such as S. candollei Pittier and S. tessmannii Harms., but many authorities consider these to be spurious. According to Record and Hess 'all of the mahogany of continental North and South America can be considered as one botanical species, Swietenia macrophylla King'.

The name mahogany was initially associated only with those islands in the West Indies under British control (French colonists used the term acajou, while in the Spanish territories it was called caoba). The origin of the name is uncertain, but it could be a corruption of 'm'oganwo', the name used by the Yoruba and Ibo people of West Africa to described trees of the genus Khaya, which is closely related to Swietenia. When transported to Jamaica as slaves, they gave the same name to the similar trees they saw there. Although this interpretation has been disputed, a more plausible origin has yet to be suggested. The indigenous Arawak name for the tree is not known. In 1671 the word mahogany appeared in print for the first time, in John Ogilby's America. Among botanists and naturalists, however, the tree was considered a type of cedar, and in 1759 was classified by Carl Linnaeus (1707–1778) as Cedrela mahagoni. The following year it was assigned to a new genus by Nicholas Joseph Jacquin (1727–1817), and named Swietenia mahagoni. Until the 19th century all mahogany was regarded as one species, although varying in quality and character according to soil and climate. In 1836 the German botanist Joseph Gerhard Zuccarini (1797–1848) identified a second species while working on specimens collected on the Pacific coast of Mexico, and named it Swietenia humilis. In 1886 a third species, Swietenia macrophylla, was named by Sir George King (1840–1909) after studying specimens of Honduras mahogany planted in the Botanic Gardens in Calcutta, India. Today, all species of Swietenia grown in their native locations are listed by CITES, and are therefore protected. Both Swietenia mahagoni, and Swietenia macrophylla were introduced into several Asian countries at the time of the restrictions imposed on American mahogany in the late 1990s and both are now successfully grown and harvested in plantations in those countries. The world's supply of genuine mahogany today comes from these Asian plantations, notably from India, Bangladesh, Indonesia and from Fiji, in Oceania.

Species of Swietenia cross-fertilise readily when they grow in proximity; the hybrid between S. mahagoni and S. macrophylla is widely planted for its timber. Mahogany is the national tree of Dominican Republic and Belize. It also appears on the national seal of Belize.

"Mahogany" may refer to the largest group of all Meliaceae, the fifteen related species of Swietenia, Khaya and Entandrophragma. The timbers of Entandrophragma are sold under their individual names, sometimes with "mahogany" attached as a suffix, for example "sipo" may be referred to as "sipo mahogany". Kohekohe (Dysoxylum spectabile), a close relative, is sometimes called New Zealand Mahogany.

The term "genuine mahogany" applies to only the Swietenia mahoganies, wherever grown. The term "true mahogany" applies to any timber commercially called "mahogany" with or without qualification that is derived from the Meliaceae family. In addition to Swietenia mahoganies this applies also to Khaya (African Mahogany) and Toona (Chinese Mahogany) which are both from the Meliacae (Mahogany) family.

In addition, the US timber trade also markets various other Federal Trade Commission-defined species as "mahoganies" under a variety of different commercial names, most notably "Philippine mahogany", which in reality is actually from the genus Shorea, a dipterocarp. This wood is also known as Lauan or Meranti.

History of the trade in American mahogany

There can be little doubt that mahogany timber has been used since prehistoric times by the indigenous peoples of the Caribbean and Central and South America. In the 17th century the buccanneer John Esquemeling recorded the use of mahogany or cedrela on Hispaniola for making canoes; 'The Indians make these canoes without the use of any iron instruments, by only burning the trees at the bottom near the root, and afterwards governing the fire with such industry that nothing is burnt more than what they would have...'. The wood first came to the notice of Europeans with the beginning of Spanish colonisation in the Americas. A cross in the Cathedral at Santo Domingo, bearing the date 1514, is said to be mahogany, and Phillip II of Spain apparently employed the wood for the interior joinery of the Escorial Palace, begun in 1584. However, caoba, as the Spanish called the wood, was principally reserved for ship building, and it was declared a royal monopoly at Havanna in 1622. Hence very little of the mahogany growing in Spanish controlled territory found its way to Europe. After the establishment of a French colony in Saint Domingue (now Haiti), some mahogany from that island probably found its way to France, where joiners in the port cities of Saint-Malo, Nantes, La Rochelle and Bordeaux used the wood to a limited extent from about 1700. On the English controlled islands, especially Jamaica and the Bahamas, mahogany was abundant but not exported in any quantity before 1700.

While the trade in mahogany from the Spanish and French territories in America remained moribund for most of the 18th century, this was not true for those islands under British control. In 1721 the British Parliament removed all import duties from timber imported into Britain from British possessions in the Americas. This had the effect of immediately stimulating the trade in West Indian timbers, of which the most important was mahogany. Importations of mahogany into England (and excluding those to Scotland, which were recorded separately) reached 525 tons per annum by 1740, 3,688 tons by 1750, and more than 30,000 tons in 1788, the peak year of the 18th century trade. At the same time, the 1721 Act had the effect of substantially increasing exports of mahogany from the West Indies to the British colonies in North America. Although initially regarded as a joinery wood, mahogany rapidly became the timber of choice for makers of high quality furniture in both the British Isles and the 13 colonies of North America.

Until the 1760s over 90 per cent of the mahogany imported into Britain came from Jamaica. Some of this was re-exported to Europe, but most was used by British furniture makers. Quantities of Jamaican mahogany also went to the North American colonies, but most of the wood used in American furniture came from the Bahamas. This was sometimes called Providence wood, after the main port of the islands, but more often madera or maderah, which was the Bahamian name for mahogany. In addition to Jamaica and Bahamas, all the British controlled islands exported some mahogany at various times, but the quantities were not large. The most significant third source was Black River and adjacent areas on the Mosquito Coast (now Republic of Honduras), from where quantities of mahogany were shipped from the 1740s onwards. This mahogany was known as 'Rattan mahogany', after the island of Ruatan which was the main off-shore entrepot for the British settlers in the area.

At the end of the Seven Years' War (1756–63) the mahogany trade began to change significantly. During the occupation of Havana by British forces between August 1762 and July 1763, quantities of Cuban or Havanna mahogany were sent to Britain, and after the city was restored to Spain in 1763 small quantities continue to be exported, mostly to small ports on the north coast of Jamaica, from where it was sent to Britain. However, this mahogany was not much liked, being regarded as inferior to the Jamaican variety, and the trade remained fitful until the 19th century. Another variety new to the market was Hispaniola mahogany, also called 'Spanish' and 'St Domingo' mahogany. This was the result of the 1766 Free Ports Act, which opened Kingston and other designated Jamaican ports to foreign vessels for the first time. The object was primarily to encourage importations of cotton from French plantations in Saint Domingue, but quantities of high quality mahogany were also shipped. These were then forwarded to Britain, where they entered the market in the late 1760s.

In terms of quantity, the most significant new addition to the mahogany trade was Honduras mahogany, also called 'baywood', after the Bay of Honduras. British settlers had been active in southern Yucatan since the beginning of the 18th century, despite the opposition of the Spanish, who claimed sovereignty over all of Central America. Their main occupation was cutting logwood, a dyewood for which there was a high demand in Europe. The centre of their activity and the primary point of export was Belize. Under Article XVII of the Treaty of Paris (1763), British cutters were for the first time given the right to cut logwood in Yucatan unmolested, within agreed limits. Such was the enthusiasm of the cutters that within a few years the European market was glutted, and the price of logwood collapsed. However, the price of mahogany was still high after the war, and so the cutters turned to cutting mahogany. The first Honduras mahogany arrived in Kingston, Jamaica, in November 1763, and the first shipments arrived in Britain the following year.

By the 1790s most of the viable stocks of mahogany in Jamaica had been cut, and the market was divided between two principal sources or types of mahogany. Honduras mahogany was relatively cheap, plentiful, but rarely of the best quality. Hispaniola (aka Spanish and St Domingo) mahogany was the wood of choice for high quality work. Although data are lacking, it is likely that the newly independent United States now received a good proportion of its mahogany from Cuba. In the last quarter of the 18th century France began to use mahogany more widely; they had ample supplies of high quality wood from Saint Domingue. The rest of Europe, where the wood was increasingly fashionable, obtained most of their wood from Britain.

The French Revolution of 1789 and the wars that followed radically changed the mahogany trade, primarily due to the progressive collapse of the French and Spanish colonial empires, which allowed British traders into areas previously closed to them. Saint Domingue became the independent republic of Haiti, and from 1808 onwards Spanish controlled Santo Domingo and Cuba were both opened to British vessels for the first time. From the 1820s mahogany from all these areas was imported into Europe and North America, with the lion's share going to Britain. In Central America British loggers moved northwest towards Mexico and south into Guatemala. Other areas of Central America as far south as Panama also began to be exploited, but the most important new development was the beginning of large scale logging in Mexico from the 1860s. Most mahogany was cut in the province of Tabasco and exported from a number of ports on the Gulf of Campeche, from Vera Cruz eastwards to Campeche and Sisal. By the end of the 19th century there was scarcely any part of Central America within reach of the coast untouched by logging, and activity also extended into Colombia, Venezuela, Peru and Brazil.

The peak of the trade in American mahogany was probably reached in the last quarter of the 19th century. Figures are not available for all countries, but Britain alone imported more than 80,000 tons in 1875. This figure was not matched again; from the 1880s African mahogany (Khaya spp.), a related genus, began to be exported in increasing quantities from West Africa, and by the early 20th century it dominated the market. In 1907 the total of mahogany from all sources imported into Europe was 159,830 tons, of which 121,743 tons were from West Africa. By this time mahogany from Cuba, Haiti and other West Indian sources was becoming increasingly difficult to obtain in commercial sizes, and by the late 20th century Central American and even South American mahogany was heading in a similar direction. In 1975 S. humilis was placed on CITES Appendix II followed by S. mahagoni in 1992. The most abundant species, S. macrophylla, was placed on Appendix III in 1995 and moved to Appendix II in 2003.

Uses

Mahogany has a generally straight grain and is usually free of voids and pockets. It has a reddish-brown color, which darkens over time, and displays a reddish sheen when polished. It has excellent workability, and is very durable. Historically, the tree's girth allowed for wide boards from traditional mahogany species. These properties make it a favorable wood for crafting cabinets and furniture.

Much of the first-quality furniture made in the American colonies from the mid 18th century was made of mahogany, when the wood first became available to American craftsmen. Mahogany is still widely used for fine furniture; however, the rarity of Cuban mahogany and over harvesting of Honduras and Brazilian mahogany has diminished their use. Mahogany also resists wood rot, making it attractive in boat construction. It is also often used for musical instruments, particularly the backs, sides and necks of acoustic guitars and drums shells because of its ability to produce a very deep, warm tone compared to other commonly used woods such as Maple or Birch. Guitars featuring mahogany in their construction include Martin D-18 and Gibson Les Paul models.

Mahogany is now being used for the bodies of high-end stereo phonographic record cartridges and for stereo headphones,[24] where it is noted for “warm” or “musical” sound.

Oakmoss

Evernia prunastri, also known as Oakmoss, is a species of lichen. It can be found in many mountainous temperate forests throughout the Northern Hemisphere, including parts of France, Portugal, Spain, North America, and much of Central Europe. Oakmoss grows primarily on the trunk and branches of oak trees, but is also commonly found on the bark of other deciduous trees and conifers such as fir and pine. The thalli of Oakmoss are short (3–4 cm in length) and bushy, and grow together on bark to form large clumps. Oakmoss thallus is flat and strap-like. They are also highly branched, resembling the form of deer antlers. The colour of Oakmoss ranges from green to a greenish-white when dry, and dark olive-green to yellow-green when wet. The texture of the thalli are rough when dry and rubbery when wet. It is used extensively in modern perfumery.

Oakmoss is commercially harvested in countries of South-Central Europe and usually exported to the Grasse region of France where its fragrant compounds are extracted as Oakmoss absolutes and extracts. These raw materials are often used as perfume fixatives and form the base notes of many fragrances. They are also key components of Fougère and Chypre class perfumes. The lichen has a distinct and complex odor and can be described as woody, sharp and slightly sweet. Oakmoss growing on pines have a pronounced turpentine odor that is valued in certain perfume compositions.

Health & Safety Information

Oakmoss should be avoided by people with known skin sensitization issues.

Patchouli

(Pogostemon cablin (Blanco) Benth; also patchouly or pachouli) is a species from the genus Pogostemon and a bushy herb of the mint family, with erect stems, reaching two or three feet (about 0.75 metre) in height and bearing small, pale pink-white flowers. The plant is native to tropical regions of Asia, and is now extensively cultivated in China, Indonesia, India, Malaysia, Mauritius, Taiwan, the Philippines, Thailand, and Vietnam, as well as West Africa.

The heavy and strong scent of patchouli has been used for centuries in perfumes, and more recently in incense, insect repellents, and alternative medicines. The word derives from the Tamil patchai (leaf). In Assamese it is known as xukloti.

Pogostemon cablin, P. commosum, P. hortensis, P. heyneasus and P. plectranthoides are all cultivated for their oils and all are known as patchouli oil.

Cultivation

Patchouli grows well in warm to tropical climates. It thrives in hot weather, but not direct sunlight. If the plant withers due to lack of watering, it will recover well and quickly after it has been watered. The seed-producing flowers are very fragrant and bloom in late fall. The tiny seeds may be harvested for planting, but they are very delicate and easily crushed. Cuttings from the mother plant can also be rooted in water to produce additional plants.

Extraction of Essential Oil

Extraction of patchouli's essential oil is by steam distillation, requiring rupture of its cell walls by steam scalding, light fermentation, or drying.

Leaves may be harvested several times a year, and when dried may be exported for distillation. Some sources claim a highest quality oil is usually produced from fresh leaves distilled close to where they are harvested; others that baling the dried leaves and fermenting them for a period of time is best.

Uses

Perfume

Patchouli is used widely in modern perfumery[8] and modern scented industrial products such as paper towels, laundry detergents, and air fresheners. Two important components of its essential oil are patchoulol and norpatchoulenol. Since the 1960s, it has become associated with American counterculture

Medicinal

In several Asian countries, such as Japan and Malaysia, patchouli is used as an antidote for venomous snakebites. The plant and oil have many claimed health benefits in herbal folk-lore and the scent is used to induce relaxation. Chinese medicine uses the herb to treat headaches, colds, nausea, diarrhea, and abdominal pain. Patchouli oil can be purchased from mainstream Western pharmacies and alternative therapy sources as an aromatherapy oil.

Insecticide

One study suggests patchouli oil may serve as an all-purpose insect repellent. More specifically, the patchouli plant is claimed to be a repellent potent against the Formosan subterranean termite.

During the 18th and 19th century, silk traders from China traveling to the Middle East packed their silk cloth with dried patchouli leaves to prevent moths from laying their eggs on the cloth.[citation needed] It has also been proven to effectively prevent female moths from adhering to males, and vice versa. Many historians speculate that this association with opulent Eastern goods is why patchouli was considered by Europeans of that era to be a luxurious scent. It is said that patchouli was used in the linen chests of Queen Victoria in this way.

Incense

Patchouli is an important ingredient in East Asian incense. Both patchouli oil and incense underwent a surge in popularity in the 1960s and 1970s in the US and Europe, mainly due to the hippie movement of those decades.

Pine

Pines are trees in the genus Pinus), in the family Pinaceae. They make up the monotypic subfamily Pinoideae. There are about 115 species of pine, although different authorities accept between 105 and 125 species

Etymology

The modern English name pine derives from Latin pinus by way of French pin; similar names are used in other Romance languages. In the past (pre-19th century) they were often known as fir, from Old Norse fyrre, by way of Middle English firre. The Old Norse name is still used for pines in some modern north European languages, in Danish, fyr, in Norwegian fura/fure/furu, Swedish, fura/furu, and Föhre in German, but in modern English, fir is now restricted to Fir (Abies) and Douglas-fir (Pseudotsuga)

Taxonomy, nomenclature and codification

Pinus Classification

Pines are divided into three subgenera, based on cone, seed and leaf characters:

Pinus subg. Pinus, the yellow or hard pine group

Pinus subg. Ducampopinus, the foxtail or pinyon group

Pinus subg. Strobus, the white or soft pine groups

Distribution

Huangshan Pine (Pinus hwangshanensis), Anhui, China

Pines are native to most of the Northern Hemisphere. In Eurasia, they range from the Canary Islands, Iberian Peninsula and Scotland east to the Russian Far East, and in the Philippines, north to just over 70°N in Norway, Finland and Sweden (Scots Pine) and eastern Siberia (Siberian Dwarf Pine), and south to northernmost Africa, the Himalaya and Southeast Asia, with one species (Sumatran Pine) just crossing the Equator in Sumatra to 2°S. In North America, they range from 66°N in Canada (Jack Pine and Red Pine), south to 12°N in Nicaragua (Caribbean Pine). Pines have been introduced in subtropical and temperate portions of the Southern Hemisphere, including Chile, Brazil, South Africa, Tanzania, Australia, Argentina and New Zealand, where they are grown widely as a source of timber. A number of these introduced species have become invasive, threatening native ecosystems.

Morphology

Ancient Pinus longaeva, Nevada, USA

Pines are evergreen, resinous trees (or rarely shrubs) growing 3–80 m tall, with the majority of species reaching 15–45 m tall. The smallest are Siberian Dwarf Pine and Potosi Pinyon, and the tallest is a 268.35-foot (81.79-meter) tall Ponderosa Pine located in southern Oregon's Rogue River-Siskiyou National Forest.

The bark of most pines is thick and scaly, but some species have thin, flaking bark. The branches are produced in regular "pseudo whorls", actually a very tight spiral but appearing like a ring of branches arising from the same point. Many pines are uninodal, producing just one such whorl of branches each year, from buds at the tip of the year's new shoot, but others are multinodal, producing two or more whorls of branches per year. The spiral growth of branches, needles, and cone scales are arranged in Fibonacci number ratios.The new spring shoots are sometimes called "candles"; they are covered in brown or whitish bud scales and point upward at first, then later turn green and spread outward. These "candles" offer foresters a means to evaluate fertility of the soil and vigour of the trees.

Pines are long-lived, typically reaching ages of 100–1,000 years, some even more. The longest-lived is the Great Basin Bristlecone Pine, Pinus longaeva. One individual of this species, dubbed Methuselah, is one of the world's oldest living organisms at around 4,600 years old. This tree can be found in the White Mountains of California. An older tree, unfortunately now cut down, was dated at 4,900 years old. It was discovered in a grove beneath Wheeler Peak and it is now known as Prometheus after the Greek immortal.

Foilage

Pines have four types of leaf:

Seed leaves (cotyledons) on seedlings, borne in a whorl of 4–24. Juvenile leaves, which follow immediately on seedlings and young plants, 2–6 cm long, single, green or often blue-green, and arranged spirally on the shoot. These are produced for six months to five years, rarely longer.

Scale leaves, similar to bud scales, small, brown and non-photosynthetic, and arranged spirally like the juvenile leaves.

Needles, the adult leaves, which are green (photosynthetic), bundled in clusters (fascicles) of 1–6, commonly 2–5, needles together, each fascicle produced from a small bud on a dwarf shoot in the axil of a scale leaf. These bud scales often remain on the fascicle as a basal sheath. The needles persist for 1.5–40 years, depending on species. If a shoot is damaged (e.g. eaten by an animal), the needle fascicles just below the damage will generate a bud which can then replace the lost leaves.

Cones

Pines are mostly monoecious, having the male and female cones on the same tree, though a few species are sub-dioecious with individuals predominantly, but not wholly, single-sex. The male cones are small, typically 1–5 cm long, and only present for a short period (usually in spring, though autumn in a few pines), falling as soon as they have shed their pollen. The female cones take 1.5–3 years (depending on species) to mature after pollination, with actual fertilization delayed one year. At maturity the female cones are 3–60 cm long. Each cone has numerous spirally arranged scales, with two seeds on each fertile scale; the scales at the base and tip of the cone are small and sterile, without seeds. The seeds are mostly small and winged, and are anemophilous (wind-dispersed), but some are larger and have only a vestigial wing, and are bird-dispersed (see below). At maturity, the cones usually open to release the seeds, but in some of the bird-dispersed species (e.g. Whitebark Pine), the seeds are only released by the bird breaking the cones open. In others, the seeds are stored in closed ("serotinous") cones for many years until an environmental cue triggers the cones to open, releasing the seeds. The most common form of serotiny is pyriscence, in which a resin binds the cones cones shut until melted by a forest fire.

Ecology

A prescribed fire in a European Black Pine (Pinus nigra) woodland, Portugal

Pines grow well in acid soils, some also on calcareous soils; most require good soil drainage, preferring sandy soils, but a few (e.g. Lodgepole Pine) will tolerate poorly drained wet soils. A few are able to sprout after forest fires (e.g. Canary Island Pine). Some species of pines (e.g. Bishop Pine) need fire to regenerate, and their populations slowly decline under fire suppression regimes. Several species are adapted to extreme conditions imposed by elevation and latitude (e.g. Siberian Dwarf Pine, Mountain Pine, Whitebark Pine and the bristlecone pines). The pinyon pines and a number of others, notably Turkish Pine and Gray Pine, are particularly well adapted to growth in hot, dry semi-desert climates.

The seeds are commonly eaten by birds and squirrels. Some birds, notably the Spotted Nutcracker, Clark's Nutcracker and Pinyon Jay, are of importance in distributing pine seeds to new areas. Pine needles are sometimes eaten by some Lepidoptera (butterfly and moth) species (see list of Lepidoptera that feed on pines), the Symphytan species Pine sawfly, and goats.

Uses

Pines are among the most commercially important of tree species, valued for their timber and wood pulp throughout the world. In temperate and tropical regions, they are fast-growing softwoods that will grow in relatively dense stands, their acidic decaying needles inhibiting the sprouting of competing hardwoods. Commercial pines are grown in plantations for timber that is denser, more resinous, and therefore more durable than spruce (Picea). Pine wood is widely used in high-value carpentry items such as furniture, window frames, panelling, floors and roofing, and the resin of some species is an important source of turpentine.

Many pine species make attractive ornamental plantings for parks and larger gardens, with a variety of dwarf cultivars being suitable for smaller spaces. Pines are also commercially grown and harvested for Christmas trees. Pine cones, the largest and most durable of all conifer cones, are craft favorites. Pine boughs, appreciated especially in wintertime for their pleasant smell and greenery, are popularly cut for decorations. A number of species are attacked by nematodes, causing pine wilt disease, which can kill some quickly. Pine needles are also used for making decorative articles like baskets, trays, pots, etc. This Native American skill is now being replicated across world. Pine needle handicrafts are made in the US, Canada, Mexico, Nicaragua and India. Pine needles serve as food for various Lepidoptera. See List of Lepidoptera which feed on Pines.

Because pines have no insect or decay resistant qualities after logging, they are generally recommended for construction purposes as indoor use only (ex. indoor drywall framing). This wood left outside can not be expected to last more than 12–18 months depending on the type of climate it is exposed to. It is commonly referred to by several different names which include North American timber, SPF (spruce, pine, fir) and whitewood.

Food Uses

Edible seeds of the Korean Pine (Pinus koraiensis)

Some species have large seeds, called pine nuts, that are harvested and sold for cooking and baking.

The soft, moist, white inner bark (cambium) found clinging to the woody outer bark is edible and very high in vitamins A and C. It can be eaten raw in slices as a snack or dried and ground up into a powder for use as a thickener in stews, soups, and other foods, such as Finnish pine bark bread (pettuleipä). Adirondack Indians got their name from the Mohawk Indian word atirú:taks, meaning "tree eaters".

A tea made by steeping young, green pine needles in boiling water (known as "tallstrunt" in Sweden) is high in vitamins A and C.

Sandalwood

is the name of a class of fragrant woods from trees in the genus Santalum. The woods are heavy, yellow, and fine-grained, and unlike many other aromatic woods they retain their fragrance for decades. As well as using the harvested and cut wood, essential oils are also extracted from the woods for use. Both the wood and the oil produce a distinctive fragrance that has been highly valued for centuries. Consequently, the slow-growing trees have been overharvested in many areas.

Sandalwoods are medium-sized hemiparasitic trees. Notable members of this group are Indian sandalwood (Santalum album) and Australian sandalwood (Santalum spicatum). Others in the genus species have fragrant wood. These are found in India, Bangladesh, Sri Lanka, Australia, Indonesia, and the Pacific Islands. In India, Bangladesh and Sri Lanka it is called Chandan.

Santalum album, or Indian sandalwood, is a threatened species. It is indigenous to South India, and grows in the Western Ghats and a few other mountain ranges like the Kalrayan and Shevaroy Hills. Although sandalwood trees in India and Nepal are government-owned and their harvest is controlled, many trees are illegally cut down. Sandalwood oil prices have risen to $1,000–1,500 per kg recently. Some countries regard the sandal oil trade as ecologically harmful as it encourages overharvesting sandalwood trees. Sandalwood from the Mysore region of Karnataka (formerly Carnatic), and marayoor forest in kerala, Southern India is high quality. New plantations were created with international aid in Tamilnadu for economic exploitation. In Kununurra in Western Australia, Indian sandalwood (Santalum album) is grown on a large scale.

Santalum ellipticum, S. freycinetianum, and S. paniculatum, the Hawaiian sandalwood (?iliahi), were also used and considered high quality. These three species were exploited between 1790 and 1825 before the supply of trees ran out (a fourth species, S. haleakalae, occurs only in subalpine areas and was never exported). Although S. freycinetianum and S. paniculatum are relatively common today, they have not regained their former abundance or size, and S. ellipticum remains rare.

Santalum spicatum (Australian sandalwood) is used by aromatherapists and perfumers. The concentration differs considerably from other Santalum species. In the 1840s, sandalwood was Western Australia's biggest export earner. Oil was distilled for the first time in 1875, and by the turn of the century there was intermittent production of Australian sandalwood oil.

Production

Sandalwood leaf

Producing commercially valuable sandalwood with high levels of fragrance oils, requires Santalum trees to be a minimum of eight years old, but at least fourteen years is preferred. Australia is the largest producer of Santalum album, the majority grown around Kununurra, Western Australia.

Unlike most trees, sandalwood is

harvested by toppling the entire tree instead of sawing them down at the trunk close to ground level. This way, wood from the stump and root can also be used.

Usage

Fragrance

Chess pieces in red sandalwood

Sandalwood essential oil provides perfumes with a striking wood base note. Sandalwood smells somewhat like other wood scents, except it has a bright and fresh edge with few natural analogues. When used in smaller proportions in a perfume, it is an excellent fixative to enhance the head space of other fragrances.

Sandalwood oil in India is widely used in the cosmetic industry. The main source of true sandalwood, S. album, is a protected species, and demand for it cannot be met. Many species of plants are traded as "sandalwood". Within the genus Santalum alone, there are more than nineteen species. Traders will often accept oil from closely related species, such as various species in the genus Santalum, as well as from unrelated plants such as West Indian Sandalwood (Amyris balsamifera) in the family Rutaceae or bastard sandalwood (Myoporum sandwicense, Myoporaceae). However, most woods from these alternative sources will lose their aroma within a few months or years.

Isobornyl cyclohexanol is a synthetic fragrance chemical produced as an alternative to the natural product.

Hinduism

Sandalwood paste is integral to rituals and ceremonies, to mark religious utensils and to decorate the icons of the deities. It is also distributed to devotees, who apply it to the forehead or the neck and chest. Preparation of the paste is a duty fit only for the pure, and is therefore entrusted in temples and during ceremonies only to priests.

The paste is prepared by grinding wood by hand upon granite slabs (popularly known as Saane kallu in Tamil) shaped for the purpose. With slow addition of water a thick paste results, which is mixed with saffron or other such pigments to make Chandan.

Sandalwood is considered in alternative medicine to bring one closer to the divine. It gives a cool soothing effect to the body thus reducing the body heat. In Thirupathi after religious tonsure, Sandal paste is applied to protect the skin. Sandalwood essential oil is used for Ayurvedic purposes and treating anxiety.

Buddhism

Sandalwood is considered to be of the padma (lotus) group and attributed to Amitabha Buddha. Sandalwood scent is believed to transform one's desires and maintain a person's alertness while in meditation. Sandalwood is also one of the more popular scents used for incense used when offering incense to the Buddha.

Chinese and Japanese Religions

Sandalwood, along with agarwood, is the most commonly used incense material by the Chinese and Japanese in worship and various ceremonies. It is used in Indian incense, religiously or otherwise.
[edit] Zoroastrianism

Zoroastrians offer sandalwood twigs to the firekeeping priests who offer the sandalwood to the fire which keep the fire burning. Sandalwood is offered to all of the three grades of fire in the Fire temple, including the Atash Dadgahs. Sandalwood is not offered to the divo, a homemade lamp. Often, money is offered to the mobad along with the sandalwood. Sandalwood is called sukhar in the Zoroastrian community. The sandalwood in the fire temple is often more expensive to buy than at a Zoroastrian store. It is often a source of income for the fire temple.

Medicine

Sandalwood essential oil was popular in medicine up to 1920-1930, mostly as a urogenital (internal) and skin (external) antiseptic. Its main component beta-santalol (~90%) has antimicrobial properties. It is used in aromatherapy and to prepare soaps. Due to this antimicrobial activity, it can be used to clear skin from blackheads and spots, but it must always be properly diluted with a carrier oil. Because of its strength, sandalwood oil should never be applied to the skin without being diluted in a carrier oil.

Technology

Due to its low fluorescence and optimal refractive index, sandalwood oil is often employed as an immersion oil within ultraviolet and fluorescence microscopy.

Distillation

Sandalwood is distilled in a four-step process, incorporating boiling, steaming, condensation and separation. The process is known as "steam distillation" and is widely carried out industrially at Kannauj, India.

Food

Australian Aboriginals eat the seed kernels, nuts, and fruit of local sandalwoods, such as quandong (Santalum acuminatum).

Silver Fir

Abies alba, the silver fir or European silver fir, is a fir native to the mountains of Europe, from the Pyrenees north to Normandy, east to the Alps and the Carpathians, and south to southern Italy and northern Serbia.

A. alba is a large evergreen coniferous tree growing to 40–50 m (exceptionally 60 m) tall and with a trunk diameter of up to 1.5 m. The largest measured tree was 68 m tall and had a trunk diameter of 3.8 m. It occurs at altitudes of 300-1,700 m (mainly over 500 m), on mountains with a rainfall of over 1,000 mm.

The leaves are needle-like, flattened, 1.8–3 cm long and 2 mm wide by 0.5 mm thick, glossy dark green above, and with two greenish-white bands of stomata below. The tip of the leaf is usually slightly notched at the tip. The cones are 9–17 cm long and 3–4 cm broad, with about 150-200 scales, each scale with an exserted bract and two winged seeds; they disintegrate when mature to release the seeds. The wood is white, leading to the species name "alba".

It tends to forms woods with other firs and beeches. It is closely related to Bulgarian Fir (Abies borisiiregis) further to the southeast in the Balkan Peninsula, and Sicilian Fir (A. nebrodensis) in Sicily, differing from these and other related Euro-Mediterranean firs in the sparser foliage, with the leaves spread either side of the shoot, leaving the shoot readily visible from above. Some botanists treat Bulgarian Fir and Sicilian Fir as varieties of Silver Fir, as A. alba var. acutifolia and A. alba var. nebrodensis respectively.

Ecology and uses

Silver Fir is an important component species in the Dinaric calcareous Silver Fir forest in the western Balkan Peninsula.

Its cone scales are used as food by the caterpillars of the tortrix moth Cydia illutana, while C. duplicana feeds on the bark around injuries or canker.

A resinous essential oil can be extracted. This pine-scented oil has soothing qualities, and is used in perfumes, bath products, and aerosol inhalants.

Silver Fir is the species first used as a Christmas tree, but has been largely replaced by Nordmann Fir (which has denser, more attractive foliage), Norway Spruce (which is much cheaper to grow), and other species. The wood is moderately soft and white, used for general construction and paper manufacture.

Spruce

A spruce is a tree of the genus Picea (play /pa??si??/),[1] a genus of about 35 species of coniferous evergreen trees in the Family Pinaceae, found in the northern temperate and boreal (taiga) regions of the earth. Spruces are large trees, from 20–60 metres (66–200 ft) tall when mature, and can be distinguished by their whorled branches and conical form. The needles, or leaves, of spruce trees are attached singly to the branches in a spiral fashion, each needle on a small peg-like structure called a pulvinus. The needles are shed when 4–10 years old, leaving the branches rough with the retained pulvinus (an easy means of distinguishing them from other similar genera, where the branches are fairly smooth).

Spruces are used as food plants by the larvae of some Lepidoptera species; see list of Lepidoptera that feed on spruces. They are also used by the larvae of gall adelgids (Adelges species).

In the mountains of western Sweden scientists have found a Norway Spruce tree, nicknamed Old Tjikko, which by reproducing through layering has reached an age of 9,550 years and is claimed to be the world's oldest known living tree.

Classification

DNA analyses have shown that traditional classifications based on the morphology of needle and cone are artificial. A recent study found that P. breweriana had a basal position, followed by P. sitchensis, and the other species were further divided into three clades, suggesting that Picea originated in North America.

Species

There are thirty-five named species of spruce in the world.

Clade I

Picea breweriana Brewer's Spruce. Klamath Mountains, North America; local endemic.

Clade II

Picea sitchensis Sitka Spruce. Pacific Coast of North America; the largest species, to 95m tall; important in forestry.

Clade III

Picea engelmannii Engelmann Spruce. Western North American mountains; important in forestry.

Picea glauca White Spruce. Northern North America; important in forestry.

Clade IV

Picea brachytyla Sargent's Spruce. Southwest China.

Picea chihuahuana Chihuahua Spruce. Northwest Mexico (rare).

Picea farreri Burmese Spruce. Northeast Burma, southwest China (mountains).

Picea likiangensis Likiang Spruce. Southwest China.

Picea martinezii Martinez Spruce. Northeast Mexico (very rare, endangered).

Picea maximowiczii Maximowicz

Spruce. Japan (rare, mountains).

Picea morrisonicola Yushan Spruce Taiwan (high mountains).

Picea neoveitchii Veitch's Spruce. Northwest China (rare, endangered).

Picea orientalis Caucasian Spruce or Oriental Spruce . Caucasus, northeast Turkey.

Picea purpurea Purple Spruce. Western China.

Picea schrenkiana Schrenk's Spruce. Mountains of central Asia.

Picea smithiana Morinda Spruce. Western Himalaya.

Picea spinulosa Sikkim Spruce. Eastern Himalaya.

Picea torano Tiger-tail Spruce. Japan.

Picea wilsonii Wilson's Spruce . Western China.

Clade V

Picea abies Norway Spruce. Europe; important in forestry. The original Christmas tree.

Picea alcoquiana ("P. bicolor") Alcock's Spruce. Central Japan (mountains).

Picea alpestris Norway Spruce, Alpine Spruce. The Alps in Europe; rare, often treated as a variant of P. abies (and hybridises with it) distinct cones.

Picea asperata Dragon Spruce. Western China; several varieties.

Picea crassifolia. China.

Picea glehnii Glehn's Spruce. Northern Japan, Sakhalin.

Picea jezoensis Jezo Spruce. Northeast Asia, Kamchatka south to Japan.

Picea koraiensis Korean Spruce. Korea, northeast China.

Picea koyamae Koyama's Spruce. Japan (mountains).

Picea mariana Black Spruce. Northern North America.

Picea meyeri Meyer's Spruce. Northern China (from Inner Mongolia to Gansu).

Picea obovata Siberian Spruce. North Scandinavia, Siberia. Often treated as a variant of P. abies (and hybridises with it) but distinct cones.

Picea omorika Serbian Spruce. Serbia and Bosnia; local endemic; important in horticulture.

Picea pungens Blue Spruce or Colorado Spruce. Rocky Mountains, North America; important in horticulture.

Picea retroflexa. China.

Picea rubens Red Spruce. Northeastern North America; important in forestry. Known as Adirondack in musical instrument making.

Uses

Timber

Spruce is useful as a building wood, commonly referred to by several different names including North American timber, SPF (spruce, pine, fir) and whitewood. Spruce wood is used for many purposes, ranging from general construction work and crates to highly specialised uses in wooden aircraft, and as a tonewood in many musical instruments, including guitars, mandolins, cellos, violins, and the soundboard at the heart of a piano and the harp. The Wright brothers' first aircraft, the Flyer, was built of spruce.

Because this species has no insect or decay resistance qualities after logging, it is generally recommended for construction purposes as indoor use only (ex. indoor drywall framing). Spruce wood, when left outside can not be expected to last more than 12–18 months depending on the type of climate it is exposed to.

Pulpwood

Spruce is one of the most important

woods for paper uses, as it has long wood fibres which bind together to make strong paper. The fibres are thin walled and collapses to thin bands upon drying. Spruces are commonly used in mechanical pulping as they are easily bleached. Together with northern pines northern spruces are commonly used to make NBSK. Spruces are cultivated over vast areas as pulpwood.
[edit] Food and medicine

The fresh shoots of many spruces and pines are a natural source of vitamin C. Captain Cook made alcoholic sugar-based spruce beer during his sea voyages in order to prevent scurvy in his crew. The leaves and branches, or the essential oils, can be used to brew spruce beer.

The tips from the needles can be used to make spruce tip syrup. Native Americans in New England also used the sap to make a gum which was used for various reasons, and which was the basis of the first commercial production of chewing gum. In survival situations spruce needles can be directly ingested or boiled into a tea. This replaces large amounts of vitamin C. Also, water is stored in a spruce's needles, providing an alternative means of hydration. Spruce can be used as a preventive measure for scurvy in an environment where meat is the only prominent food source.

Other Uses

The resin was used in the manufacture of pitch in the past (before the use of petrochemicals); the scientific name Picea is generally thought to be derived from Latin pix, pitch (though other etymologies have been suggested).

Native Americans in North America use the thin, pliable roots of some species for weaving baskets and for sewing together pieces of birch bark for canoes. See also Kiidk'yaas for an unusual golden Sitka Spruce sacred to the Haida people.

Spruces are also popular ornamental trees in horticulture, admired for their evergreen, symmetrical narrow-conic growth habit. For the same reason, some (particularly Picea abies and P. omorika) are also extensively used as Christmas trees.

Spruce branches are also used at Aintree racecourse, Liverpool, to build several of the fences on the Grand National course. It is also used to make sculptures and Christmas trees.

Etymology

Picea used in coat-of-arms of Kuhmo, Finland

The word "spruce" entered the English language from Old French Pruce, the name of Prussia. Spruce was a generic term for commodities brought to England by Hanseatic merchants and the tree was believed to have come from Prussia. According to a different theory, some suggest that it may however be a direct loanword from a Polish expression [drzewo / drewno] z Prus which literally means "tree / timber from Prussia". That would suggest that the late mediaeval Polish-speaking merchants would import the timber to England and the English would pick up the expression from them.

Teak

Teak is the common name for the tropical hardwood tree species Tectona grandis and its wood products. Tectona grandis is native to south and southeast Asia, mainly India, Indonesia, Malaysia, and Burma, but is naturalized and cultivated in many countries, including those in Africa and the Caribbean. Burma accounts for nearly one third of the world's total teak production.

The word teak comes from the Tamil (in the Dravidan region) word thekku. This tree is mentioned in the seventh-century literature of Tamil popularly known as the Tevaram.

Tectona grandis is a large, deciduous tree that is dominant in mixed hardwood forests. It has small, fragrant white flowers and papery leaves that are often hairy on the lower surface.

Description

Tectona grandis is a large, deciduous tree up to 40 m (131 ft) tall with gray to grayish brown branchlets. Leaves are ovate-elliptic to ovate, 15–45 cm (5.9–17.7 in) long by 8–23 cm (3.1–9.1 in) wide, and are held on robust petioles that are 2–4 cm (0.8–1.6 in) long. Leaf margins are entire.

Flowers at Ananthagiri Hills, in Rangareddy district of Andhra Pradesh, India.

Flower, fruit & leaves of Tectona grandis in Kolkata, West Bengal, India.

U Bein Bridge Amarapura, Myanmar. The longest teak bridge in the world at 1.2 km (0.75 mi) in length.

Leaves of Tectona grandis in Palakkad, Kerala.

Fragrant white flowers are borne on 25–40 cm (10–16 in) long by 30 cm (12 in) wide panicles from June to August. The corolla tube is 2.5–3 mm long with 2 mm wide obtuse lobes. Tectona grandis sets fruit from September to December; fruits are globose and 1.2-1.8 cm in diameter. Flowers are weakly protandrous in that the anthers precede the stigma in maturity and pollen is shed within a few hours of the flower opening. The flowers are primarily entomophilous (insect-pollinated), but can occasionally be anemophilous (wind-pollinated). A 1996 study found that in its native range in Thailand, the major pollinator were species in the Ceratina genus of bees.

Distribution and Habitat

Tectona grandis is one of three species in the genus Tectona. The other two species, T. hamiltoniana and T. philippinensis, are endemics with relatively small native distributions in Myanmar and the Philippines, respectively.[6] Tectona grandis is native to India, Indonesia, Malaysia, Myanmar, northern Thailand, and northwestern Laos.

Tectona grandis is found in a variety of habitats and climatic conditions from arid areas with only 500 mm of rain per year to very moist forests with up to 5,000 mm of rain per year. Typically, though, the annual rainfall in areas where teak grows averages 1,250-1,650 mm with a 3-5 month dry season.

Botanical History

Tectona grandis was first formally described by Carl Linnaeus the Younger in his 1782 work Supplementum Plantarum. In 1975, Harold Norman Moldenke published new descriptions of four forms of this species in the journal Phytologia. Moldenke described each form as varying slightly from the type specimen: T. grandis f. canescens is distinguished from the type material by being densely canescent, or covered in hairs, on the underside of the leaf, T. grandis f. pilosula is distinct from the type material in the varying morphology of the leaf veins, T. grandis f. punctata is only hairy on the larger veins on the underside of the leaf, and T. grandis f. tomentella is noted for its dense yellowish tomentose hairs on the lower surface of the leaf.

Cultivation

Teak is a yellowish brown timber with good grains and texture. It is used in the manufacture of outdoor furniture, boat decks, and other articles where weather resistance is desired. It is also used for cutting boards, indoor flooring, countertops and as a veneer for indoor furnishings.

Teak, though easily worked, can cause severe blunting on edged tools because of the presence of silica in the wood. Teak's natural oils make it useful in exposed locations, and make the timber termite and pest resistant. Teak is durable even when not treated with oil or varnish. Timber cut from old teak trees was once believed to be more durable and harder than plantation grown teak. Studies have shown[10] Plantation Teak performs on par with old-growth teak in erosion rate, dimensional stability, warping, and surface checking, but is more susceptible to color change from UV exposure.

The vast majority of commercially harvested teak is grown on teak plantations found in Indonesia and controlled by Perum Perhutani (a state owned forest enterprise) that manages the country's forests. The primary use of teak harvested in Indonesia is in the production of outdoor teak furniture for export.

Teak consumption raises a number of environmental concerns, such as the disappearance of rare old-growth teak. However, its popularity has led to growth in sustainable Plantation Teak production throughout the seasonally dry tropics in forestry plantations. The Forest Stewardship Council offers certification of sustainably grown and harvested teak products. Propagation of teak via tissue culture for plantation purposes is commercially viable.

Much of the world's teak is exported by Indonesia and Myanmar. There is also a rapidly growing plantation grown market in Central America (Costa Rica) and South America.

Hyblaea puera, a moth native to southeast Asia, is a teak pest whose caterpillar feeds on teak and other species of trees common in the region.

Uses

Teak is used extensively in India to make doors and window frames, furniture, and columns and beams in old type houses. It is very resistant to termite attacks. Mature teak fetches a very good price. It is grown extensively by forest departments of different states in forest areas.

Leaves of the teak wood tree are used in making Pellakai gatti (jackfruit dumpling), where batter is poured into a teak leaf and is steamed.[citation needed] This type of usage is found in the coastal district of Udupi in the Tulunadu region in South India. The leaves are also used in gudeg, a dish of young jackfruit made in Central Java, Indonesia, and give the dish its dark brown color.

Teak is used as a food plant by the larvae of moths of the genus Endoclita including E. aroura, E. chalybeatus, E. damor, E. gmelina, E. malabaricus, E. sericeus and E. signifer and other Lepidoptera including Turnip Moth.

Teak is used extensively in boat decks, as it is extremely durable and requires very little maintenance. The teak tends to wear in to the softer 'summer' growth bands first, forming a natural 'non-slip' surface. Any sanding is therefore only damaging. Use of modern cleaning compounds, oils or preservatives will shorten the life of the teak, as it contains natural teak-oil a very small distance below the white surface. Wooden boat experts will only wash the teak with salt water, and re-caulk when needed. This cleans the deck, and prevents it from drying out and the wood shrinking. The salt helps it absorb and retain moisture, and prevents any mildew and algal growth. People with poor knowledge often over-maintain the teak, and drastically shorten its life.

Teak is often an effective material for the construction of both indoor and outdoor furniture. Teak's high oil content, strong tensile strength and tight grain makes it particularly suitable for outdoor furniture applications. Over time teak can mature to a silvery-grey finish.

Propagation

Tree in new leaves in Kolkata, West Bengal, India.

Teak is propagated mainly from seeds. Germination of the seeds involves pretreatment to remove dormancy arising from the thick pericarp. Pretreatment involves alternate wetting and drying of the seed. The seeds are soaked in water for 12 hours and then spread to dry in the sun for 12 hours. This is repeated for 10–14 days and then the seeds are sown in shallow germination beds of coarse peat covered by sand. The seeds then germinate after 15 to 30 days.

Clonal propagation of teak has been successfully done thorough grafting, rooted stem cuttings and micro propagation. While bud grafting on to seedling root stock has been the method used for establishing clonal seed orchards that enables assemblage of clones of the superior trees to encourage crossing, rooted stem cuttings and micro propagated plants are being increasingly used around the world for raising clonal plantations.

Treemoss

Usnea is the generic and scientific name for several species of lichen in the family Parmeliaceae, that generally grow hanging from tree branches, resembling grey or greenish hair. It is sometimes referred to commonly as Old Man's Beard, Beard Lichen, or Treemoss. Usnea looks very similar to Spanish moss, so much so that the latter plant's Latin name is derived from it (Tillandsia usneoides, the 'Usnea-like Tillandsia').

Usnea grows all over the world. Like other lichens it is a symbiosis of a fungus and an alga. The fungus belongs to the division Ascomycota, while the alga is a member of the division Chlorophyta.

Taxonomy

Many species have been described. A monography by Józef Motyka from 1947 distinguished 451 species. Many of these are now regarded as morphological varieties and adaptations to local circumstances. The taxonomic categorization of many members of this genus remains uncertain. The number of recognized species in Finland is decreasing for this reason, from 34 in 1951 to 25 in 1963 and only 12 in 2000. It is now noted as including more than 600 species and being one of the largest genera within the Parmeliaceae.(Ref. Wirtz, N. et al. 2006.)

Ecology

Usnea is very sensitive to air pollution, especially sulfur dioxide. Under bad conditions they may grow no larger than a few millimetres, if they survive at all. Where the air is unpolluted, they can grow to 10–20 cm long.

Uses

Usnea has been used medicinally for at least 1000 years. Usnic acid ($C_{18}H_{16}O_7$), a potent antibiotic and antifungal agent is found in most species. This, combined with the hairlike structure of the lichen, means that Usnea lent itself well to treating surface wounds when sterile gauze and modern antibiotics were unavailable. It is also edible and high in vitamin C.

In modern American herbal medicine, Usnea is primarily used in lung and upper respiratory tract infections, and urinary tract infections. There are no human clinical trials to either support or refute either practice, although in vitro research does strongly support Usnea's antimicrobial properties.

Usnea also has shown usefulness in the treatment of difficult to treat fish infections in aquariums and ponds; in part due to the Usnic Acid for digestive internal infections or external infections, and as well for gill infections/stress due to Mucilage which is also contained in Usnea.

Usnea was one ingredient in a product called Lipokinetix, promoted to induce weight loss via increase in metabolic rate. Lipokinetix has been the topic of an FDA warning in the USA,[2] due to potential hepatotoxicity, although it is unclear yet if any toxicity would be attributable to the Usnea. Lipokinetix also contained PPA, caffeine, yohimbine and diiodothyronine. There is reason to believe that usnic acid, in high concentrations, could possess some toxicity. The National Toxicology Program is currently evaluating the issue.

There is no formal scientific information on the safety or efficacy of oral use of Usnea, although its long history of use strongly suggests value.

Species

Some of the species of Usnea include:

Usnea barbata

Usnea dasypoga

Usnea florida

Usnea hirta

Usnea rubicunda

Usnea rubiginea

Usnea scabrida

Usnea subfloridana

Usnea strigosa

The species Usnea longissima was renamed Dolichousnea longissima in 2004.

Turpentine

Turpentine (also called spirit of turpentine, oil of turpentine, and wood turpentine) is a fluid obtained by the distillation of resin obtained from live trees, mainly pines. It is composed of terpenes, mainly the monoterpenes alpha-pinene and beta-pinene. It is sometimes colloquially known as turps.

The word turpentine derives (via French and Latin) from the Greek word terebinthine, the name of a species of tree, the terebinth tree, from whose sap the spirit was originally distilled. Mineral turpentine or other petroleum distillates are used to replace turpentine, but they are very different chemically.

Source Trees

One of the earliest sources was the terebinth or turpentine tree (Pistacia terebinthus), a Mediterranean tree related to the pistachio. Important pines for turpentine production include:

Maritime Pine (Pinus pinaster),

Aleppo Pine (Pinus halepensis),

Masson's Pine (Pinus massoniana),

Sumatran Pine (Pinus merkusii),

Longleaf Pine (Pinus palustris),

Loblolly Pine (Pinus taeda) and

Ponderosa Pine (Pinus ponderosa).

Jeffrey pine, which resembles

Ponderosa Pine, produces a resin that, when distilled, yields almost pure n-Heptane, which is explosive: it cannot be used to make turpentine.

When producing chemical wood pulp from pines or other coniferous trees with the Kraft process, turpentine is collected as a byproduct. Often it is burned at the mill for energy production. The average yield of crude turpentine is 5–10 kg/t pulp.

Canada balsam, also called Canada turpentine or balsam of fir, is a turpentine which is made from the resin of the balsam fir. Venice turpentine is produced from the Western Larch Larix occidentalis.

Industrial and Other End Uses

1912 postcard depicting harvesting pine resin for the turpentine industry

As a Solvent

The two primary uses of turpentine in industry are as a solvent and as a source of materials for organic synthesis. As a solvent, turpentine is used for thinning oil-based paints, for producing varnishes, and as a raw material for the chemical industry. Its industrial use as a solvent in industrialized nations has largely been replaced by the much cheaper turpentine substitutes distilled from crude oil. Turpentine has long been used as a solvent, mixed with beeswax or with carnauba wax, to make fine furniture wax for use as a protective coating over oiled wood finishes (e.g., lemon oil).

Source of Organic Compounds

Turpentine is also used as a source of raw materials in the synthesis of fragrant chemical compounds. Commercially used camphor, linalool, alpha-terpineol, and geraniol are all usually produced from alpha-pinene and beta-pinene, which are two of the chief chemical components of turpentine. These pinenes are separated and purified by distillation. The mixture of diterpenes and triterpenes that is left as residue after turpentine distillation is sold as rosin.

Medicinal Elixir

Turpentine and petroleum distillates such as coal oil and kerosene have been used medicinally since ancient times, as topical and sometimes internal home remedies. Topically it has been used for abrasions and wounds, as a treatment for lice, and when mixed with animal fat it has been used as a chest rub, or inhaler for nasal and throat ailments. Many modern chest rubs, such as the Vicks variety, still contain turpentine in their formulations.

Taken internally it was used as treatment for intestinal parasites because of its alleged antiseptic and diuretic properties, and a general cure-all as in Hamlin's Wizard Oil. Sugar, molasses or honey were sometimes used to mask the taste. Internal administration of these toxic products is no longer common today.

Turpentine was a common medicine among seamen during the Age of Discovery, and one of several products carried aboard Ferdinand Magellan's fleet in his first circumnavigation of the globe.

Niche Uses

Turpentine is also added to many cleaning and sanitary products due to its antiseptic properties and its "clean scent". In early 19th-century America, turpentine was sometimes burned in lamps as a cheap alternative to whale oil. It was most commonly used for outdoor lighting, due to its strong odor. A blend of ethanol and turpentine added as an illuminant called burning fluid was also important for several decades. In 1946, Soichiro Honda used turpentine as a fuel for the first Honda motorcycles as gasoline was almost totally unavailable following World War II.

Turpentine was a common additive in cheap gin until the 20th century and gave it its characteristic juniper berry flavor without the need for pricier distillations with aromatic spices and berries.

Hazards

As an organic solvent, its vapor can irritate the skin and eyes, damage the lungs and respiratory system, as well as the central nervous system when inhaled, and cause renal failure when ingested, among other things. Being combustible, it also poses a fire hazard.

Vetiver

Chrysopogon zizanioides, commonly known as vetiver, is a perennial grass of the Poaceae family, native to India. In western and northern India, it is popularly known as khus. Vetiver can grow up to 1.5 metres high and form clumps as wide. The stems are tall and the leaves are long, thin, and rather rigid; the flowers are brownish-purple. Unlike most grasses, which form horizontally spreading, mat-like root systems, vetiver's roots grow downward, 2–4 m in depth. Vetiver is most closely related to Sorghum but shares many morphological characteristics with other fragrant grasses, such as lemongrass (Cymbopogon citratus), citronella (Cymbopogon nardus, C. winterianus), and palmarosa (Cymbopogon martinii). Though it originates in India, vetiver is widely cultivated in the tropical regions of the world. The world's major producers include Haiti, India, Java, and Réunion. The most commonly used commercial genotypes of vetiver are sterile (do not produce fertile seeds), and because vetiver propagates itself by small offsets instead of underground stolons, these genotypes are noninvasive and can easily be controlled by cultivation of the soil at the boundary of the hedge. However, care must be taken, because fertile genotypes of vetiver have become invasive. Vegetatively propagated, almost all vetiver grown worldwide for perfumery, agriculture, and bioengineering has been shown by DNA fingerprinting to be essentially the same nonfertile cultigen (called 'Sunshine' in the United States, after the town of Sunshine, Louisiana).

The Vetiver system, a technology of soil conservation and water quality management, is based on the use of the vetiver plant.

Morphology

The vetiver grass has a gregarious habit and grows in bunches. Shoots growing from the underground crown make the plant frost- and fire-resistant, and allow it to survive heavy grazing pressure. The leaves can become up to 120-150 cm long and 0.8 cm wide. The panicles are 15-30 centimeters long and have whorled, 2.5-5.0 centimeters long branches. The spikelets are in pairs, and there are three stamens.

The plant stems are erect and stiff. They can persist deep water flow. Under clear water, the plant can survive up to two months.

The root system of vetiver is finely structured and very strong. It can grow 3–4 m deep within the first year. Vetiver has no stolons nor rhizomes. Because of all these characteristics, the vetiver plant is highly drought-tolerant and can help to protect soil against sheet erosion. In case of sediment deposition, new roots can grow out of buried nodes.

Uses

Vetiver grass is grown for many different purposes. The plant helps to stabilise soil and protects it against erosion, but it can also protect fields against pests and weeds. Vetiver has favourable qualities for animal feed. From the roots, oil is extracted and used for cosmetics and aromatherapy. Due to its fibrous properties, the plant can also be used for handicrafts, ropes and more.

Erosion Control

Several aspects of vetiver make it an excellent erosion control plant in warmer climates. Unlike most grasses, it does not form a horizontal mat of roots; rather, the roots grow almost exclusively downward, 2–4 m, which is deeper than some tree roots. This makes vetiver an excellent stabilizing hedge for stream banks, terraces, and rice paddies, and protects soil from sheet erosion. The roots bind to the soil, therefore it can not dislodge. The plant also penetrates and loosens compacted soils.

Runoff mitigation and water conservation

The close-growing culms also help to block the runoff of surface water. It slows water's flow velocity and thus increases the amount absorbed by the soil (infiltration). It can withstand a flow velocity up to 5 metres per second (16 ft/s).

Vetiver mulch increases water infiltration and reduces evaporation, thus protects soil moisture under hot and dry conditions. The mulch also protects against splash erosion.

Crop Protection

Vetiver can be used for crop protection. It attracts pests, such as the stem borer (Chilo partellus), which lay their eggs preferably on vetiver. Due to the hairy architecture of vetiver, the larvae can not move on the leaves, fall to the ground and die.

As a mulch, vetiver is used for weed control in coffee, cocoa and tea plantations. It builds a barrier in the form of a thick mat. When the mulch breaks down, soil organic matter is built up and additional nutrients for crops become available.

Animal Feed

The leaves of vetiver are a useful byproduct to feed cattle, goats, sheep and horses. The nutritional content depends on season, growth stage and soil fertility. Under most climates, nutritional values and yields are best if vetiver is cut every 1-3 months.

Perfumery & Aromatherapy

Vetiver is mainly cultivated for the fragrant essential oil distilled from its roots. In perfumery, the older French spelling, vetyver, is often used. Worldwide production is estimated at about 250 tons per annum. Due to its excellent fixative properties, vetiver is used widely in perfumes. It is contained in 90% of all western perfumes. Vetiver is a more common ingredient in fragrances for men; some notable examples include Dior Eau Sauvage, Guerlain Vetiver, Zizan by Ormonde Jayne and Vetiver by L'Occitane.

Indonesia, China, Haiti are major producers. Vetiver processing was introduced to Haiti in the 1940s by Frenchman Lucien Ganot. In 1958, Franck Léger established a plant on the grounds of his father Demetrius Léger's alcohol distillery. The plant was taken over in 1984 by Franck's son, Pierre Léger, who expanded the size of the plant to 44 atmospheric stills, each built to handle one metric ton of vetiver roots. Total production increased in ten years from 20 to 60 tonnes annually, making it the largest producer in the world. The plant extracts vetiver oil by steam distillation. Another major operation in the field is the one owned by the Boucard family. Réunion is considered to produce the highest quality vetiver oil called "bourbon vetiver" with the next favorable being Haiti and then Java.

The United States, Europe, India, and Japan are the main consumers.

Essential Oil

Composition - Vetiver oil or khus oil is a complex oil, containing over 100 identified components, typically:

benzoic acid	furfurol
vetivene	vetivenyl vetivenate
terpinen-4-ol	5-epiprezizane
khusimene	-muurolene
khusimone	Calacorene
-humulene	-longipinene
-selinene	- selinene
-cadinene	valencene
calarene,-gurjunene	?-amorphene

epizizanal	3-epizizanol
khusimol	Iso-khusimol
valerenol	vetivone
-vetivone	vetivazulene

Structure of - vetivone, the main fragrant component of the oil of vetiver

Structure of khusimol, another fragrant component of the oil of vetiver

Structure of - vetivone, another fragrant component of the oil of vetiver

The oil is amber brown and rather thick. Its odor is described as deep, sweet, woody, smoky, earthy, amber, and balsam. The best quality oil is obtained from 18- to 24-month-old roots. The roots are dug up, cleaned, and then dried. Before the distillation, the roots are chopped and soaked in water. The distillation process can take up to 24 hours. After the distillate separates into the essential oil and hydrosol, the oil is skimmed off and allowed to age for a few months to allow some undesirable notes which form during the distillation to dissipate. Like patchouli and sandalwood essential oils, the odor of vetiver develops and improves with aging. The characteristics of the oil can vary significantly depending on where the grass is grown and the climate and soil conditions. The oil distilled in Haiti and Réunion has a more floral quality and is considered of higher quality than the oil from Java, which has a smokier scent. In the north of India, oil is distilled from wild-growing vetiver. This oil is known as khus or khas, and is considered superior to the oil obtained from the cultivated variety. It is rarely found outside of India, as most of it is consumed within the country.

Medicinal Use

Vetiver has been used in traditional medicine in South Asia, Southeast Asia, and West Africa.

Old Tamil literature mentions the use of vetiver for medical purposes.

In-house Use

In the Indian Subcontinent, khus (vetiver roots) is often used to replace the straw or wood shaving pads in evaporative coolers. When cool water runs for months over wood shavings in evaporative cooler padding, they tend to accumulate algae, bacteria and other microorganisms. This causes the cooler to emit a fishy or seaweed smell into the house. Vetiver root padding counteracts this smell. A cheaper alternative is to add vetiver cooler perfume or even pure khus attar to the tank. Another advantage is that they do not catch fire as easily as dry wood shavings.

Mats made by weaving vetiver roots and binding them with ropes or cords are used in India to cool rooms in a house during summer. The mats are typically hung in a doorway and kept moist by spraying with water periodically; they cool the passing air, as well as emitting a refreshing aroma.

In the hot summer months in India, sometimes a muslin sachet of vetiver roots is tossed into the earthen pot that keeps a household's drinking water cool. Like a bouquet garni, the bundle lends distinctive flavor and aroma to the water. Khus-scented syrups are also sold.

Fuel Cleaning

A recent study found the plant is capable of growing in fuel-contaminated soil. In addition, the study discovered the plant is also able to clean the soil, so in the end, it is almost fuel-free.

Other Uses

Vetiver grass is used as roof thatch (it lasts longer than other materials), mud brick-making for housing construction (such bricks have lower thermal conductivity), strings and ropes and ornamentals (for the light purple flowers).

A & E Connock Ltd. - United Kingdom

Essential Oils & Aromatic Chemicals

Book # 1 (A - H)

Birch Tar

Cade
Cedarwood

Fir Needle

Guaicwood

Patchouli
Pine (Pumilionis)

Sandalwood
Sweet Birch

A.N.E.C. - France

Endroit Produits

Ambre

Bois de cèdre
Bois de santal

Cade

Patchouli

Adrian Industries SAS - France

Products

Amyris

Cedarleaf
Cedarwood Atlas
Cedarwood China
Cedarwood Texas
Cedarwood Virginia

Patchouli

Pine Nigrae
Pine Siberia

Sandalwood

Processed Essential Oils

Birch Tar, rectified
Birch Tar, twice rectified

Cade rectified
Cedarwood Texas, rectified
Cedarwood Virginia, rectified

Patchouli, decolorized

Terpenes & By Products

Vetiver Terpenes

Balsams & Gums

Cade

Guaiacwood

Aromatic Raw Materials

Alpha Pinene Dextro
Alpha Pinene Laevo

Beta Pinene

Cedrol
Cedryl Acetate

Isobornyl Acetate

Sandenol

Vetiveryl Acetate

Organic Essential Oils & Extracts

Cedarwood Morrocco
    Cedrus Atlantica

Patchouli Oil
    Pogostemon Cablin
Pine Oil
    Pinus Sylvrestis

Turpentine Oil
    Pinus Pinaster

Vetiver Oil
    Vetiveria Zizanoides

Agan Aroma & Fine Chemicals - Israel

Products

Amberonne
Atralone

Albert Vieille SA - France

Maitieres Premietres Aromatiques

Abies Oil - Korea
Amyris Sandalwood Oil - Haiti

Cedarleaf Oil - France
Cedarwood Oil Atlas - Morocco
Cedarwood Oil Virginia - USA

Patchouli Light Oil - Indonesia
Patchouli Oil - India
Patchouli Oil - Indonesia
Pine Maritime Oil - France
Pine Needles Oil - Siberia

Sandalwood Oil - Sri Lanka,
New Caledonia

Vetiver Oil - Haiti, Java

Absolutes

Sandalwood Abs. - Spain
New Caladonia,

Treemoss Abs. - Yugoslovia

Alfa Chem - USA

Fine Aroma Materials

Amyris Oil

Balsam Copaiba
Balsam Copaiba Oil
Balsam Fir Canada
Balsam Gurjun
Balsam Peru
Balsam Peru Oil
Balsam Tolu
Birch Tar rectified

Cade Oil
Cade Oil rectified
Cedarleaf Oil
Cedarwood Oil Atlas
Cedarwood Oil Chinese
Cedarwood Oil Texas
Cedarwood Oil Texas Light
Cedarwood Oil Virginia
Cedarwood Oil redistilled
Cedarwood Terpenes (Cedrene)
Cedrene
Cedrol China, Texas

Fir Balsam Canadian
Fir Needle Oil Canadian
Fir Needle Oil Siberian

Guaiacwood Oil
Guaiacwood Acetate
Gurjun Balsam

Patchouli Oil Indonesia
Patchouli Oil Light
Patchouli Oil Micro Distilled
Patchouli Oil redistilled
Pinus Pumilionis Oil
Pinus Sylvestris Oil

Vetiver Acetate Haiti
Vetiver Acetate Java
Vetiver Oil Bourbon
Vetiver Oil Chinese
Vetiver Oil Java
Vetiver Redistilled

Absolutes

Fir Balsam Abs.

Oakmoss Moroccan Abs.
Oakmoss Yougoslav Abs.

Aromatic Chemicals

Alpha Pinene, Dextro
Alpha Pinene, Laevo

Beta Pinene

Cedrol Methyl Ether
Cedryl Acetate 50 %
Cedryl Acetate 70 %

D-Alpha Pinene

Iso Borneol

L-Bornyl Acetate
Longifolene

(MCK) Acetyl Cedrene
Methyl Cedrylone
Methyl Cedryl Ketone

Polarsan

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Amen Organics - India

Products

Abies Oil

Pine Oil

Sandalwood Oil

Essential Oils

Amyris Oil

Birch Oil

Cade Oil
Cedarwood Oil
Cyperess Oil

Fir Needle Oil
Fir Oil

Patchouli Oil
Pine Oil
Pine Seed Oil

Sandalwood Oil

American Society of Perfumers - USA

Classification of Olfactory Notes

Essential Oils - Woody Note

Amyris
Cedarwood
Guaiacwood
Oakmoss
Patchouly
Sandalwood
Treemoss
Vetiver

Aromatic Materials - Woody Note

Bois Ambrene Forte
Cedramber
Cedrol
Cedryl Acetate
Guaiyl Acetate
Ionones
Iso E Super
Kephalis
Madrox
Methyl Ionones
Nopyl Acetate
Oakmoss Synthetic
Sandalwood Synthetic
Santalol
Santalyl Acetate
Vertenex
Vertofix Coeur
Vetiverol
Vetiveryl Acetate

Anthea Aromatics Pvt. Ltd. - India

Product Catalog

Acetyl Longifolene
Anthamber
Anthamber Premium
Anthea Sandal Coeur

Chandanone

Isolongifolanone

Anupam Industries - India

Product Catalog

Alpha Ionone

Bacdanol
Beta Ionone

Camwood (Acetoketol)
Cedarwood Rectified
Cedarfix
Cedramber
Cedryl Acetate Liquid
Cervolide

Ebanol
Endanol (Bacdanol / Anandol)

Guaiyl Acetate

Hinolene (Greenyl Butyrate)

Iononyl Alcohol Ester
Ionone 100 %
Ionone Pure
Irisone Alpha
Irisone Pure
Irone Alpha
Irotyl
Iso E Super
Iso Raldeine 70
Iso Raldeine 95

Karnal
Kepahlis
Koavone

Linalool Oxide
Longifolene Ketone

Madrox
Massada
Methyl Cedryl Ketone
Methyl Ionone
Methyl Ionone Gamma
Musk NC
Mysoriff

Okoumal
Orivone
Oxyoctaline Formate

P Tertiary Butyl Cyclo Hexanyl Acetate

Sandalore
Sandenol
Santalaire (SMC)

Timberiff
Tobaccorol
Trimofix ‘O’

Vertofix
Vetiveryl Acetate Popular
Vetiveryl Acetate Pure

Aromatic Collection - France

Endroit: Produits

Cade Oil Rectified

Guaiacwood Oil

Patchouli Crude
Patchouli Light
Patchouli Oil MD
Pine Oil Siberian

Sandalwood Australian

Vetiver Oil

Natural Isolates

Alpha Pinene Dextro

Vetyverol

Natural Derivatives

Vetiveryl Acetate

Aromatic International LLC - USA

Odor Profiles

Woody / Balsams / Moses Group

Amyris

Benzoin

Cedarwood
Cistus

Guaiacwood

Labdanum

Myrrh

Oakmoss

Patchouli
Peru Balsam

Sandalwood

Tobacco
Tolu
Treemoss

Vanilla
Vetivert

Aromatics Adl - France

Catalogue Des Produits

Amyris

Cade Crue (Juniperus)
Cedre Atlas
Cedre Chine
Cedre Virginie

Patchouli Indonesie Fonce
Patchouli Indonesie Clair

PRODUITS AROMATIQUES DEFINIS EX NATUREL ET SYNTHETIQUES

Acetate Bornyle Cristallise
Acetate Bornyle Liquide
Acetate Cedrenyle
Acetate Cedryle Cristallise
Acetate Cedryle Liquide
Acetate Nonyle
Acetate Nopyle
Alpha Pinene Dextro
Alpha Pinene Laevo

Beta Pinene 85 %
Beta Pinene 95 %

Cedrene
Cedrol Liquide

Ionone Beta
Ionone Beta Savon

Methyl Ionone Alpha 75 %
Beta 20 %
Methyl Ionone Brute
Methyl Ionone Gamma
Methyl Ionone Iso Alpha
Methyl Ionone Pure
Methyl Ionone Savon

Aromor Flavors & Fragrances Ltd. - Israel

Products

Ambermor

Vetiver Terpene
Vetiveryl Acetate

Artiste Flavor / Essence - USA

Fragrances & Specialty Ingredients

Birch Oil

Cedarwood Oil

Fir Needle Oil

Patchouli Oil
Pine Oil

Sandalwood Oil

Astral Extracts - USA

Products

Amyris

Balsam Peru

Cedarwood - Virginia

Patchouli
Pine Needle

Sandalwood - Agemark

Augustus Oils Ltd. - U.K.

Fragrance Specialties & Essential Oils

Ambre Augaflor 1
Ambre Augaflor 3

Drywood Augaflor 8

Patchouli Augaflor 22

Essential Oils

Agarwood Oil
Amyris Oil

Cedarwood Oils

Fir Needle Oils

Guaicwood Oil

Pine Needle Oil

Sandalwood Oils

Vetyvert Oils

Australian Botanical Products Pty. Ltd. - Australia

Essential & Citrus Oils

Cedarleaf
Cedarwood Atlas
Cedarwood Chinese
Cedarwood Himalayan
Cedarwood Texas

Fir Needle Canada
Fir Needle Siberian
Fir Needle Silver

Guaicwood

Patchouli
Patchouli Light
Patchouli ACEH
Pinus Pumilio
Pinus Sylvestris

Sandalwood East Indian
Sandalwood Pacific Islands
Sandalwood West Australian
Sandalwood West Indian

Turpentine

Vetiver
Vetiver Bourbon
Vetiver Haiti
Vetiver Java

Axxence SARL - France

Specialty Materials

Travail a Facon Rectification Fractionnement

Birch Tar Rectified
    Bouleau Rectifiee

Guaicwood Oil
    Guaic (Boise De)

Vetyveryl Acetate
    Vetyveryl Acetate

BASF Japan Ltd. - Japan

Fine Chemicals

Beta Ionone R

BASF Japan Ltd. - Japan

Fine Chemicals

Amberwood

Rootanol 100

Ketone

DiHydro Beta Ionone

BFA Laboratoires - France

Essential Oils & Specialties

Cedar wood
Cedrus Atlanticus

B.S. Industries - India

Essential Oils

Amber Shamama
Amyris Oil

Cade Oil
Cedar Wood Oil

Fir Needle Oil

Guaicwood Oil

Patchouli natural & std Oil

Bansal Aroma - India

Product List

Cedarwood Oil

Patchouli Oil
Pine Oil

Sandal Wood Oil

Vetivert

Barosyl S.A. - France

Essential Oils

Amyris
    Amyris Balsamifera

Balsam Copaiba
    Copaifera Officinalis
Balsam Peru
    Myroxylon Balsamum
Balsam Tolu
    Myroxylon Balsamum

Cade
Cade rectified
Cedar Leaf
Cedarwood Atlas
    Cedrus Atlantica
Cedarwood Chinese
    Cedrus Deodara
Cedarwood Virginia
    Juniperus Virginia

Patchouly Indonesian
    Posgostemon Cablin
Patchouly Light
    Pogostemon Cablin
Patchouly Madagascar
    Pogostemon Cablin
Pine Nedle Austria
Pine Needle Siberia
Pine Sylvestris
    Pinus Sylvestris

Sandalwood Mysore

Vetyver Haiti
    Vetiveria Zizanoides
Vetyver Java
    Vetiveria Zizanoides
Vetyver Madagascar
    Vetiveria Zizanoides

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Berge Inc. - USA

Essential Oils, Aroma Chemicals & Fragrance Specialties

Amyris Oil W.I.

Balsam Copaiba
Balsam Copaiba Oil
Balsam Peru
Balsam Peru Oil

Cedarleaf Oil
Cedarwood Oil Chinese
Cedarwood Oil Texas
Cedarwood Oil Virginia

Fir Balsam Canadian
Fir Needle Oil Canadian
Fir Needle Oil Chinese
Fir Needle Oil Siberian

Guaiacwood Oil

Oakmoss Absolute Green

Patchouli Oil Indonesian
Patchouli Oil Light
Patchouli Oil M.D.
Pinus Oil Pumilio
Pinus Oil Sylvestris

Sandalwood Oil Australia
Sandalwood Oil East Indies
Sandalwood Oil Indonesia
Siamwood Oil

Vetiver Oil Haitian
Vetiver Oil Indonesian
Vetiver Terpenes

Aroma Chemicals

Bornyl Acetate Iso

Cedrene
Cedrenol
Cedryl Acetate
Cedryl Acetate 50%
Cedryl Acetate Crystals
Cedryl Methyl Ether

Ionone Beta
Ionone For Soap

Nopol
Nopyl Acetate

Pinene Alpha P & F
Pinene Beta P & F

Biolandes Parfumerie - France

Fine Essential Oils

Wood, branches

Armoise
Cistus
Cypress
Eucalyptus
Juniper
Laurel
Lentisque
Rosemary
Thyme

Specialties

Treemoss Concentrae Substitute
Treemoss Absolute 50 Substitute
Treemoss Colorless SP Substitute

Vetiveryle Acetate RS

Natural Products

Cedarwood Inco 100

Fir Balsam Anhydrol Inco 5

Pine Needle Oil

Absolutes

Fir Balsam Absolute

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Resinoid

Fir Balsam Resinoid

Peru EAL Resinoid
Peru Hex Resinoid

Bioabsolutes

Pine Bioabsolute

Moses

Cedarmoss Absolute
Cedarmoss Absolute Decolorized

Oakmoss Absolute IF 12/04
Oakmoss Inco 20 IF 12/04
Oakmoss Absolute
Oakmoss Absolute Sylvestre
Oakmoss Absolute Sylvestre 50 % / DPG
Oakmoss Inco 10

Treemoss Inco 10
Treemoss Concrete
Treemoss Absolute
Treemoss Decolorized

Olfactory Reproductions

Fir Balsam Artessence

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Sandalwood Super Eco
Sandalwood Artessence

Bordas Destilaciones Chinchurreta Sa - Spain

Fine Essential Oils

Cade Oil, Crude
Ex Jun. Oxycedrus
Cade Oil, Crude
Ex Jun. Phoenicea
Cade, Rectfied
Ex Jun. Oxycedrus
Cedarwood Oil, China
Cedarwood Terpenes Def.

Pine Oil 900
Pine Oil 907

Absolutes

Oakmoss Absolute A MPG
Oakmoss Absolute E DEP 500
Oakmoss Absolute E DPG 50
Oakmoss Absolute E MPG
Oakmoss Absolute, Decoloured

Concretes

Oakmoss Concrete
Oakmoss Concrete Green

Aroma Chemicals

Alpha Pinene Dextro
Alpha Pinene Laevo 90
Alpha Pinene Laevo 95 Rectified

Beta Pinene Laevo 96
Borneol Crystal 60/40
Borneol Crystal 97/3

Cedrene Alpha 80
Cedrene Rectified
Cedrol Crystal 97
Cedrol Liquid 65
Cedryl Acetate Crystal
Cedryl Acetate Liquid
Cedryl Acetate Liquid 55

Iso Bornyl Acetate

Methyl Cedryl Ketone

Nopyl Acetate

Sandol

Terpenes

Cedarwood Terpenes Def.

Brighten Colorchem B.V. - The Netherlands

Product List of Aromatic Chemicals

Cedarwood Oil

Pine Oil
Pine Oil Light

Turpentine Oil

Aromatic Chemicals

Sandaler
Sanenol

Buckton Page Ltd. - U.K.

Product List

Amyris Oil

Cade Oil
Cedarwood Oils

Fir/Pine Needle Oils

Guaiacwood Oil

Pine Oil

Sandalwood Oil
Spruce Oil

Vetiver Oil

Camí de Fontanilles - Spain

Product List

Cedarleaf Oil

Other Origin

Cedarwood Atlas Oil
Cedarwood Oil

Oakmoss Resinoid

Patchouly Oil Dark
Patchouly Oil Light

Sandalwood Oil (Indonesia)

Treemoss Resinoid

Vetiver Oil

Carrubba Inc. - USA

Botanical Extracts

Amber

Cedarwood

Oakmoss

Patchouli
Pine Maritime (Sea Pine)

Sandalwood
Silver Fir Needle
Spruce (Norway)

Vetiver

Castrading - Korea

Essential Oils

Amyris

Birch Tar, Rectified

Cade, Rectified
Cedarwood, China
Cedarwood, Texas
Cedarwood, Virginia

Fir Needle, Canada
Fir Needle, Siberia

Guaiacwood

Patchouly, China
Patchouly, East Indies
Patchouly, Decolorized
Pine Needle
Pinus Pumilionis
Pinus Sylvestris

Sandalwood, India
Sandalwood, Java
Spruce, Canada

Vetyver, Bourbon
Vetyver, Haiti
Vetyver, Java

Central States Chemical Marketing - USA

Bio Scent's Product Catalog

Cade Oil rectified
Cedarleaf Oil

Fir Needle Siberian Oil

Patchouli Crude Oil
Patchouli Light Oil
Patchouli MD Oil

Vetivert Acetate
Vetivert Oil - Haiti
Vetivert Oil - Java

Absolutes

Oakmoss Abs. P & N

Treemoss Abs. 50 % in Citroflex

Champon Vanilla, Inc. - USA

Essential Oils & Aromatic Chemicals

Amyris Oil

Balsam Copaiba
Balsam Gurjon
Balsam Peru Crude
Balsam Tolu

Cedarleaf Oil
Cedarwood Chinese
Cedarwood Texas
Cedarwood Virginia

Fir Needle Canadian
Fir Needle Siberian

Patchouli

Sandalwood

Vetiver Bourbon
Vetiver Chinese / Java
Vetiver Haiti

Aromatic Chemicals

Beta Pinene 95 / 98 %

Cedryl Acetate

Ionone Alpha / Beta
Iso Longifoline

Methyl Cedrialone

Methyl Cedryl Ketone

Nopol
Nopyl Acetate

Charabot & Company Inc. - France

Fine Essential Oils

Guaicwood Acetate

Vetivert Acetate
Vetiver Oil

China Aroma Chemical Co., Ltd. - China

Essential Oils & Imported Products

Agar Oil
Agarwood Oil
Amyris Oil

Cedarwood Oil

Fir Oil

Patchouli Oil
Pine Seed Oil

Sandalwood Oil

Turpentine Oil

Vetiver Oil

Concretes

Oak Moss Concrete

Tinctures

Ebony Tincture

China Perfumer - China

On Line Catalogs

Amyris Oil

Cedar Leaf Oil
Cedarwood Oil Atlas
Cedarwood Oil China
Cedarwood Oil Virginia

Guaiacwood Oil De Hydrate

Patchouli Oil Decolor Indonesia
Patchouli Oil Ironless Indonesia

Sandalwood Oil India

Vetiver Oil Bourbon
Vetiver Oil Haiti
Vetiver Oil Java

Balsams

Fir Balsam

Peru Balsam

Natural Isolates

Vetivert Acetate Haiti
Vetivert Acetate Extra Haiti

Recos

Sandalwood

Chinessence Ltd. - China

Key Products

Cedarwood Oil - Water Distilled
Cedarwood Oil BPC (PG)
Cedarwood Oil Terpenes

Pine Oil

Turpentine Oil

Vetivert Oil

Natural Isolated

Cedrene Alpha
Cedrol Crystal

Longifolene PG

Pinene Alpha PG
Pinene Beta PG

Aroma Chemicals

Cedryl Acetate 50 %

Iso Longifolanone 80 %
Iso Longifolene 80 %

Methyl Cedryl Ether
Methyl Cedryl Ketone 80 %

Sandenol

Citral Oleos Essenciais Ltda. - Brazil

Perfume Bases, Essential Oils & Aromatic Chemicals

Black Agar Givco 215

Oakmoss Givco 214

Sandawood Givco 203
Sandec Givco 220

Vetiver Organic Oil B 1350

Aromaterapia

Cedar Atlantica Oil

Pine Needle Pinaster Oil

Vetiver Zizanoides Oil

Oleos Essencias - Naturals

CedroTexas Oleo

Patchouli Dark OE
Patchouli Oil DM

Vetiver Organic Oil B1350

Perfumaria

Acetato Cedrenila

Bacdanol

Cedramber

Indisan

Javanol

Kephalis

Metil Cedril Ketone

Okoumal

Sandalore
Sandela

Vertenex - Acetato PTBCH
Vertofix

Clos D Aguzon - France

Matieres Premieres Aromatiques

Cade Oil Rectified

Guaiacwood Oil

Patchouli Crude
Patchouli Light
Patchouli Oil MD
Pine Oil Siberian

Vetiver Oil

Concretes & Absolutes

Fir Needle

Oakmoss

Treemoss

Natural Isolates

Alpha Pinene Dextro

Vetyverol

Natural Derivatives

Amyris Acetate

Guaiyl Acetate
    Guaiacwood Acetate

Vetiveryl Acetate

Cokson & Hunt International Co. - USA

Essential Oils & Aromatic Chemicals

Amyris Oil - Haiti

Balsam Copaiba - Brazil
Balsam Peru - El Salvador
Balsam Tolu - South America

Guaiaicwood Oil - Paraguay

Patchouli Oil - Indonesia,
China

Sandalwood Oil - India, Indonesia,
Australia

Vetivert Oils - Haiti, Indonesia,
China

Creative Fragrances Ltd. - USA

Essential Oils

Amyris Oil - Haiti

Birch Oil Sweet - Canada
Birch Tar Oil rectified - France

Cade Oil rectified - Spain
Cedarleaf Oil - Canada
Cedarwood Oil - US
Copaiba Oil - Brazil
Copaiba Balsam - Brazil

Fir Balsam Resin - Canada
Fir Needle Oil Siberian - Russia

Guaiacwood Oil - Paraguay

Hemlock Oil (Spruce Oil) - US

Moss (Mousse de Arbre) - France

Oakmoss (Mousse de Chene)
Abs. - France

Patchouly Oil Light - Indonesia

Sandalwood Mysore E.I. - India
Spruce Oil (See Hemlock) - US

Vetiver Oil - Haiti

DMH Ingredients - USA

Essential Oils & Aromatic Chemicals

Amyris

Balsam (Various)
Birch Sweet, Southern
Birch Tar

Cade Rectified
Cedarleaf

Fir Needle - Canada

Guaiacwood

Patchouly - China EI
Pine Needle
Pinus Pumilionis, Sylvestris

Sandalwood
Spruce - Canada

Vetyver

De Monchy Aromatics, Inc. - U.K.

Essential Oils & Specialties

Cedarwood Virginiana

Gurjun Balsam
Gurjun Balsam (Refined)

Patchouli
Patchouli (Light)

Sandalwood Australian
Sandalwood Indonesian

Vetivert

Natural Aroma Chemicals

Pinene Alpha
Pinene Beta

Destilerias Munoz Galvez, s.a. - Spain

Essential Oils, Aroma Chemicals & Flavours

Cade
Cade rectified

Pine

Aromatic Chemicals

Alpha Pinene 99 % Dextro
Alpha Pinene 99 % Laevo

Bornyl Iso Acetate

Diffusions Aromatiques - France

Matieres Premieres Aromatiques

Produit De Synthese

Acetate Iso Bornyle
Ambercore

Cedramber (MCE)
Cedrol Cristallise

Sandal Mysore Core
Sandalore
Sandol (Bacdanol Indes)

Dulcos Trading - France

Liste de Produits

Amyris Haiti

Cade

Patchouli Chine
Patchouli Indonesie
Pin Siberie

Santal Inde Agemarked
Santal Indonesie

Vetyver Bourbon
Vetyver Chine
Vetyver Haiti
Vetyver Java

Dullberg Konzentra GmbH - Germany

Fine Essential Oils

Abies Alba Needle Oil

Balm Peru

Cade Oil
Cedarleaf Oil
Cedarwood Oil

Dwarf Pine Needle Oil

Fir Needle Oil

Guaiac Wood Oil
Gurjum Oil

Patchouli Oil
Pine Needle Oil

Sandalwood Oil
Turpentine Oil

Vetiver Oil

Earth Oil Plantations Ltd. - U.K.

Organic Essential Oils

Patchouli Oil

Sandalwood Oil

Vetiver Oil

Enter Oil - Viet Nam

Essential Oils

Turpentine Oil
  a-Pinen 60 %/b-Pinen 4 %
  a-Pinen 85 %/b-Pinen 1 %

Isolates

a-Pinen - ex. Turpentine Oil
  90 % min.

Eramex Aromatics GmbH - Germany

Esential, Citrus Oils & Aromataic Chemicals

Amyris Oil, West Indian

Birch Tar Oil

Cade Oil
Cedarleaf Oil
Cedarwood Oil, Texas
Cedarwood Oil, Virginia

Fir Needle Oil, Siberian

Patchouli Oil, Indonesian
Patchouli Oil, Indonesian, Light
Pine Needle Oil Dwarf

Sandalwood Oil, East Indian
Sandalwood Oil, Indonesian
Sandalwood Oil, West Australian

Vetivert Oil Indonesian
Vetiverty Oil Indian

Absolute/Concrete

Oakmoss/Treemoss Absolute/
Concrete

Aroma Chemicals

Ambermor

Longifolene

Esarco - Argentina

Organic Herbs

Guaiacwood Oil

Essential Oils

Cedarwood Oil

Sandalwood Oil

Esencias y Materiales Lozmar, S.A. de C.Y. - Mexico

Esencias

Cedro Hojas
Cedro Texas
Cedro Virginia

Patchouly Dark
Patchouli Light

Sandalo Amiris
Sandalo Mysore
Sandela "T"

Quimicos De Aromaticos

Acetato De Cedrilo
Acetato De Iso Bornilo

Balsamo De Tolu

Cedramber

Ionona Beta
Iso E Super

Metil Cedril Ether

Veramoss
Vertenex
Vertofix (Methyl Cedrelona)

Esperia S.p.A - Italy

Essential Oils

Pine Needle Dwarf

Essencia, Aetherische Oele Ag - Switzerland

Liste des Produits

Cedre Atlas
Cedrus Atlantica
Copaiba
Copaifera Reticulata

Pin de Siberle AN
Abies Nephrolepis
Pin de Siberie DAB 2001
Abies Sibirica
Pin Mariana
Picea Mariana
Pin Pumilio Tirol Ph.Helv.8
Pinus Pumilonis
Pin Silvestre DAB 2001
Pinus Sylvestris
Pin Silvestre de France i.n.
Pinus Sylvestris

Vetiver Bourbon
Vetiveria Zizanoides
Vetiver Java
Vetiveria Zizanoides Stap

Resinoide

Baume De Copaiba
Copaifera Reticulata
Baume De Perou Salvador
Myroxylon Pereirae

Matieres Premieres Aromatiques

Acetate D'Iso - Bornyle
Acetate De Nopyle
Nopyle Acetate

Acetate De Vetiveryle

Phenylacetaldehyde 85 %
Phenyl Acetaldehyde - Di Methyl Acetal
Pinene, beta
Pinene, d - alpha

Sandalore
Sandela

Euma - Argentina

Essential Oils & Natural Products

Amyris Oil / Petiribi

Balsam, Copaiba
Blasam, Fir Canada
Balsam, Peru
Balsam, Tolu

Cade Oil
Cedar, Chinese Oil
Cedar, Leaves / Tuya
Cedar, Texas
Cedar, Virginia

Pine Tree 600 Oil
Pine Tree 700 Oil
Pine Tree 75
Pine Tree Siberia
Pine Tree Siberia Berge
Pine Tree Silvester
Pine Tree Std

Sandalwood Oil

Turpentine

Vetivert Haiti
Vetivert Java

Aceites Esenciales & Productos Naturales

Balsamo Abeto Canada
Fir Balsamo

Balsamo De Copaiba
Balsamo De Tolu
(toluifera balsamum)
Balsamo Peru
(myroxylon balsamum)

Cade Aceite
(juniperus oxycedrus)
Cedro Chino Ac. Es.
Cedro Hojas / tuya
Cedro Texas
Cedro Virginia
Cedron

Pino 600 Aceite
Pino 700 Aceite
Pino 75
Pino De Siberia Berge
Pino Siberia
Pino Silvestre
(pinus sylvestris)

Sandalo Amyris
(Occidental) (amyris bal samifera)
Sandalo Madera Ac.
Sandalwood
(santalum album)

Vetiver Bourbon Ac. Es.
Vetivert Haiti
Vetivert Java
(vetiveria zizanoides)

Exaflor - France

Catalogue

Patchouli Indonesie
Pin Canadien
Pin Maritime

Santal Inde

Vetyver Indonesie

Huiles Essentielles
Promenez Vous Sur La Carte

Canada

Pin Cadien

France

Pin Maitime

Inde

Santal

Indonesie

Patchouli

Vetyver

Maitieres Brutes

Bois De Santal Route - Inde

FD Copeland & Sons Ltd. - UK

Essential Oils

Amyris Oil - West Indian Sandal

Cade Oil
Cedar Atlas Oil
Cedar Leaf Oil (Thuja)
Cedarwood Oil Virginian

Pine Oil Sylvestris

Sandalwood Oil - East Indian
Sandalwood Oil - Indonesian

Vetivert Oil - Bourbon
Vetivert Oil - Haiti
Vetivert Oil - Java

Absolutes

Oakmoss Abs.

Treemoss Abs.

FFC Aromas Private Limited - India

Products

Vetamber (Kepahlis)

Woodynol I
Woodynol II

Farotti Essences srl - Italy

Natural Essential Oils

Amyris Haiti Essence
Amyris Sandalwood Essence

Birch White Rett Essence

Cedarwood Essence

Fir Dalmatian White Essence
Fir Sachalin Essence

Patchouli Malaysia Essence
Pine Mountain Essence
Pine Scots Essence
Pine Stone Essence

Sandal Agemarked Essence

Turpentine Essence

Vetiver Java Essence

Fine Chemical Trading Ltd. - U.K.

Products

Amyris

Cedarwood (Himalaya)

Fir Needle

Patchouli
Pine

Sandalwood

Vetiver - Grade I
Vetiver - Grade II

Firmenich SA - Switzerland

Product Catalog

Ambrinol
Ambrox DL

Cedroxyde
Cetalox Laevo
Cetyver SA

Florex
Florol

Limbwood Base 109389 B

Palisandrol 17979

Rhubofix

Sandalwood 77125 B
Sandalwood 77125D

Teak 109955

Vetyrisia

Fiveash Data Management, Inc., - USA

Spectra of Essential Oils

Agarwood India

Birch Sweet Canada
Birch Sweet Yellow USA

Cade Spain
Cedar Leaf Thuja Canada, Europe
Cedar Wood Atlas Morocco
Cedar Wood Himalayan India, China, Japan, Port Orford, Virginia

Fir Needle, Austria, Canada, Douglas USA, Douglas Slovenia, Siberian Russia

Guaiacwood Paraguay

Patchouli Dark Indonesia
Pine Black Bulgaria
Pine Dwarf Italy
Pine Ocean France
Pine Scotch Bulgaria, Hungary
Pine White USA

Sandalwood Australian, Indonesia
Sandalwood Mysore India
Sandalwood Premium Australia
Sandalwood Tamil Nadu India
Spruce Black Canada
Spruce - Eastern Hemlock Canada

Vetiver Haiti
Vetiver Indonesia

Flavodor - The Netherlands

Catalogues

Abies Alba Oil
Amyris Oil

Birch Tar Oil rectified

Cade Oil
Cedarwood Oil

Fir Needle Oil

Guaiacwood Oil

Patchouly Oil
Pine Oil, Misc. Origins

Sandalwood Oil

Vetyver Oil

Absolute Resinoids

Oakmoss

Peru Balsam
Pine Needle

Treemoss

Terpenes

Patchouly Residues

Sandalwood Fractions

Fleurchem, Inc. - USA

Essential Oils & Aromatic Chemicals

Amyris (Sandalwood W. I.)

Balsams
Birch Tar

Cedar Leaf
Cedarwood, Chinese
Cedarwood, Texas
Cedarwood, Virginia

Fir Balsam Oil, Canadian
Fir Needle, Austrian
Fir Needle, Canadian
Fir Needle, Chinese 15 %
Fir Needle, Siberian

Guiaicawood

Hemlock (Spruce)

Patchouli
Pine Needle

Sandalwood, East Indian
Sandalwood, Singapore
Spruce (Hemlock)

Vetivert, Bourbon (Reunion)
Vetivert, Haitian
Vetivert, Java

Aromatic Chemicals

Alpha Pinene

Cedrene
Cedrol
Cedryl Acetate

Guiacol
Guaicwood Acetate

Ionone, Beta
Ionone, Gamma Methyl
Iso-Bornyl Acetate

Methyl Cedryl Ketone

Santalol

Turpentine, rectified

Vetiverol
Vetiveryl Acetate, Bourbon
Vetiveryl Acetate, Haiti
Vetiveryl Acetate, Java

Fleurin, Inc. - USA

Product Listing

Patchouly Oil

Sandalwood Oil

Vetiver Oil
Vetiveryl Acetate

Absolutes

Oakmoss Abs.

Florachem Corporation - USA

Aroma Chemicals

Cade Oil, Crude (ex Juniperus Oxycedrus)
Cade Oil, Crude (ex Juniperus Sabina)
Cade Oil, rectified (ex Jun. Oxy.)

Turpentine Oil (ex Gum)

Absolute/Concretes

Oakmoss Absolute “A” (Brown) Decoloured
Oakmoss Absolute “E” (Green)
Oakmoss Concrete

Florachem

Alpha Pinene

Beta Pinene

Gum Turpentine

Pine Oil

Harting Aromas

Alpha Pinene (ex CST)

Beta Pinene (ex CST)

Makhteshim Again of N.A. - Israel

Amberonne
Atralone

Iso E Super (® IFF)

Mousse de Metre, Evernyl (® Givaudan)

Veramoss (® IFF)

Privi Organics Limited - India

Beta Ionone

Sandal Fleur

Timber Touch

Aroma Chemicals

Alpha Pinene Dextro
Alpha Pinene Laevo

Beta - Pinene (laevo)
Borneol Crystal 65/35 %
Borneol Crystal 90/10 %
Bornyl Acetate Crystal 97/3 %
Bornyl Acetate Liquid 50/50 %

Cedrene

Cedrol p-Menthanol-8 Di Hydro Terpineol
Cedryl Acetate 70% (Liquid)
Cedryl Acetate Crystal

Methyl Cedryl Ketone

Nopol
Nopyl Acetate

Frencharoma Imports Co., Inc. - USA

Essential Oils & Aromatic Chemicals

Amyris

Balsam Copaiba
Balsam Gurjon Oil
Balsam (Peru)

Cade (rectified)
Cedarwood Oil Texas
Copaiba Oil

Fir Needle (Siberian)

Gurjon Balsam

Patchouli Crude
Patchouli Light
Peru Balsam
Pine Needle

Sandalwood

Vetyver (Haiti)

Turpentine Oil (SDW)

Aromatic Chemicals

Alpha Pinene

Beta Pinene

Ionone, Beta

Pinene, Alpha
Pinene, Beta

Frey + Lau GmbH - Germany

Essential Oils & Aromatic Chemicals

Cedarleaf Oil
Cedarwood Oil Chinese
Cedarwood Oil Texas

Dwarf Pine Needle Oil
(Pumilio)

Fir Needle Oil Asia
Fir Needle Oil Canadian
Fir Needle Oil Siberian

Guaiacwood Oil

Patchouli Oil

Pine Needle Oil Canadian
Pine Needle Oil Siberian

Sandalwood Oil West -Indian

Vetiver Oil

Fritzsche SAICA - Argentina

Products

Cedarwood White Texas Oil

Patchouli Oil
Pine Oil

Sandalwood Oil

Vetiver Oil

Fruitarom Industries - Israel

Essential Oils, Citrus & Specialties

Cade Oil
Cedarwood Oil
Cedarwood Oil Microscopy
Cedarwood Oil Virginia
Cypress Oil

Fir Needle Oil Siberian

Patchouli Oil Indonesia (Dark)
Parchouli Oil MD
Patchouli Oil Substitute
Patchouli Oil Tartarized (Light)
Peru Balsam 50 %
Peru Balsam Oil Natural
Pine Oil Pumilionis

Sandalwood Oil Substitute

Turpentine Oil (-VE) BP2000

Vetivert Oil Java

Fuerst Day Lawson - U.K.

Essential Oils & Aroma Chemicals

Cedarwood Oil

Gurjun Balsam
Guaiacwood Oil

Patchouli Oil Indonesia, China

Sandalwood Oil India, Indonesia

Aroma Chemicals

Alpha Cedrene Epoxide

Cedryl Acetate
Cedryl Methyl Ether

Iso Bornyl Acetate
Isolongifolene

Longifolene

Methyl Cedryl Ketone

Sandenol

GMPCT - India

Essential Oils & Perfumery Chemicals

Cedarwood Oil Atlantica
Cedarwood Oil (Rectified)

Pine Oil

Sandlewood Oil odor type
compounds

Aromatic Chemicals

Iso-Bornyl acetate from camphene
and Pinene 5655-61-8

Givaudan Fragrance Corporation - Switzerland

Specialty Bases & Aroma Chemicals Compendium

Black Agar Givco 215

Oakmoss Givco 214
Orris Givco 204/2

Sandalwood Givco 203
Sandec Givco 220

Aroma Chemicals Compendium

Aldehyde C - 12 Lauric
Ambrofix

Base 3
Boisiris

Cetonal
Cetone Alpha

Dihydro Ambrate
Dihydro Ionone Beta

Ebanol

Kephalis

Madrox

Okoumal

Raldeine A GV

Vetynal Extra

Givaudan / Quest International Perfumer s Compendium

Acetyl Cedrene FIc
Arboroma

Bangalo

Cedar English
Citrowood ABQ7021

Leather Base FM1064
Leaather Base FM1064B

Moss AB311
Moss AB311D
Mouse De Mer FM 1052

Patchouli Oil Acid Washed
Patchouli SUB AM4927GMY
Precious Wood AM401

Sandalwood FM1068
Sandalwood Oil Nardanised

Global Essence Ltd. - U.K.

Products

Amyris Oil

Cedarwood Oil

Fir Needle Oil

Patchouli Dark Oil
Patchouli Light Oil
Pine Oil

Sandalwood Oil

Vetyver Oil

Organic Essential Oils

Patchouli Oil
Pine Douglas Oil
Pine Sylvestris Oil

Vetiver Oil

Aromatic Chemicals

Amberfleur

Borneol Crystals - Usa
Borneol Flakes

Cedryl Acetate

Iso Bornyl Acetate

Sandenol

Timber Touch - Uk

The Good Scents Company - USA

Perfumery Raw Materials Information

Agarwood Oil
Amyris Woody Oil

Balsam Fir Oil America
Birch Bud Oil
Birch Oil Sweet America
Birch Tar Oil

Cade Oil
Cedarleaf Oil Canada
Cedarleaf Oil Terpeneless
Cedarleaf Oil Western Red
Cedarwood Oil Atlas
Cedarwood Oil China
Cedarwood Oil Himalaya
Cedarwood Oil Port Orford
Cedarwood Oil Texas
Cedarwood Oil Virginia

Fir Needle Oil Canada
Fir Needle Oil Siberia
Fir Needle Oil Terpeneless Canada

Guaiacwood Oil
Guaiacwood Oil 25 % in Gurjun Balsam Oil
Gurjun Balsam Oil

Hibawood Oil

Oakmoss Oil

Patchouli Oil
Pine Needle Oil Dwarf
Pine Needle Oil Scotch Siberia
Pine Tar Oil

Sandalwood Oil Australia
Sandalwood Oil East Indian
Sandalwood Oil Red
Silver Spruce Oil From Needles
Spruce Oil Black
Spruce Oil Canada
Spruce Oil Red
Spruce Oil White From Cones
Spruce Sitka Oil
Sugi Wood Oil

Vetiver Oil Haiti

Absolutes

Cedarwood Atlas Absolute

Fir Balsam Absolute

Oakmoss Absolute

Patchouli Absolute
Pine Needle Absolute

Spruce Needle Absolute

Tolu Balsam Absolute
Treemoss Absolute

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Concretes

Oakmoss Concrete

Pine Needle Concrete

Treemoss Concrete

Woody Notes

Agarwood Oil
Amber Carbinol
Amber Decatriene
Amber Dioxane
Amber Dodecane
Amber Formate
Amber Pentadecane
Amber Spirolene
Ambrene Acetal
Amyris Acetate

Bornyl Iso Valerate

Cabreuva Oil
Cadinene
Camphene
Caryophyllene Alcohol Acetal
Caryophyllene Alcohol Acetal - B
Caryophyllene Epoxide - Beta
Cedanol
Cedar Cyclododecariene
Cedarwood Absolute Atlas
Cedarwood Oil Atlas

Cedarwood Oil China
Cedarwood Oil Epoxidized
Cedarwood Oil Himalaya
Cedarwood Oil Port Orford
Cedarwood Oil Texas
Cedarwood Oil Virginia
Cedralone
Cedrene - Alpha
Cedrene Epoxide - Alpha
Cedrenol
Cedrenyl Acetate
Cedrol Cedrol Methyl Ether
Cedryl Acetate
Cedryl Formate
Cedryl Methyl Ether
Cistus Absolute
Cistus Oil
Copaene - Alpha
Copaiba Balsam
Cyclododecyl Formate
Cyperus Root Oil

Decalyl Acetate - Beta
Diethyl Dimethyl - 2 - Hexenone
Dihydro - Alpha - Terpinyl A.
Dihydro - Beta - Ionol
Dihydro - Beta - Ionone

Elecampane Root Absolute
Elecampane Root Oil
Ethyl Geranate - (E)
Eudesmol - Beta

Farnesene
Farnesene - Beta
Frankincense Gum Grade “I”
Somalian Tears
Frankincense Resin Somalia

Guaiacwood Oil
Guaiacwood Oil 20 % in Gurjun
Balsam Oil
Guaiacyl Acetate
Guaiol
Gurjunene - Alpha

Herbal Norbornane
Hibawood Oil
Hinoki Root Oil
Humulene
Huon Pine Wood Oil
4 - Hydroxybenzaldehyde

Juniperberry Oleoresin

Labdanum Concrete
Labdanum Ethanone
Longifolene
Longifolene Epoxide Iso
Longifolene Ketone Iso

Marine Formate
Menth - 3 - en - 1 - ol Para
Menth - 8 - en - 1 - ol Para
Methoxy - 4 - Vinyl Phenol 2
Methyl Cedryl Ketone
Methyl Ionol - Iso Alpha
Methyl Ionone Delta
Methyl Ionone Beta
4 - Methyl - 1 - Phenyl - 2 Penta.
1 - Methyl Pyrrole
Methyl Sandal
Methyl Tetrahydroionyl Acetate
Methyl Vetivate
Myrtenyl Iso Butyrate
Myrtenyl Formate

Nopyl Aldehyde

Orris Hexanone

Patchouli
Patchouli Absolute
Patchouli Ethanol
Patchouli Ethanone
Patchouli Hexanol
Patchouli Oil
Patchouli Woody Amber
Phorone Iso
Pinacol
2 - Pinanol
Polylimonene

Rhubarb Oxirane

Sandal Butenol
Sandal Cyclopentane
Sandal Cyclopropane
Sandal Glycol Acetal
Sandal Hexanol
Sandal Octanol
Sandal Pentanol
Sandal Pentenone
Sandalrome
Sandalwood
Sandalwood Oil East Indian
Sandalwood Oil West Australia
Santall
Santalol
Santalyl Acetate
Santalyl Butyrate
Santalyl Phenyl Acetate
Santol Pentenol
Sclareolide
Spikenard Oil
Spruce Oil Canada
Sugi Wood Oil

Terpinene - Alpha
Thujaplicin - Beta
Timber Dioxolane
Timber Propanol
Tobacco Dodecane
Tobacco Nonene
Treemoss Concrete

Undecenoic Acid - 10

Vetiver Oil Haiti

Vetiver Resinoid
Vetiverol
Vetiveryl Acetate
Violet Propanol

Woody Acetate
Woody Amylene
Woody Bouquet
Woody Carboxylate
Woody Cyclohexanone
Woody Dioxolane
Woody Dodecane
Woody Epoxide
Woody Ether
Woody Heptene
Woody Nonane
Woody Octene
Woody Propanol

Zedoary Bark Oil

Gorlin & Company - USA

Essential Oils

Amyris

Birch Tar, Rectified

Cade, rectified
Cedarleaf
Cedarwood, China
Cedarwood, Texas
Cedarwood, Virginia
Cypres

Fir Needle - Canada
Fir Needle - Siberia

Guaiacwood
Gurjon Balsam

Patchouly, China
Patchouly, Decolorized
Patchouly, East Indies
Peru Balsam
Pine Needle
Pinus Pumilionis
Pinus Sylvestris

Sandalwood - India
Sandalwood - Java
Spruce - Canada

Vetyver, Bourbon

Graham Chemical Corporation - USA

Aroma Chemicals & Essential Oils

Amyris Oil

Balsam Fir Oil
Balsam Oil
Birch Sweet Oil
Birch Tar Oil

Cade Oil
Cedarleaf Oil
Cedarwood Oil
Cypress Oil

Fir Needle Oil

Guaiacwood Oil

Patchouli Oil
Pine Needle Oil
Pine Oil Scotch
Pine Oil White

Sandalwood Oil
Spruce Oil (Hemlock)

Aroma Chemicals

Guaiol Acetate

Iso Bornyl Acetate

Pinene, alpha
Pinene, beta

Vetiverol
Vetiveryl Acetate

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HC Biochem - China

Essential Oils & Concretes

Agar Oil
Amyris Oil

Cedar Wood Oil

Patchouli Oil
Pine Seed Oil

Turpentine Oil

Vetiver Oil

Concretes

Hemlock

Oak Moss

Peru

Treemoss

Vetiver

Tinctures

Ebony

H. Reynaud & Fils - France

Essential Oils

Pin Des Graines
Pine Woodland

Absolue

Mousse De Chene
Oakmoss Tree
Mousse D'Arbre Brune
Treemoss Brown
Mousse D'Arbre Incolore
Treemoss Colorless

Resinoid

Mousse D'Arbre
Tree Moss

Essential oils and extracts adapted to Aromatherapy:

Nom du produit

Amyris Haiti
Amyris Oil

Bois De Gayac
Guaiacwood Oil
Bouleau Rectifie
Birch Oil Rectified
Cade Ex Juniperi
Cade Oil
Cedre Atlas Maroc
Cedarwood Oil Atlas
Cedre Chine
Cedarwood Oil Chinese
Cedre Feuilles Canada
Cedar Leaf Oil
Cedre Virginie USA
Cedarwood Oil Virginia
Cypress Espagne
Cypress Oil

Mousse Arbre Absolue Fr.
Oakmoss Abs.

Patchouli Indonesie
Patchouly Oil
Perou Baume
Peru Balsam
Pin Des Landes France
Pine Woodland Oil
Pin Siberie Russie
Pine Siberian Oil
Pin Sylvestre Europe
Pine Sylvestre Oil
Pin Des Landes France
Pine Woodland Oil
Pin Siberie Russie
Pine Siberian Oil
Pin Sylvestre Europe
Pine Sylvestre Oil

Santal Inde
Sandalwood Oil

Vetyver Haiti
Vetyrvert Haiti Oil
Vetyver Java
Vetyvert Jave Oil

Water Soluble Oils

Bois De Gayac
Guaiacwood Oil

Cypres Espagne
Cypress Oil

Patchouli Indonesie
Patchouly Oil
Perou Baume
Peru Balsam
Pin Siberie Russie
Pine Siberian Oil

Vetyver Java
Vetyvert Java Oil

Hydrolats

Santal
Sandalwood

Haldin - Indonesia

Essential Oils & Extracts

Agarwood Oil

Patchouli Oil

Sandalwood Oil

Vetiver Oil

Handa Fine Chemicals Ltd., - U.K.

Fine Essential Oils

Agar Oil
Agarwood Oil
Amyris Oil

Balsam Oil

Cedarwood Oil Rectified
Cypress Oil

Guaiacwood Oil

Patchouli Oil
Pine Oil

Sandalwood Oil

Vetivert Oil

Concentrated Botanical Herbal Extracts

Balsam
Birch

Cedarwood

Fir

Oak

Patchouli
Pine

Sandalwood

Tree Balsam
Tree Moss

Hangzhou Aroma Chemical Company - China

Products

Aplha Cedrene Epoxide

Cedrol (70 %)
Cedrol Crystals
Cedryl Acetate 50 %

Methyl Cedryl Ether
methyl Cedryl Ketone
Methyl Cedryl Ketone Coeur
MCKhac (Cedryl Methyl Ketone)

Turpentine Oil Derivatives

Sandacanal
Sandasweet

Hemani Ex-Imp Corporation - India

Natural Essential Oils Aromatic Chemicals

Cedarwood Oil (Rect)
Cedarwood Oil (D.D.)

Hindustan Mint & Agro Products Pvt. Ltd. - India

Products

Agarwood Oil

Cederwood Oil

Patachauli Oil

Sandalwood Oil

Vetivert Oil

IPRA Fragrances - France

Produits

Book # 2 (I - Z)

Cedre Atlas
Cypres Pays

Patchouly Indonesie
Pin Siberie

Santal Indes

Vetyver Haiti
Vetyver Java

Produits Organiques et de Synthese

Acetate De Cedryle Liquide
Acetate De Vetyveryle Haiti
Acetyl Cedrene

Methyl Cedryl Ketone

Santalol

Vetyverol
Vetyverol Extra

Innospec Inc. - USA

Aroma List

Herbaceous

Bigarade Oxide

Iso Freshal Nitrile

Iso Tagetone 50
Isobornyl Isobutyrate

Ocimene PQ

Thymoxane

Indesso - Indonesia

Essential Oils, Natural Extracts & Aromatic Chemicals

Patchouli Oil 865	Pale yellow to yellow brown viscous liquid. Woody, balsamic, sweet camphoraceous.
Patchouli Oil F 867	Pale yellow to yellow brown viscous liquid. Woody, balsamic, sweet camphoraceous.
Patchouli Oil J871	Pale yellow to yellow brown viscous liquid. Woody, balsamic, sweet, camphoraceous.
Patchouli Oil Light F 866	Yellow to brown viscous liquid. Woody, balsamic, sweet, camphoraceous.
Patchouli Oil Light P 868	Yellow to brown viscous liquid. Woody, balsamic, sweet, camphoraceous.

Innospec Inc. - USA

Aroma List

Woody

Amborate

Has a delicate woody-amber character, combining notes of cedarwood, vetiveryl acetate, clary sage and orris. Tenacity - 1 week on a smelling strip. Has considerable potential throughout the entire perfumery spectrum, from alcoholic preparation to modern soap and detergent fragrances, particularly in woody, spicy and oriental types. It is compatible with a wide range of perfumery component materials and has marked fixative properties. Amborate has been evaluated in a variety of media for compatibility, stability of odour and colour and, in the case of aerosols, also for freedom from corrosive effect and clogging of valves.

Amborol 50

Delicate, warm, woody, with notes of amber and clary sage. Of wide potential application, from concentrates and toilet waters to fragrances for antiperspirants and deodorants. It is of particular value in woody types and has considerable potential in perfumes for men's toiletries. It is compatible with a wide range of perfumery compounding materials and has marked fixative properties. Amborol has been evaluated in a variety of media for compatibility and stability for odour and colour.

Amboryl Acetate

A modern woody note, with a delicate, tenacious woody-amber character reminiscent of vertiveryl acetate, sandalwoods and clary sage. Tenacity - over one week on a smelling strip. Of wide potential application from concentrates and toilet waters to modern soap and detergent fragrances. It is of particular value in woody, spicy and oriental types and has considerable potential for men's toiletries. It is compatible with a wide range of perfumery component materials and has marked fixative properties. Amboryl Acetate has been evaluated in a variety of media for compatibility and stability of odour and colour.

Bigarade Oxide

Woody, herbal, grapefruit. A middle to topnote material which provides interesting twist to a variety of fragrance types. Floral, oriental and of course, citrus fragrances may be improved by the effect of Bigarade

Oxide.

Isofreshal Nitrile

Ozone green, herbaceous, woody. Hard surface cleaners especially where pH stability is important, air freshners and detergents.

Osyrol

Sandalwood, with a flowery, woody note, very reminiscent of natural sandalwood oil. Recommended for fragrances in which a high quality sandalwood character is required. Blends well with floral compounds such as rose and muguet and is most effective with chypre and woody notes. Has excellent fixative properties and contributes to the overall blending and perfecting of the composition. Has great potential in luxury fragrances, including those for cosmetics and toiletries, and is also of value in perfumes for soaps and detergents.

Vetimoss

Outdoor, forest, damp wood, vegetation, potatoes. Many applications, for use in most fragrances, especially air fresheners, cosmetics and household cleaners.

International Flavors & Fragrances - USA

Fragrance Ingredients

Alpha Pinene
Andrane
Aphermate

Bacdanol®

Cedrafix
Cedramber
Cedrenyl Acetate
Coniferan

Dihydro Terpinyl Acetate
Dimethyl Cyclormol

Guaiyl Acetate

Ionone 100 %
Ionone Alpha
Ionone Alpha Beta Regular
Ionone Beta

Koavone
Kohinool

Methyl CedrylKetone Coeur
Methyl Ionone Gamma A
Methyl Ionone Gamma Coeur
Methyl Ionone Gamma Pure

Orivone

Piconia

Sanjinol
Santaliff

Terpinolene 20
Terpinolene 90
Tobacarol
Trimofix

Unipine 60
Unipine 85
Unipine B
Unipine NCL
Unipine S - 70
Unitene D
Unitene LP

Vertenex
Vertenex HC
Vertofix Coeur

JC Buck Ltd. - U.K.

Products

Amyris

Cade Rectified
Cade Crude
Cypress French
Cypress Spanish

Fir Needle Austrian
Fir Needle Siberian

Guaiacwood

Palmarosa Indian
Patchouli Chinese
Patchouli Indonesian
Patchouli Indonesian Light
Pine Pumilionis
Pine Sylvestris

Sandalwood East Indian
Sandalwood Indonesian

Turpentine Rectified

Vetivert Bourbon Type
Vetivert Haiti
Vetivert Java

By Products

Vetivert Terpenes

J & E Sozio, Inc. - USA

Esential Oils

Cedarwood Oil Texas Light
Cypress Oil

Patchouli Oil T.I.

Sandalwood Oil E.I.

J. Piltz & Cia. Ltda. - Brazil

Esential Oils

Cedro (Arvore)
Cedro (Folha)

Patchouli

Sandalo

Vetiver

Joint American Ventures in China - USA

Aroma Chemicals

Alpha Cedrene Epoxide

Cedryl Acetate
Cedryl Methyl Ether

Iso Bornyl Acetate

Methyl Cedryl Ketone
Methyl Ionone Alpha
Methyl Ionone Gamma

Vetiverol Extra
Vetivert Acetate Extra

Kanta House - India

Natural Essential Oils

Cedarwood Oil (Indian)

Thuja Wood Oil

Vetiver Oil
(Northern Indian Quality)
Vetiver Oil
(Southern Indian Quality)

Rectified Essential Oils

Cedarwood Oil rectified
Cedar Wood Oil double distilled

Kao Corporation - Japan

Aroma Chemicals

Acetyl Cedrene Coeur “Vertofix”
Amber Core

Boisambrene Forte

Cedryl Methyl Ether

o-t-BCHA

p-t-BCHA

Sandalmysore Core

Katyani Exports - India

Fine Spices & Herbs

Indian Name	Botanial Name	Part Used
Arjuna	Terminalia Arjuna	Bark
Ashoka	Saraca Indica (South)	Bark
Babool	Acacia Arabica	Bark
Bharangi	Clerodendrum S.	Bark
Dalchini	Cinnamomum Tamal.	Bark
Daru Haridra	Berberis Aristata	Bark
Devdaru	Polyalthia Longifolia	Wood
Gular	Ficus Racemosa	Bark
Kachnar	Bauhinia Variegata	Bark
Khardira	Acacia Catechu	Bark
Kuda / Kurchi	Holarrhena Antidy.	Bark
Lodhara	Symplocos Racemosa	Bark
Narvel	Viburnum Foetidum	Bark
Rohital	Aphanamixis Poly.	Bark
Sahjana	Moringa Oleifera	Bark
Vijayasar	Pterocarpus Marsup.	Wood

Kruetz Helmut - Portugal

Produto

Amyris Oil

Cade Oil
Cedarwood Oil Microscopy
Cedarwood Oil Perfumery
Cedarwood Oil - Virginia
Copaiba Balsam Oil
Copaiba Oil Daniel Distilled
Coriander Oil - Russia
Cypress Oil

Fir Needle Siberian Oil

Gurjum Balsam
Gurjum Oil rectified
Guaicwood Oil

Patchouli Oil (Dark) - Indonesia
Patchouli Oil MD
Patchouli Oil Substitute
Patchouli Oil Tartarized (Light)
Pine Sachalinensis
Pine Siberian
Pine Oil Pumilionis
Pine Silvestris

Sandalwood Oil Substitute

Turpentine Oil (- VE) BP2000

Vetivert Oil Java

Krupa Scientific - India

Flavours & Fragrances

Sweet

Vetiveryl Acetate

Vetiver

Vetiveryl Acetate

Kuber Impex Ltd. - India

Herbs & Spices

Local Name	Botanical Name
Agar	Aquillaria Gallocha
Devdhar	Cedrus Deodara
Sandal, Chandan (Sweet)	Santalum Album
Viburnum Bark, Narvela	Viburnum Foetidum

Laboratoire Monique Remy - France

Specialty Materials - The Major Catalog's of Fragrance

Moss-Oak Absolute Yugo 5 % DPG	Mousse Chene Yugo Absolue 50 % DPG
Moss-Tree Absolute MD IPM (IFRA)	Mousse Arbre Absolue DM IPM (IFRA)
Moss-Oak Absolute MD 20 % Solvents	Mousse Chene Absolue DM 20 % Solvants
Moss-Oak Absolute Decol	Mousse De Chene Absolue Deco
Patchoul Heart No. 3	Patchouli Coeur No 3
Patchouli Oil Indonesia Iron Free	Patchouli Indonesie Essence Deferisee
Patchouly Oil Indoneisa MD	Patchouli Indonesie Essence DM
Sandalwood Oil India	Santal Inde Essence
Vetiver Oil Haiti	Vetiver Haiti Essence
Vetiver Oil Haiti MD	Vetiver Haiti Essence DM
Vetiver Oil Java	Vetiver Java Essence
Vetiver Oil Java MD	Vetiver Java Essence DM

Lluche Essence - Spain

Essential Oils & Aromatiac Chemicals

Exclusive Distributing Agent for the following companies:

Amgat Citrus Productos S.A.
(AMC Grupo)

Aromor (Aromor F & F)

Axxence Aromatic
(Axxence Aromatic Gmbh)

Barosyl S.A.

Camphor & Allied Products Lmt.

Chugay Boyeki Co. Ltd.
(Shin Etsu)

C.V. Aroma & Co.

Destilaciones Bordas Chinchurreta, SA (DBCH)

Fruitarom Ltd.

Grau Aromatics GMBH & Co.KG

H. Reynaud Et Fils

Kato Aromatic S.A.E.

Krems Chemie

Mentha & Allied Products Ltd.

Millennium Specialty Chemicals

Plant Lipids Limited

Privi Organics Pvt. Ltd.

Quest International

Soda Aromatic Co., Ltd.

Tecnaal, S.A.

Toyotama Internacional Inc.

Vioryl S.A.

The company also has products in stock of other well-known companies like:

Basf

Celanese

Firmenich

Givaudan

PCAS

Agarwood Oil
Amyris Oil

Birch Rect. Oil

Cade Crude Oil
Cade Rectified Oil
Cedarwood Atlas Oil
Cedarwood China Oil
Cedarwood India Oil
Cedarwood Leaf Oil
Cedarwood Texas Oil
Cedarwood Virginia Oil
Cypress Oil

Guayacwood Oil
Gurjum Ref. 25 Oil
Gurjum Ref. 34 Oil

Indian Sandal Coeur

Patchouly Indonesia Oil
Patchouly Light Indonesia Oil
Patchouly Molecular Distilled Oil
Pine Mugo Oil
Pine Needle Sachalinensis Oil
Pine Needle Siberia Oil
Pine Sylvestris Oil

Sandalwood Australia Oil
Sandalwood India Oil

Turpentine Oil

Vetyvert Brasil Oil
Vetyvert China Oil
Vetyvert Haiti Oil
Vetyvert Java Oil
Vatyvert Terpene

Absolutes

Fir Needle Green Abs.

Pine Needle Abs.

Resinoids

Galbanum Resinoid
Gurjum Balsam

Natural Isolates

Cedrene
Cedrol Crystal
Cedrol Liquid - China
Cedrol Liquid - USA
Cedryl Acetate Liquid - China
Cedryl Acetate Liquid - USA

Guiacwood Acetate

Vetiveryl Acetate

Aromatic Chemicals

Acetyl Eugenol
Allyl Ionone
Ambar Crystal
Amberfluer
Ambermor

Bangalol
Bornyl Acetate Crystals
Bornyl Acetate Liquid

Ebanol

Irone Alfa
Iso Bornyl Acetate

Kephalis

Linalool Oxide
Longifolene

Magnolan
MCK Coeur
MCK Tech
Methyl Ionone Gamma
Methyl Ionone Gamma Coeur
Methyl Ionone Iso Super Alfa
Methyl Ionone Soap

Nopyl Acetate

Patchone
Patchoulol
Pine 50 %
Pinene Alpha
Pinene Beta

Sandalina
Sandaltouch
Sandela
Sandenol

Timber Touch

Vetyverol
Vetyverol Coeur

Woodarom
Woodinyl Acetate

Lothar Streek - Germany

Ingredients by

Base 3

Cetonal
Cetone Alpha
Cetone V

Ebanol

Irisone Alpha
Irisone Pure
Irone Alpha

Kephalis

Linalool Oxide

Madrox

Okoumal

Sandalore

M.X.D. Enterprise System - Korea

Perfume List

Birch Tar Oil Purified Extra
Birch Tar Oil Rectified Extra

Cedarwood Texas Oil Extra
Copaiba Oil Extra
Cypress Oil
Cypress Oil Extra
Cypress Oil Terpeneless Extra

Guaiacwood Oil Extra

Patchouly Oil Redistilled Extra
Patchouly Old Oil
Patchouly Old Oil Extra
Peru Oil
Pine Siberian Oil Extra

Sandalwood Oil Extra

Vetiver Oil Extra

Absolutes

Oakmoss Yugoslavian Abs.

Patchouli Abs. Extra
Patchouly Abs. MD
Peru Abs. Extra
Pine Sylvestris Abs.

Treemoss Abs. Colourless Liquid
Treemoss Abs. Extra

Resinoids

Peru Resinoid Extra

Mane SA - France

Raw Materials Catalog

Patchouly Oil MD - Indonesia
Peru Oil - El Salvador

Natural Absolutes

Patchouly Abs. - Indonesia

Peru Resinoid - El Salvador

Natural Concrete

Mousse Cedre Concrete - Morocco

Molecular Distillations

Fir Balsam Abs. MD

Oakmoss Abs. MD

Patchouli Abs. MD
Patchouli Essential Oil MD
Peru Balsam MD

Sambac Abs. Indian MD

Treemoss Abs. MD

Vetyver Abs. MD

Aroma Chemicals & Isolates

Cedryl Acetate

Santalol

Vetiver Acetate
Vetiverol
Vetiveryle Acetate

MelChem Distribution - USA

Natural Aroma Chemicals

Ionone Beta Nat.
Ionone Mixture Nat.

Linalool Oxide Nat.

Pinene Alpha (1S) Nat.
Pinene Beta (1S) Nat.

Millennium Chemicals - USA

Fragrances Bases & Aromatic Chemicals

Alpha Pinene, P & F

Beta - Pinene P & F

L-Alpha Pinene

Moelhausen S.p.A. - Italy

Fine Essential Oils

Birch Oil rectified

Cade Oil crude
Cade Oil rectified
Cedar Bark Oil
Cedarwood Oil Chinese
Cedarwood Oil Texas
Cedarwood Oil Virginia
Copaiba Balsam
Cypress Oil

Guaiacwood Oil
Gurjum Balsam decolorized
Gurjum Balsam rectified

Patchouly Oil
Patchouly Oil Extra Light
Patchouly Oil Indonesia
Patchouly Oil Light
Patchouly Terpenes
Pine Oil Siberian
Pine Needle Oil
Pine Sachalinensis Oil
Pine Scotch Oil

Sandalwood Oil

Turpentine
Turpentine Larch

Vetiver Oil
Vetiver Oil China

Absolutes

Oakmoss Abs.

Moraflor Produits Aromatiques - France

Specialties & Essential Oils

Amyris - Haiti

Birch - Rectified

Cedar Leaves - Canada
Cedarwood Raw - Texas
Cedarwood Clear - Texas
Cedarwood Clear - Virginia

Gaicwood - Brazil

Patchouly - Indonesia
Pine - Siberia
Pine Sylvestris - Austria

Santal - India

Vetyver - Haiti
Vetyver - Java

Specialties or Reconstitute Oils

Amber Liquid MF
Amber Solid MF

Oakmoss Resinoid MF
Oakmoss Resinoid Std MF
Oakmoss Resinoid Green Std MF

Patchouly Extender MF
Pine Oil MF

Santal Oil & Resinoid MF

Muller & Koster - France

Essential Oils

Patchouly Indonesia
    Pogostemon Cablin
Patchouly Malacca
    Pogostemon Cablin
Peru' Quintessence
    Myroxylon Pereirae
Pino Americano
    Abies Balsamea
Pino Mugo
    Pinus Pinaster
Pino Silvestre
    Pinus Sylvestris
Pino Silvestre Pays
    Pinus Sylvestris

Sandalo
    Santalum Album
Sandalo Indie
    Santalum Album
Sandalo Misore
    Santalum Album

Naradev - Hong Kong

Essential Oils

Amyris

Cedar Leaves
Cedarwood Atlas
Cedarwood Virginian
Cypress Leaves

Patchouli Blond
Patchouli Dionized
Patchouli MD
Patchouli MD Super
Patchouli Singapore
Patchouli Singapore Extra
Pine Siberian
Pine Siberian Extra

Sandalwood Mysore East-Indian
Sandalwood New Caledonia
    Distical Brand
Sandalwood West Indian
    (see amyris)

Vetiver Haitian
Vetiver Java

Nardev - Israel

Essential Oils

Amyris Oil

Balsam Copaiba Oil
Balsam Peru Oil

Cedar Leaf Oil
Cedarwood Oil - Atlas
Cedarwood Oil - China
Cedarwood Oil redistilled
Cedarwood Oil - Texas
Cedarwood Oil - Virginia
Cypress Oil

Fir Needle Oil Canadian
Fir Needle Oil Siberian

Guaiacwood Oil

Patchouli Oil - Indonesia
Patchouli Oil Light
Patchouli Oil Micro Distilled
Patchouli Oil redistilled
Peru Balsam Oil
Pimento Leaf Oil rectified
Pinus Pumilionis Oil
Pinus Sylvestris Oil

Sandalwood Oil - Australia
Sandalwood Oil - India
Sandalwood Oil - Indonesia

Vetiver Oil - Bourbon
Vetiver Oil - China
Vetiver Oil - Haiti
Vetiver Oil - Java

Natural Sourcing, LLC - USA

Essential Oils

Amyris, Haiti

Cedarleaf, Bulgaria
Cedarwood, India
Cedarwood, Virginia
Cypress, France
Cypress, Spain

Fir Balsam, Bulgaria

Gurjum Balsam, Indonesia

Patchouli, Indonesia
Pine Needle, Hungary

Sandalwood, India

Vetiver, Haiti

Oliganic - USA

Essential Oil Crop Calendar

Amyris - Haiti

Balsam Copaiba - Brazil
Balsam Peru - El Salvador

Cedarleaf - Canada
Cedarwood - China
Cedarwood - USA

Fir Needle - Austria
Fir Needle - Canada

Guaiacwood - Paraguay
Gurjum Balsam - Indonesia

Patchouli - China
Patchouli - Indonesia
Peru Balsam - El Salvador
Pine Needle - Europe

Sandalwood - Australia
Sandalwood - India
Sandalwood - Indonesia

Vetiver - China
Vetiver - Haiti
Vetiver - Indonesia
Vetiver - Reunion

Organica Aromatics Pvt. Ltd. - India

Fine Chemicals by Family

Amber

Ambronica

Rionyl

Sandal

Iso Mohanol

Kephalor

Sandanol

Sandalfleur
Supersantal

PCAS - France

Specialty Chemicals Odor Classification

Woody

l - Camphor
Cyclohexanone Para Tertio Butyl
Cyclododecyl Formate
Cyclofor

Glycoacetal 236

Irisone Crystals

Phenyl Benzoate

PFW Aroma Chemicals - The Netherlands

Fine Chemicals

Costaulon
Costausol

Orinox

Patchwood

Thiazyl 1 % in DPG

P.P. Sheth & Co. - India

Essential Oils

Amyris Oil

Cedar Leaf Oil
Cedarwood Oil Terpenes
Cedarwood Oil
Cypress Oil

Oakmoss Absolute
Oakmoss Resinoid

Patchouli Oil
Patchouli Oil MD
Patchouli Oil Iron Free
Patchouli Oil Light
Peru Balsam

Tolu Balsam
Treemoss Resinoid

Vetiver Oil

Paul Kaders GmbH - Germany

Fine Aroma Products

Abies Alba Needle Oil
Amyris Oil

Cade Oil, Crude + Rect.
Cedarwood Oil, Texas
Cedarwood Oil, Chin. BPC
Cypress Oil

Fir Needle Oil (Pine Needle Oil)

Guaiacwood Oil

Patchouly Oil
Pine (Fir) Needle Oil Siberia
Pinus Pumilio Oil (Dwarf Pine
Needle)

Sandalwood Oil

Vetiver Oil

Aromatic Chemicals

Guaiacwood Acetate

Payan Bertrand SA - France

Essential Oils, Absolutes & Specialties

Birch Tar Purified Oil

Cedarwood Virginia
Cypress Oil

Patchouly Oil
Patchouly Old Oil
Patchouly Redistilled Oil
Pine Siberian Oil

Sandalwood Oil

Vetyver Haiti Oil
Vetyver Java Oil

Absolute

Peru Abs.

Penta Manufacturing - USA

Natural Chemicals

Amyris Oil

Birch Oil Sweet
Birch Oil, Tar Rectified

Cade Oil
Cedar Leaf Oil
Cedarwood Oil, Chinese
Cedarwood Oil, Texas Light
Cedarwood Oil, Virginia
Cypress Oil

Fir Needle Oil Canadian
Fir Needle Oil Siberian

Guaicwood Oil
Gurjun Balsam Oil

Patchouli Oil
Patchouli Oil Bleached & Filtered
Patchouly Oil MD Colorless
Pine Oil
Pine Needle Oil
Pine Tar Oil

Sandalwood Oil

Tolu Balsam Oil

Vetiver Oil (Bourbon)
Vetiver Oil (Brazil)
Vetiver Oil Indonesian (Haiti)
Vetiver Oil (Java)

Oakmoss

Oakmoss Concrete Brown Morocco
Oakmoss Concrete Green Morocco

Terpenes

Cedarwood Terpenes

Vetiver Terpenes

Aromatic Chemicals

Linalool natural Oxide

Pinene - alpha
Pinene - beta

Perfume & Flavor Manufacturers - Australia

A Complete Listing

Abies Alba Mill Oil
Abies Balsamea L. Mill Oil - US
Abies Balsamea L. Needle Oil- Canada
Abies Picea Lindl. Needle Oil
Abies Sibirica Ledeb. Needle Oil - Siberia
Abies Spp. Needle Oil - Siberia
Amber Oil
Amyris Wood Oil

Balsam Fir Needle Oil
Balsam Fir Oil - America
Balsam Peru Oil
Birch Black Oil
Birch Bud Oil
Birch Oil Sweet
Birch Tar Oil

Cabreuva Wood Oil
Cade Oil
Cedarleaf Oil - China
Cedarleaf Oil - Western Red
Cedarleaf White Oil - Canada
Cedarwood Oil - Atlas
Cedarwood Oil - China
Cedarwood Oil - East Africa
Cedarwood Oil - Himalaya
Cedarwood Oil - Lebanon
Cedarwood Oil - Morocco
Cedarwood Oil - Port Orford
Cedarwood Oil - Red America
Cedarwood Oil - Texas
Cedarwood Oil - Virginia
Cedrus Atlanteca Oil - Morocco
Cedrus Deodara Oil - Himalaya
Cedrus Wood Oil - Lebanon
Copaiba Balsam Oil - S.M.

Fir Needle Oil - Canada
Fir Siberian Oil - Siberia
Fir Silver Oil - America

Guaiacwood Oil
Gurjun Balsam Oil

Norway Pine Oil
Norway Spruce Oil

Patchouli Oil
Pine Bark White Oil
Pine Mountain Oil
Pine Needle Mugo Turra Oil
Pine Needle Dwarf Oil
Pine Norway Oil
Pine Scotch Oil
Pine Sea Oil
Pine Tar Oil
Pinus Leucodermis Oil
Pinus Mugo Turra Oil
Pinus Nigra Oil
Pinus Pinaster Oil
Pinus Oil
Pinus Strobus Oil
Pinus Sylvestris Oil

Sandalwood East Indian Oil
Sandalwood Oil - Australia, West Indian
Sandalwood Oil Yellow
Scotch Pine Oil
Spruce Black Oil
Spruce Red Oil
Spruce Seed Oil
Spruce Silver Oil From Cones
Spruce Sitka Oil
Spruce White Oil From Cones

Turpentine Oil

Vetiver Oil - Haiti

Peter Jarvis Cosmetic Developments Ltd. - U.K.

Botanical Listing

Balsm EG

Cedarwood EA
Cedarwood EG
Cedarwood EO
Cypress EG

Patchouli EG

Sandalwood EG
Sandalwood EO

Petigara Chemicals - India

Natural Products

Cedarwood Oil Himalayan

Vetiver Oil

Petit Marie - Brazil

Lista De Produtos

Cade Oil Crude
Cedarleaf Oil
Cedarwood Texas Oil

Guiaicwood Oil

Patchouli Oil
Pine Siberian Oil

Sandalwood Oil

Vetiver Indonesia Oil

Oleo

Cade Oleo
Cedro Folhas Oleo
Cedro Madeira Virginia Oleo
Cedro Texas Oleo

Patchouly Oleo
Pinho Oleo
Pinho Oleo 45
inho Oleo 50
Pinho Oleo 65
Pinho Oleo 70
Pinho Oleo 75
Pinho Oleo 80
Pinho Siberiano Oleo

Vetivert Oleo

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Resins

Mousse De Chene Resin
(Carbalho)

Aromatic Chemicals

Acetato Cedrila
Acetato Cedrila Cristalizado
Acetato Iso Bornila
Ambrinol - Firmenich
Ambrox DL

Bacdanol
Brahmanol

Fir Balsam Oreton

Guaiacol

Indisan
Ionona Beta
Iso E Super

Metil Ionona Gamma

Orivone

Patchone
Piconia
Pineno Alfa
Pineno Beta

____

Sandalo Olifac
Sandalo Amiris
Sandalo Mysore
Sandalore
Santal Core

Timberol
Tobacarol

Veramoss (Mousse Mietra)
Evernyl
Vertofix Coeur
(Metil Cedril Ketone)

Phoenix Aromas & Essential Oils, Inc. - USA

Essential Oils

Amyris Oil

Cedarleaf Oil
Cypress Oil

Fir Needle Oil Siberian

Patchouli Oil
Patchouli Oil Light
Patchouli Oil MD

Sandalwood Oil
Indian, Indonesian

Vetivert Oil Haiti

Plant Lipids - India

Product Catalog

Vetiver Oil

Polarome Intenrational - USA

Product Listing

Amyris Oil

Balsam Copaiba Oil
Balsam Fir Canada
Balsam Peru Oil
Birch Tar Rectified

Cade Oil
Cade Oil Rectified
Cedar Leaf Oil
Cedarwood Oil Atlas
Cedarwood Oil Chinese
Cedarwood Oil Redistilled
Cedarwood Oil Texas
Cedarwood Oil Texas Light
Cedarwood Oil Virginia
Cypress Oil

Fir Balsam Canadian
Fir Needle Oil Canadian
Fir Needle Oil Siberian

Guaiacwood Oil

Hemlock - (Spruce)

Patchouli Oil Indonesia
Patchouli Oil Light
Patchouli Oil Micro-Distilled
Patchouli Oil Redistilled
Peru Balsam Oil
Pinus Pumilionis Oil
Pinus Sylvestris Oil

Sandalwood Oil Indian
Sandalwood Oil Indonesian
Spruce (Hemlock)

Turpentine Crude, Dextro
Turpentine Crude, Laevo
Turpentine Rectified

Vetiver Oil Bourbon
Vetiver Oil Chinese
Vetiver Oil Haitian
Vetiver Oil Java

Balsams

Balsam Gurjun

Balsam Peru

Balsam Tolu

Resinoid

Peru Resinoid

Treemoss Resinoid

Absolute

Fir Balsam Abs.

Oakmoss Moroccan Abs.
Oakmoss Yougoslav Abs.

Treemoss Abs.

Concrete

Oakmoss Moroccan Concrete
Oakmoss Yougoslav Concrete

Treemoss Concrete

Terpenes

Cedarwood Terpenes (Cedrene)

Aromatic Chemicals

Alpha Pinene, (Dextro, Levo)

Cedrol China
Cedrol Methyl Ether
Cedrol Texas
Cedryl Acetate 50 %
Cedryl Acetate 70 %

Iso Bornyl Acetate

Para Cymene

Vetiver Acetate Haiti
Vetiver Acetate Java
Vetiver Redistilled

Premier Chemical Corporation - India

Essential Oils & Aromatic Chemicals

Amyris Oil

Birch Tar Oil

Cade Oil Rectified
Cedar Wood Oil Rectified
(Cedrus Deodara)
Cedar Wood Oil Double Distilled
(Cedrus Deodara)

Gurjam Oil

Patchouli Oil
Pine Oil

Vetiver Oil

Aromatic Chemicals

Beta Ionone (P/G)

Sandol-SA
(Equivalent to Bacdanol)

Woodamber-SA
(Equivalent to Timberol)

Prima Fleur - USA

Essential Oils & Aromatic Chemicals

Balsam, El Salvador
Myroxylon Balsamum Var.
Balsam, Tolu
Myroxylon Balsamum
Birch
Betula Lenta

Cedar
Cedrus Atlantica
Cedar Virginiana
Juniperus Virginiana
Cypress
Cuminum Cyminum
Cypress
Cupressus Sempervirens
Cypress Blue
Callitris Intratropica

Fir Balsam
Abies Balsamea
Fir Balsam
Abies Balsamea
Fir Douglas
Pseudotsuga Menziesii
Fir Grand
Abies Gandis
Fir Silver
Abies Alba

Patchouli
Pogostemon Patchouli
Pine
Pinus Sylvestris
Pine
Pinus Pinaster
Pine
Pinus Pinaster

Sandalwood
Santalum Alabum
Spruce
Picea Sitka
Spruce Black
Picea Mariana

Vetivert
Andropogon Muricatus

Absolutes

Oakmoss Abs.
Evernia Prunastri

Privi Organics Ltd. - India

Product

Alpha Ionone
Alpha Ionone Pure
Amber Fleur

Beta Ionone

Floralscone

Indian Sandal Coeur
Ionone 100 %

Methyl Ionone

Nimberol

Sandal Fleur
Sandal Touch

Timber Forte
Timber Touch

Prodarom - France

Training Manual For Student Perfumer's

Main Group of Raw Materials

Main Olfactory Groups

Wooded:

Amyris

Cedar wood

Guaiacwood

Patchouli

Sandalwood

Vetiver

Prodasynth - France

Aroma Product Line

Alpha Pinene

Beta Pinene

Puressence Wuersten Inc. - Switzerland

Essential Oils

Abies Alba Oil
Amyris Oil

Birch Tar Oil

Cade Oil
Cedarleaf Oil
Cedarwood Oil
Cypress Oil

Firneedle Oil

Guajacwood Oil

Patchouly Oil
Pine Oil

Vetyver Oil

Resinoid

Perubalsam

Concretes

Oakmoss

Pineneedle

Balsam

Canadafirbalsam

Firbalsam

Perubalsam

Terpenes

Patchouly Fractions/ Residues

Quality Analysis Ltd. - U.K.

Product List

Amyris Oil - West Indies
(Sandalwood Oil W.I.)

Cedarwood Oil - China, Himalaya, Texas, Virginia
Cedarwood Oil Atlas - Morocco
Cypress Oil - Spain

Guaicwood Oil - Paraguay

Patchouli Oil - Indonesia
Pine Needle Oil - Europe

Sandalwood Oil - Australia, East India, Indonesia
Silver Fir Oil - Siberia

Terebinth / Turpentine Oil

Vetivert Oil - Java, Haiti

Rai Ingredients - Brazil

Raw Materials

Bacdanol

Cedramber
Cedrenyl Acetate
Cedrenol

Guaiacum

Iso E Super
Isobornyl Acetate

Patchouly Light OE

Vertenex

Linalool Oxide

Madrox

Oakmoss Givco 214
Okoumal

Sandalore
Sandalwood Givco 203
Sandec Givco 220
Sandela

China Perfumer - Givaudan material listing

Base 3
Black Agar Givco 215
Boisiris

Cetonal
Cetone Alpha
Cetone V

Ebanol
Evernyl

Javanol

Kephalis

Raj Aromatics Aroma Corporation - India

Esential Oils & Aromatic Chemicals

Amigo & Arditi SA - Paraguay

Guicawood Oil

Guicawood Oil Pure

Vetiver Oil Pure

Chinese

Cedryl Acetate

Vetiver Oil Haiti
Vetiver STD

Rhodia Organics - France

Fine Products

Beta Ionone

Candalum

Rhodiantal

Robertet SA - France

Natural Ingredients

Ambre 140 BSA

Brich Sweet Essence

Fir Balsam Abs.

Iris Concrete

Patchouli Bleached Oil
Patchouli Rectified Essence
Patchouli Rectified Oil
Patchouly Abs.
Pine BT Resinoid
Pine Needles Abs.
Pine Siberian Essence
Pine Siberian Oil

Turpentine Oil

Vetiveryl Bourbon Oil

Rosetta Enterprises, LLC - USA

Products

Amyris FCC

Birch Sweet Southern FCC

Cedarleaf Thuja Occidentals FCC
Cedarwood Texas
Cedarwood Virginia

Fir Canadian FCC
Fir Siberian FCC

Guaiacwood Concrete

Hemlock

Patchouli Amber
Patchouli Dark
Patchouli Light
Patchouli MD
Pine Needles Siberian FCC

Sandalwood East Indian FCC
Spruce

Vetivert Bourbon
Vetivert Java

Balsams & Gums

Balsam Copaiba
Balsam Fir Oregon
Balsam Peru Genuine

SAT Group - India

Essential Oils

Cedarwood Oil
Cypress Oil

Fir Needle Oil

Pine Oil

Sandal Wood Oil

Vetivert Oil

Perfume Oils / Attar

Amber Perfume Oil

Sandalwood Perfume Oil

SRS Aromatics Ltd. - U.K.

Perfumery Specialties

Specialty Bases

Patchoulox 332 M
Patchox 4262

Santalox 244 MCandalum

Woodly Extra 3840 P

Essential Oils

Cade Oil
Cade Oil 'A'
Cypress Oil
Cypress Oil 613

Patchouly Oil Iron Free Indonesia
Patchouly Oil M.D. Indonesia A
Pine Oil

Sandlewood Oil Rectified India

Vetiver Oil Bourbon Type 2421
Vetiver Oil Java

Natural Extracts

Birch Bark Extract
Birch Leaves Extract

Evergreen Extract

Pine Needle Extract

Red Sandelwood Extract

Aromatic Chemicals

Alpha Ionone
Alpha Pinene

Candalum
cis Pinene

Iso Bornyl Acetate

Linalool Oxide

Methyl Ionone Gamma
Methyl Ionone Terpenes

Pine Ester
Pine Oil

Sandelione 3480 P
Sandelione Extra 2495 P
Sandelione Supra 3560 P

Turpentine

Vetysantal

Woodinyl Acetate

Sarcom Inc. - USA

Fine Oils & Aromatic Chemicals

Cedarwood BPC49

Patchouli China
Patchouli Indonesia

Sandalwood East Indian

Vetyver Indonesia

Aromatic Chemicals

Cedryl Acetate Crystals 98 %
China

Iso Bornyl Acetate 97 % China

Sandenol China

Science Lab - USA

Essential Oils

Amyris Oil W.I.

Cedar Leaf Oil FCC
Cedarwood Oil (For Clearing)
Cedarwood Oil (For Immersion)

Fir Needle Oil Canadian FCC
Fir Needle Oil Siberian FCC

Guaiacwood Oil
Gurjon Balsam Oil

Patchouli Oil
Pine Needle Oil
Pine Oil White
Pine Oil White, Low Alcohol
Pine Sylvestris Oil Natural

Sandalwood Oil
Spruce Oil Eastern

Vetivert Oil Haitian

Seema International - India

Product List

Amyris Oil

Cedarwood Oil

Patchouli Oil
Pine Oil

Vetivert Oil

Sensient Essential Oils Gmbh - Germany

Products

Abies Oil - East Asian
Amyris Oil - West Indian

Cade Oil rectified
Cedar Leaf Oil - Canada
Cedarwood Oil - Atlas
Cedarwood Oil - Himalaya
Cedarwood Oil - Texas 22 %
Cedarwood Oil - Texas 25 %
Cedarwood Oil - Texas 40 %
Cypress Oil - France

Guaiacwood Oil - Paraguay

Patchouli Oil - Indonesia
Patchouli Oil - Indonesia ironfree

Pine Needle Oil - China 15 %
Pine Needle Oil - Siberia 30 %
Pine Needle Oil - Slovenia

Sandalwood Oil - East Indian
Swiss Pine Oil - Allgäu rect. 15/16
Swiss Pine Oil (Arven Oil)

Vetiver Oil - Haiti, Javi

Sensient Technologies Corporation - USA

Fragrances

Cade Oil, crude
Cade Oil, distilled

Product List

Methyl Cedryl Ketone Coeur

Shanghai M & U International Trade Co., Ltd. - China

Essential Oils & Aromatic Chemicals

Cedarwood Oil

Guaiaicol

Patchouli Oil

Aromatic Chemicals

Iso Bornyl Acetate

Methyl Cedryl Ketone

Sandenol 208
Sandenol 803

Vetivert Oil

Shreeji Aroma - India

Essential Oils & Aromatic Chemicals

Cade Oil
Cedarwood
Cyprus

Patchouli
Patchouli S.D.

Sandalwood

Aromatic Chemicals

Balsam Peru
Balsam Tolu

Cedarwood Rectified

Evernyl

Iso Borneol Acetate

Longifolene Acetate

Mahagonate

Precious Wood

Sandal Mysore Core

Vetiveryl Acetate

Woodytol

Sigma Aldrich - USA

Essential Oils

Amyris Oil

Birch Sweet Oil
Birch Tar Oil rectified

Cade Oil
Cade Oil rectified
Cedarwood Oil Texas
Cedarwood Oil Texas White
Cedarwood Oil Virginia
Cedrol redistilled
Cedryl Acetate
Copaiba Balsam
Copaiba Balsam Oil
Copaiba Balsam bleached

Fir Needle Oil, Canadian
Fir Needle Oil, Siberian

Guaicwood Acetate
Guaiacwood Oil

Methyl Cedryl Ether > 96 %
Methyl Cedryl Ketone
Methyl Cedryl Ketone Coeur

Patchouli Oil

Sandalwood Oil, Indonesia

L-Turpentine

Vetiver Acetate

Silvestris & Szilas Ltd. - Hungary

Essential Oils

Fir Needle Oil
(Siberian) (Abies Siberica)

Pinus Sylvestris Oil
(Pinus Sylvestris)

Sandalwood Oil
(Santalum Album)

Som Santi House - India

Natural Products

Cedarwood Oil - Nat.

Vetiver Oil - Nat.

Some Extracts - India

Products

Vetiver Oil

Imported Products

Guajacwood Oil - Paraguay

Patchauli - Indonesia

Indigenus Essential Oils

Herbs/Wood Oils

Vetiver Oil nat.

Resinoids / Bases

Treemoss 50 % BB - Nepal

Sovimpex - France

Produits

Les Huiles Essentielles

CITRONELLE / CHINE

HUILE DE MANDARINE / ITALIE
HUILE DE NEROLI / MAROC
HUILE DE PACHOULI / INDE

MENTHE PIPERITA / INDE

ORANGE / BRESIL
ORIGAN / EUROPE DE L EST

SPEARMINT NATIVE - USA

TEA TREE / AUSTRALIE

YLANGS / MADAGASCAR

Amyris

Bois De Cedre Texas Light
Bois De Cedre Texas Regular
Bois De Cedre Virginie
Bois De Roses Bresil
Bois De Santal - Australie
Bois De Santal - Inde
Bois De Santal - Indonesie

Patchouli
Patchouli D.M.
Patchouli Light
Pin Siberie
Pin Sylvestre

Vetyver Haiti
Vetyver Java

Derives Natureles

Acetate Vetyveryle

Cedrene
Cedrol

Terpenes

Vetyver

Absolutes / Concretes

Mousse D'Arbre
Mousse De Chene

Baumes, Feves Gommes, Resinoides

Baume Copahu
Baume Gurjum
Baume Perou
Baume Tolu

Aromatics De Synthese

Acetate Iso Bornyle
Methyl Cedryl Ketone
MCK - Coeur

Spectrum Chemicals - USA

Fine Chemicals

Birch Sweet Southern Oil

Cedarwood Oil
Cypress Oil

Fir Needle Oil Canadian FCC

Guaiacwood Oil

Patchouli Oil
Pine Oil White Low Alcohol
Pine Sylvestris Oil natural

Sandalwood Oil

Vetivert Oil Haitian natural

Sundial Fragrances & Flavors - USA

Aromatic Chemicals

Ionone AB 80 % Total Ionones
Ionone Beta
Iso Bornyl Acetate 88 %

Pine Oils Natural 60 %
Pine Oils Natural 70 %
Pine Oils Natural 80 %
Pine Oils Natural 90 %
Pine Oils Synthetic 60 %
Pine Oils Synthetic 70 %
Pine Oils Synthetic 80 %
Pine Oils Synthetic 90 %
Pinene Alpha SDW 90 % natural
Pinene Alpha RS 92 %
Pinene Alpha P & F 97 % FCC
Pinene Beta P & F 97 % FCC
Pinene Beta R & S 83 %

Steam Distilled Wood (SDW)

Turpentine
Turpentine Gum Spirits
Turpentine Gum Spirts Domestic

Sunrose Aromatics - USA

Fine Essential Oils

Key:

O - Organic

ONC - Organic, not certified

WC - Wild crafted

Cedarwod Himalayan (WC)
Cedarwood Atlas Morocco
Cypress
Cypress (O)

Douglas Fir Needle (O)

Fir Balsam (WC)
Fir Needle (WC)

Guaiacwood

Patchouli
Patchouli, Iron Free
Pine Needle

Sandalwood, Australia
Spruce (WC)

Vetivert, Haiti (WC)
Vetivert, India (WC)

Absolutes

Oak Moss Abs. Extra

Organic Essential Oils

Black Spruce - (O) NOP

Douglas Fir Needle (O)

Wild Crafted Essential Oils

Spruce (WC)

Vetivert, Haiti (WC)
Vetivert, India (WC)

Rare & Exotic

Oak Moss Absolute Extra

Sandalwood, Australia

Vetivert, Haiti (WC)
Vetivert, India (WC)

Symrise GmbH & Co. KG - Germany

Fragrance Ingredients

Argumex HC
Amberwood F
Ambrinol S

Brahmanol
Brahmanol F

Mahagonat
Majantol
Mysore Acetate

Palisandal
Palisandin

Sandel 80
Sandel Extra
Sandel H & R ECO
Sandel SP
Sandel SR
Sandranol

Tabanon
Timberol

Vetikon

Y samber K

Synaco Group - Belgium

Essential Oils

Amyris Oil

Cade Oil rectified
Cedar Leaf Oil
Cedarwood Oil - China, Virginia

Guaiacwood Oil - Paraguay

Patchouli Oil Indonesian
Pine Needle Oil

Sandalwood Oil - Indian, Australia

Turpentine Oil

Vetivert Oil

Synarome - France

Specialty Products

Acetal Bois 12

Cederone

Lycopene

Mousse SXJ
Mysoral

Aromatic Chemicals Natural

Acetate De Cedryle Cristallise
Acetate De Santalyle
Acetate De Vetiver Coeur
Acetate De Vetiveryle Supra
Acetate Sylvestre

Cyprenate

Mossarome

Takasago International Corporation - Japan

Aroma Chemicals Compendium

Acetoketal

Ambrinol 20 - T

Caryoketone
B-Caryophyllene
Caryophyllene Acetate
Cedanol
Cypress Oil

Florasantol

b-Ionone

Levosandol
Linalool Natural

Nopol
Nopyl Acetate

Oakmoss No. 1
Orbitone

a-Pinene 95
a-Pinene P&F
b-Pinene P&F

Santalex T
Santalex T Neat

Taytonn Ptd Ltd. - Singapore

Fine Aromas

Companies Represented

Aroma & Fine Chemicals

CV Aroma

Capua

Citrovita

EOAS International

IFF

Miltitz Aromatics

Silvestris & Szilas

Taiwan Fine Chemicals

Toyotama

Essential Oils

INDONESIAN

Patchouli

Vetivert

EUROPEAN

Pinus Sylvestris

International Flavors & Fragrances

Bacdanol

Cedramber
Cedrenyl Acetate

Guaiyl Acetate

Ionone Beta
Iso E Super

Methyl Ionone Gamma A
Methyl Ionone Gamma Supreme

Orivone

Patchone

Vertenex
Vertofix Coeur

Toyotama

Nopyl Acetate

Texarome - USA

Product List

Alpha Cedrene
Amyris Oil
Amyris Alcohol
Amyris Terpenes

Cedar Wood Oil Perfumer Grade
Cedar Wood Oil Texas
Cedar Wood Oil Virginia
Cedar Wood Oil Texas Crude
Cedar Wood Oil Texas Hydrosol
Cedar Wood Oil Texas Redistilled
Cedar Wood Oil Texas Resin
Cedar Wood Oil Texas
Water Soluable
Cedrene
Cedrenol Texas
Cedrol Crystal Texas

Thujopsene

Vetiver Oil Haiti
Vetiver Oil Haiti redistilled

Thailand Institute of Science & Technology - Thailand

Essential Oils by Country

Albania

Abies Alba Oil

Austria

Birch Tar Oil

Brazil

Vetiver Oil

Bulgaria

Albies Alba Oil

Canada

Cedarleaf Oil
Fir Balsam Oil
Fir Needle Oil

China

Cedarwood Oil

Patchouli Oil
Siberian Pine Needle Oil
Vetiver Oil

El Salvador

Peru Balsam Oil

Germany

Birch Tar Oil

Guatemala

Vetiver Oil

Haiti

Amyris Oil
Vetiver Oil

India

Cedarwood Oil
Sandalwood Oil
Vetiver Oil

Indonesia

Patchouli Oil
Sandalwood Oil
Vetiver Oil

Morocco

Cedarwood Oil

Poland

Abies Alba Oil

Spain

Cade Oil

Thailand

Gurjan Balsam

United States

Cedarwood Oil
Fir Balsam Oil
Pine Oil

USSR

Birch Tar Oil
Siberian Pine Needle Oil

Yugoslavia

Abies Alba

____

Thakker Group - India

Essential Oils & Fragrances

Agarwood - Symrise
Amyris Oil Extra - Payan Bertrand

Balsam Copaiba - Payan Bertrand
Balsam Peru - Payan Bertrand

Cedarwood Oil - Virginia

Oakmoss Absolute - Payan & Bertrand
Oakmoss Thick Resinoid - Payan Bertrand

Sandal Forte - Forte

Treemoss Absolute - Payan Bertrand

Aromatic Chemicals

Bacdanol (Anandol / Sandolene) IFF, Symrise
Boisanol - Symrise

Majantol - Symrise
Methyl Cedryl Ketone (MCK) - China

Th. Gyer Gmbh & Co. KG - Germany

Products

Base Timbrox 10
Brahmanol
Brahmanol F

Sandolen

Timberol

Ysamber - K

Aroma Chemicals

Ambrinol S

Isobornylacetate

Majantol

Palisandal
Palisandin

Sandel
Sandolen

Treatt USA Inc. - USA

Citrus Specialties

Amyris Oil

Balsam Copaiba Oil
Balsam Peru Oil
Birch Tar Oil Rectified

Cedarwood Oil
    Chinese/Texas/Virginia
Cypress Oil

Guaiacwood Oil

Patchouli Oil
Pine Needle Oil

Sandalwood Oil

Vetivert Oil

Treatt USA Inc. - USA

Essential Oil Map of the World by Treatt USA Inc.

Europe

Austria

Fir

Finland

Fir

France

Cypress

Georgia

Pine

Greece

Pine

Portugal

Turpentine

Russian Federation

Birch Tar
Pine Needle

Middle East

Turkey

Cypress

Africa

Angola

Vetivert

Reunion

Vetivert

Tanzania

Sandalwood

North America

Canada

Cedarleaf

United States

Turpentine

Caribbean

Haiti

Amyris
Vetivert

South America

Brazil

Guaiacwood
Vetivert

Chili

Turpentine

Paraguay

Guaiacwood

Asia

Democratic Republic of Korea

Pine

East Teamor

Sandalwood

India

Agarwood
Sandalwood

Indonesia

Patchouli
Sandalwood
Turpentine
Vetivert

Malaysia

Patchouli

Mayanmar - Burma

Turpentine

Napal

Turpentine

Sir Lanka

Vetivert

Pacific Ocean

Australia

Sandalwood

New Caladonia

Sandalwood

Trisenx, Inc. - USA

Fine Aromatic Chemicals

Cedar Wood Oil (Light Texas)

Patchouly Oil (Light Bleached)

Sandalwood Oil (EL)

Library of Fine Chemicals

Bacdanol

Cedar - wood Oil (Light Texas)

Patchouly Oil - (Light Bleached)
Polysantol

Sandalwood Oil (EL)
Sandela

Alcohols

Bacdanol

Polysantol

Uhe Company, Inc. - USA

Essential Oils & Aroma Chemicals

Amyris

Cedarleaf
Cedarwood

Fir Needle

Patchouli
Pinus Pumilionis

Sandalwood

Vetivert

Ultra International Limited - India

Natural Essential Oils

Amyris

Cedarwood

Fir Needle

Patchouli

Sandalwood

Vetiver

Natural Reconstruction Oils

Patchouli

Sandal Indian

Vetivert

Ungerer & Company - USA

Essential Oils Compendium

Amyris FCC

Birch Sweet Southern FCC

Cedarleaf, Thuja Occidentals FCC
Cedarwood Texas
Cedarwood Virginia

Fir Canadian FCC
Fir Siberian FCC

Guaicwood Concentrate

Patchouli Amber
Patchouli Dark
Patchouli Light
Patchouli MD
Pine Needles Siberian FCC

Sandalwood East Indian
Spruce

Vetivert Java

Ventos, Ernesto S.A. - Spain

Products

Amyris Oil

Cade Oil, Rectified
Cedarleaf Oil
Cedarwood Oil, Atlas
Cedarwood Oil, Chinese
Cedarwood Oil, Texas
Cedarwood Oil, Virginia
Cypress Coeur
Cypress Coeur Super Light
Cypress Oil
Cypress Oil, rectified

Guaiac Wood Oil
Gurjum Balsam Oil

Patchouli Coeur Super Light
Patchouli Oil MD Indesso
Patchouli Oil MD Ventos
Patchouli Oil, 70 %
Patchouli Oil
Patchouli Oil, Indonesia
Patchouli Oil, Iron Free
Patchouli Oil, Light
Pine Oil 65 - IFF
Pine Oil 85 - IFF
Pine Oil 900 - IFF
Pine Oil, Austrian
Pine Oil, Siberian
Pine Oil, Sylvestris

Sandalwood Oil, Australian
Sandalwood Oil, Indian

Vetiver Extract CO2
Vetiver Oil Brazil Super Light
Vetiver Oil, Brazil
Vetiver Oil, Haiti
Vetiver Oil, Indonesian

Natural Aromatics

Beta-Pinene

Cedrol 35 %
Cedrol 60 %
Cedrol Crystals
Cedrol Crystals 1X - IFF

Santalol

Vetiverol - Synarome

Resinoids

Oakmoss Resinoid

Absolutes

Fir Balsam Abs. - IFF

Oakmoss Abs.
Oakmoss Abs. Yugoslavia

Aromatic Chemicals

Alpha Irone - Givaudan

Amber Core - KAO
Amboryl Acetate
Ambarome Abs. - Synarome
Ambrox DL - Firmenich

Cedramber - IFF
Cedrenyl Acetate EOA - IFF
Cedrenyl Acetate - IFF
Cedrone S - IFF
Cedroxyde - Firmenich
Cedryl Acetate, Liquid
Cedryl Methyl Ether
Coniferan - IFF

Ebanol - Givaudan

Iso Bornyl Acetate

Koavone - IFF
Kohinool - IFF

Majantol - Symrise
Methyl Cedryl Ketone, Chinese

Nopyl Acetate

Orivone - IFF

Piconia - IFF
Pino Acetaldehyde - IFF
Polysantol - Firmenich

Sandalore

Sandela - Givaudan
Sandenol
Sandenol Extra
Sandol, Asia
Sanjinol - IFF
Santaliff - IFF

Tobacarol - IFF
Trimofix O - IFF

Veramoss - IFF
Vertenex HC - IFF
Vertofix Coeur - IFF

Woodamber / Timberol

Venus Enterprises Ltd. - U.K.

Products

Amyris Oil

Cedarwood Oil

Fir Needle Oil

Guaiacwood Oil

Patchouli Oil
Pine Needle Oil
Pine Oil

Sandalwood Oil

Vetivert Oil

Aromatic Chemicals

Alpha Ionone
Alpha Pinene Dextro Natural

Beta Ionone

Iso Bornyl Acetate

Methyl Cedryl Ketone

Sandasweet

Vigon International, Inc. - USA

Essential Oils

Balsam Oil Peru Extra

Cedarwood Oil Chinese
Cedarwood Oil Texas

Patchouli Oil
(30 % Patchouli Alcohol)

W & W Australia Pty Ltd. - Australia

Products

Cedarwood Oil
Cedarwood Oil (Water Distilled)

Patchouli Oil
Pine Oil 65 %
Pine Oil 85 %

Aromatic Chemicals

Alpha Cedrene
Alpha Cedrene Epoxide

Cedarwood Terpenes
Cedrenol
Cedrol Crystal
Cedryl Acetate (50 %)
Cedryl Acetate (70 %)
Cedryl Acetate (97 %)
Cedryl Methyl Ether
(Cedramber)

Iso Bornyl Acetate

Sandenol

Walsh, John D., Company Inc. - USA

Products

Alpha Pinene 99% Natural

Beta Pinene 98% Natural

Cade Oil
Cedarleaf Oil
Cedarwood Oil, Texas
Cedarwood Oil, Virginiana
Cedarwood Oil, White
Cypress Oil

Fir Needle Oil, Canadian
Fir Needle Oil, Siberian

Patchouli Oil, E.I.
Pine Oil

Absolutes

Fir Balsam Abs.

Oakmoss Abs.

Treemoss Abs.

Aromatic Chemicals & Naturals

Bacdanol

Cedraclaire
Cedramber
Cedrenyl Acetate
(Cedryl Acetate)
Cedrenyl Acetate Crystals
Cedrol Crystals
Cedrone S
Coniferan

Fir Balsam Oliffac

Guaiacwood Acetate
Guaiyl Acetate

Iso E Super

Koavone
Kohinool

Methyl Cedryl Ketone

Osyrol

Nopyl Acetate

Patchone

Piconia

Sandalwood Oliffac
Sandela

Trimofix O
Turpentine

Veramoss

Wambesco Gmbh - Denmark

Essential Oils & Essences

Cedarleaf Oil
Cedarwood Burnt Oil
Cedarwood Terpenes Oil
Cedarwood Unburnt Oil

Fir Needle Oil

Gurjun Balsam Oil

Patchouly Oil
Pine Oil
Pine Aleppo Oil

Sandalwood Oil
Sibirian Pine Oil

Vetiver Oil

Aromatic Chemicals

Beta Ionone

Cedrene Epoxide Alpha
Cedrenyl Acetate
Cedrol Liquid ex Cedarwood Oil
Cedrol Crystal
Cedryl Acetate Crystal ex Cedarwood Oil
Cedryl Acetate Liquid ex Cedarwood Oil
Cedryl Methyl Ether M.C.E.

Methyl Cedryl Ketone
Methyl Cedryl Ketone ex Cedarwood Oil

Vertilione ex Cedarwood Oil
Vetiveryl Acetate Select - Haiti

Woody Fragrance Chemicals

Abalyn	A weak piney woody odor.
Allyl Ionone	Oily sweet slight flowery, but also fruity woody bark like green.
Aloe Vera Lupo Quinon Extract	An extremely fine delicate ambergris sandalwood odor.
Alpha Pinene	Warm resinous, refreshing coniferious like.
Ambergris T Oliffac	Amber
Amphermate	Woody.
Amyris Acetate	Woody slightly sweet dry, fresh.
Amyris Oil W.I.	Faintly woody not dry.
Bacdanol	Powerful sandalwood note.
Beachwood Cresote	Powerful and penetrating resembling that of smoked wood.
Benteine	A woody odor.
Beta Pinene	Dry, woody resinous piney.
Birch Leaf Oil	Pleasant woody green balsamic odor.
Birch Tar Oil	A phenolic tarry woody smoky leathery, diffusive material.
Brahmanol	A light sweet odor of sandalwood.
Cabreuva Oil	Sweet woody very delicate slightly floral.
Cade Oil	Intense tar like smoky phenolic odor.

Cadinene	Mild, dry woody slightly medicinal tarry odor.
Calamus	Warm, woody spicy and pleasant odor.
Cedarwood Alcohol	A woody cedar type odor, a bit harsh.
Cedarwood Oil Terpeneless	Stronger woody cedar odor free from terpenes.
Cedarwood Oil Texas Crude	Pleasant sweet woody somewhat tar like odor.
Cedarwood Oil Virginia	Oily woody almost sweet mild pleasant, cedar chest like odor.
Cedramber	Refined woody, pleasantly green odor.
Cedrene	Woody, camphoraceous, somewhat dry green odor.
Cedrenol	Mild woody odor less dry more balsamic than cedrene.
Cedrol Crystals	Very faint odor of cedarwood type.
Cedrenyl Acetate	Faint fresh woody odor.
Cedryl Acetate	Woody slight leathery.
Citronella Oil Ceylon	Peculiar warm woody yet fresh grassy odor of wet leaves.
Cortex Aldehyde	Powerful green woody sap like, but fresh aldehydic sweet.
Costus Oil	Peculiar soft tenacious, reminiscent of old precious wood.
Cubeb Oil	Dry woody, but simultaneously warm camphoraceous spicy.
Cypress Oil	Pleasing smoky woody similar to amber.
Di Hydro Cuminyl Alcohol	Warm, herbaceous slightly woody oily odor.
Fir Needle Balsam Resin	A powerful diffusive pine forest type odor.
Fir Needle Canadian	Rich balsamic sweet, and pleasant oily pinaceous fragrance.
Fir Needle Siberian	Refreshing balsamic, slight fatty oily with Pw pine forest odor.
Fixolide	Sweet woody musky.

Fleuroxene	A strong green floral woody non descript odor.
Ginger Oil	Sweet fresh woody spicy.
Guaicol	Powerful smoke like medicinal odor.
Guaicwood Acetate	Soft warm delicately sweet rosy woody odor.
Gurjan Balsam Oil	Mildly woody balsamic sweet odor.
Heptavert	A green woody odor.
Ionone Beta	More fruity, and woody like than alpha.
Iraldeine Beta	Woody warm odor.
Iris Resin	Deep sweet slightly woody tobacco like.
Iso Cyclomene E	Woody amber.
Iso E Super	Woody amber.
Iso Longifolanone	Fresh woody raw amber.
Iso Methyl Cedryl Ketone A	A fine sandalwood cedar complex quite natural.
Kephalis LRG - 1182	Woody amber complex.
Koavone	Woody floral complex with amber violet note.
Kohinool	A fine woody amber dry out.
Linalool Oxide	Powerful sweet woody floral.
Menthanyl Acetate	Fresh piney citrusy somewhat herbaceous.
Menthol Racemic	Similar to above more woody less sweet.
Merion	A diffusive oriental woody complex.
Methyl Ionone Beta	Woody warm odor.
Methyl Ionone Beta Coeur	Purer grade more woody, and warm.

Methyl Ionone Gamma A	A floral violet woody isomeric mixture.
Methyl I G Supreme	Floral woody fruity complex.
Methyl Ionone Tails	A harsh woody solvent masking odor.
Methyl Ionone Terpenes	Harsh woody solvent masking fragrance.
Mousse De Chenne Abs.	Powerful clean oakmoss odor.
Mousse De Metra	Powder form of oakmoss.
Moussyl 1055	A mossy balsamic type odor almost woody like very dry.
Nerolidyl Acetate	Sweet woody and mildly refreshing green.
Nopol	Mild woody camphoraceous odor.
Nopyl Acetate	Sweet woody fruity odor.
Norsdandyl 81157	A fine woody complex.
Orivone	Very diffusive woody camphoraceous odor.
Ortho Methyl Cinnamic Ald.	Powerful sweet herbaceous woody camphoraceous.
Osyrol	Sandalwoody flowery woody note.
Parsley Seed Oil	Warm woody sweet spicy.
Patchone	Extremely dry woody camphoraceous.
Patchouli Dark	Extremely rich sweet herbaceous aromatic spicy woody.
Petitgrainol	Intensely woody neroli note.
Phenyl Acetaldehyde	Powerful green wood sap like.
Pine Oil Yarmor # 302	Fresh, harsh pine type.
Polarsan	Sandalwood.
Rosemary Oil	Woody herbaceous, reiminiscent of spike lavender oil.

Rose Nitrile	Rich rose geranium woody iris.
Sandalore	Sandalwood amyris woody type odor.
Sandela	Sandalwood.
Sandalwood Essence	Captures the sweetness and heart of sandalwood very nice.
Sandalwood 77.125B	Has the dry slightly sweet balsamic odor of amyris oil W.I.
Sandalwood Oil East Indies	Extremely soft sweet woody almost animal balsamic.
Sandalwood Oil Australian	Soft woody extremely tenacious and somewhat balsamic.
Sandranol	Woody, and extremely fine sandalwood compound last days.
Santalum Citrinum	Very pleasant sweet woody odor reminiscent of sandalwood.
Thiazyl	Dry woody and Eau De Grouts character.
Tree Moss Abs.	A strong at the same time persistent moss odor.
Trimofix	Amber woody note with vetivert and smoky tobacco nuances.
Turpentine SDW	A woody solvent which is steam distilled.
Unipine 85	Fresh pine.
Unipine 90	Fresh pine.
Unitene D	Piney lemony type odor.
Valanone B	Warm woody odor.
Vanoris	Woody fruity, soft refreshing odor of mild orris type.
Vertenex	Sweet, animal creamy woody odor with a soft floral undertone.
Vertofix	Woody.
Vetivert Oil Bourbon	Woody, finest grade of vetivert oil.
Woodine	Woody.

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