World Journal of Pharmaceutical Sciences
ISSN (Print): 2321-3310; ISSN (Online): 2321-3086
Published by Atom and Cell Publishers
Available online at: http://www.wjpsonline.org/
Editorial

Diverse Applications of Oleo resins

Dr. (Ms) Mahtab Z.Siddiqui
Ph.D., FICCE
Principal Scientist (Organic Chemistry)
Processing & Product Development Division,
ICAR-IINRG, Namkum,
Ranchi - 834 010 (Jharkhand), INDIA.
Cell: +91-9934937070; E-mail: mzs_2009@rediffmail.com

*Dr. (Ms) Mahtab Z. Siddiqui, Principal Scientist (Organic Chemistry), is presently serving in ICAR-Indian Institute of Natural Resins & Gums (Formerly Indian Lac Research Institute) at Ranchi (Jharkhand) India and is engaged on the physico-chemical characterization & protein profiling of natural resins and gums and development of gum-based nano formulations as antibacterial agents since March, 2007. Earlier while serving at ICAR-Indian Veterinary Research Institute, Izatnagar, Bareilly (Uttar Pradesh), India, from July 13, 1987 to March 27, 2007, she had worked on Peptide/protein synthesis, purification & characterization; Hybridoma technology and Salmonella serotyping. She has published **42** research papers in highly reputed International/National Journals, **58** presentations in International/National Symposia/Conferences/Seminars besides **46** popular articles, **11** laboratory manuals, **02** book chapters, **02** technical bulletins and **01** publicity folder. She has been Assistant Editor of Toxicology International from 01.4.2003 to 31.3.2007 besides member in its Advisory Board. She is invited Member of New York Academy of Sciences, New York; Fellow Member of Research Journal of Chemistry & Environment and Life Member of ten Scientific/Technical Societies. She is **Editorial Board Member of 'World Journal of Pharmaceutical Sciences'**, **'Research Journal of Chemistry & Environment'** and **'Krishak Vandana'**----a highly reputed monthly Hindi Magazine on Agriculture & Farming, besides Reviewer of **'Arid Land Research and Management'**, **'Pharmaceutical Biology'**, '**Journal of Essential Oil bearing Plants**' and **'Research Journal of Chemistry & Environment'**. Her name was mentioned in the 'Dictionary of International Biography' and 'Directory of Distinguished Leadership'.*

Resins can be generalized as oxidation products of various essential oils. These are chemically related to the terpenes or the essential oils. Resins are not edible. They are aromatic, flammable and insoluble in water, but soften, when heated, and then melt to a clear stick fluid. These dissolve readily in alcohol, ether, or other solvents. Resins can broadly be classified into three types *i.e.* oleo resins, oleo gum-resins and hard resins.

Oleo resins: These are soft mixtures of resins with volatile oils, with distinct aroma and contain considerable amount of essential oil, usually obtained by incision of the trunk of trees that contain it. The turpentine and the copaiba are natural oleo resins recognized by the United States Pharmacopeia and The National Formulary (USP-NF). As the word 'gum' is often used to identify some resins, the same way word 'balsam' applies to certain oleo resins. A variety of oleo resins are extracted from various plants. Amongst them, the important ones are pine oleo resin obtained from pine trees, dammar oleo resin from *Dipterocarpus spp.*, and copal from *Agathis dammara.* Some oleo resins are high terpene resins from *Pinus* species and Labdanum, Elemi, Copaiba oleo resins etc.

As regards, high terpene resins, amongst the number of *Pinus* species available *viz.* chir pine (*Pinus roxburghii* Sargent), blue pine (*Pinus wallichiana* Jackson), khasi pine (*Pinus keysia* Royle ex Gord), *Pinus gerardiana* Wall (Chilgoza pine), *Pinus armandi* French and *Pinus merkussi* (Sumatra pine), only chir pine is tapped commercially for resin. This resin is one of the most important non-wood forest products. Chir pine forests are found in the provinces of Jammu and Kashmir, Himachal Pradesh, Uttarakhand, Uttar Pradesh, parts of Sikkim, West Bengal and Arunachal Pradesh. It is also known as Himalayan

long needle pine, long leaved Indian pine, Indian chir pine, chir / chil etc. Vernacularly, it is known as Kulhdin, sarol, sirli (Garhwal and Jaunsar); chir (Hindi and Punjabi); and Dhup (Nepali). Earlier used method of French 'cup and lip' for resin-tapping has been replaced by the 'rill' method. *P. roxburghii*, *P. wallichiana* and *P. gerardiana* are found in the Himalayas, whereas *P. kesiya* and *P. merkussi* are indigenous to Assam (India) and Burma. Diverse habitats of chir pine in different geographical regions of Himalayas and Shivalik range supports the existence of natural variation.

Chir pine provides a variety of wide ranged goods and services to human beings. Being a highly valuable tree, in North India, its timber is used for house building, as rafters, poles and posts, shingles, as also packing boxes, boards, railway sleepers, boat building, tea chests, sports articles, bodies of violins, match-sticks and in the manufacture of pulp & paper etc.

Chir pine yields a good quality oleo resin, which on steam distillation generates two industrially important products *i.e.* volatile turpentine oil (~70%) and the remaining transparent solid material called rosin (~17%). The composition of turpentine oil varies considerably according to the species of pine exploited. The turpentine obtained from the resin of all pine trees is antiseptic, diuretic, rubefacient and vermifuge. It is mostly used as a solvent in industries and has medicinal properties as well. It is used as an inhaler for nasal and throat ailments. It is applied on boils, heel-cracks and on either side of the eye to reduce swelling and is efficacious in gleet, gonorrhoea and disorders of the genito-urinary organs. It is also used in the manufacturing of varnishes & lacquers, paints, insecticides, disinfectants and synthesis of fragrant chemicals etc. Rosin, a brittle, faintly aromatic solid, possesses a glassy texture and is used in paper manufacturing, paper sizing, chemicals and pharmaceuticals, synthesis of ester gums, synthetic resins, paints, varnishes, printing inks, soap, rubber, surface coatings, floor coverings, adhesives, sealing waxes, plastics, etc. In color, it varies from pale amber to black. The lighter the color of the rosin, the more valuable it is. Chir pine seeds are rich in fatty oil and the tannin obtained from its bark is suitable for curing leather. The wood is diaphoretic and stimulant. It is useful in treating burning of the body, cough and ulcers. Chir pine has been included in IS: 883-1970: Code of Practice for design of structural timber in building. The world's total annual import / export of rosin is around 330,000 tonnes. China accounts for about one-third of total world production and exports, whereas India has secured sixth position amongst the top ten countries across the world. Approximate 90% of its production is gum rosin. Annual export of rosin from China is around 200,000 tonnes, amounting to 40 to 50% of the world's total trade in rosin. In view of the extensive pine plantations and availability of cheap labor, China is expected to maintain its dominance in rosin trade in the world. There are several problems associated with resin tapping. One of them is un-scientific large scale exploitation of pine trees leading to considerable damage to naturally occurring pine forests.

Elemi (*Canarium luzonicum*, Family: *Burseraceae*), an oleo resin harvested from the tree native of Philippines, is a pale yellow substance with honey-like consistency and on steam distillation gives aromatic oil. It is a fragrant resin with a sharp pine and lemon-like scent. One of its components is called amyrin. Commercially, the resin is used for making varnishes, lacquers and some printing inks. Medicinally, it is used to treat bronchitis, extreme coughing, mature skin, scars, stress, and wounds. The constituents include phellandrene, limonene, elemol, elemicin, terpineol, carvone, and terpinolene.

Labdanum (*Cistus ladanifer*, Family: *Cistaceae*), also known as ladanum, laudanum, ladan or ladanon, is a sticky brown resin obtained from the shrubs *C. ladanifer* (Western Mediterranean) and *C. creticus* (Eastern Mediterranean), species of Rockrose. It has a long history of use in herbal medicine and as a perfume ingredient. Labdanum is much valued in perfumery because of its resemblance to ambergris, which has been banned in many countries because it originates from the sperm whale, an endangered species. Labdanum is the main ingredient for making scent of amber in perfumery. Labdanum's odour is differently described as amber, animalic, sweet, woody, dry musk, or leathery.

Copaiba / Copal (*Copaifera officinalis*, Family: *Fabaceae* or *Caesalpiniaceae*), a stimulant oleo resin, is obtained from the trunk of multiple pinnate-leaved South American leguminous trees (Genus: *Copaifera*). The thick, transparent exudate varies in color from light gold to dark brown, depending on the ratio of resin to essential oil. Copaiba is used in making varnishes and lacquers. The balsam on steam distillation gives copaiba oil, a colorless to light yellow liquid with the characteristic odor of the balsam and an aromatic oil, slightly bitter with pungent taste. The oil primarily consists of sesquiterpene hydrocarbons and its main component is caryophyllene. The hydrocarbons in copaiba are terpenes, which on heating break into methanol and other simple compounds, useful for fuel and as raw materials in chemical industry. Copaiba balsam is used for

treating bronchitis, hemorrhoids, constipation, diarrhea, bladder infections as also other urinary tract infections besides as stimulant. It is also used for manufacturing soaps, cosmetics and perfumes.

Canada balsam (*Abies balsamea*, Family: *Pinaceae)***,** also called Canada turpentine or Balsam of fir, is a viscous yellowish to greenish liquid exuded from the balsam fir of North America. It is a turpentine, an oleo resin and not balsam. Canada balsam solidifies to a transparent mass and is important cement, particularly in microscopy for mounting specimens and for glass in optical work. The firs are distinguished from other genera in the pine family by their leaves. The needle like leaves of a true fir grow directly from the branch, and the needles' bases, which are shaped like suction cups, leave conspicuous circular scars when they fall. In North America, there are 10 native species of fir, mostly found in the Rocky Mountains westward, in the Sierra Nevada and Cascade ranges. There are number of species of fir *viz.* White fir (*A. concolor*), the Noble fir (*A. nobilis*), the California red fir (*A. magnifica*) and the Pacific silver fir (*A. amabilis*), all can attain a height of 60 m (200 feet). With the exception of Noble fir, the wood of most western American firs is inferior to that of pine or spruce but is used for lumber and pulpwood. Of the two fir species that occur in the eastern United States and Canada, the best known is the balsam fir (*A. balsamea*), which is a popular ornamental and Christmas tree. It may be 12 to 18 m (about 40 to 60 feet) tall at maturity, with cones 5 to 10 cm (about 2 to 4 inches) long. Canada balsam, an oleo resin collected from pitch blisters on the balsam fir's bark, is used to mount specimens on glass slides for microscopic examination. The silver fir is abundant in most of the mountain ranges of southern and central Europe, but not in the northern parts of the continent. In Asia, it occurs on the Caucasus and Ural mountains and in some parts of the Altai chain. The tree yields high-quality turpentine from blisters on its bark. Burgundy pitch and other resin products are also obtained from the silver fir.

Dammar represents a group of resins obtained from Indian or East Asian trees belonging to family *Dipterocarpaceae* and *Burseraceae* and genera *Shorea*, *Balanocarpus* or *Hopea*. The principal dammars of India are sal dammar (*Shorea robusta*, Family: *Dipterocarpaceae*), white dammar (*Vateria indica*, Family: *Dipterocarpaceae*) and black dammar (*Canarium strictum*, Family: *Burseraceae*). Locally, these are known by different names *viz*. sal dhuna, lal dhuna, ral, dhup in Hindi and Bengali. Dammars are solid resins, generally less hard and durable than the copals and the color ranges from very pale grades to grey-black. The fossilized form is usually grey-brown. Sal dammar is widely used as an incense and disinfectant fumigant, in the preparation of varnish, inferior quality paints and skin ointments, whereas white dammar is used as substitute for amber in photographer varnish and in medicines. Black dammar which is derived from the bark is utilized for varnish making, bottling wax, and caulking boats.