



Asian Journal of Plant Sciences

ISSN 1682-3974

science
alert

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The Wealth of Kashmir Himalaya-Gymnosperms

A.R. Dar and G.H. Dar
Centre of Plant Taxonomy, Department of Botany,
University of Kashmir, Srinagar-1900 06, Jammu and Kashmir

Abstract: Gymnosperms almost a neglected group of plants in Indian subcontinent especially in Kashmir Himalaya deserves special attention in many respects. Gymnosperm species of the Kashmir Himalaya not only dominate forests-the green gold of the State of Jammu and Kashmir, but are source of diverse economic and medicinal products. The stems, bark, young twigs, leaves, berries, fruits, etc. of gymnosperms are exploited to obtain medicines and other useful products. Many gymnosperm species, such as *Taxus wallichiana*, *Ephedra gerardiana* and some *Juniperus* species if used sustainably can provide chief and effective medicines and at the same time strengthen the States economy. The present study gives a brief account of economic, medicinal and ethno botanical potential of the gymnosperms species of this region. In total 19 species falling in 6 families have been dealt in the present communication. The present study is of paramount importance with respect to bio-prospecting. This effort may serve to awaken the concerned, to be conscious about the wealth we possess and sustainable exploitation of this wealth, which is being at present exploited ruthlessly.

Key words: Gymnosperms, medicines, economy, ethno botanical, Kashmir Himalaya

INTRODUCTION

Of the earth's biological diversity, the plant kingdom is the most essential to human welfare and is extensively exploited for the countless purposes including food, fuel, fibre, construction, tools and medicine. Of these multiple uses, medicinal use is of high significance as plants have been by far the most important source of medicine for humankind throughout our evolutionary history. Medicinal properties may be present in one or all of their parts: root, stem, bark, leaf, flower, fruit or seed. Indeed Phytomedicine are beginning to link traditional (homeopathic) medicine and modern (allopathic) medicine. Currently, the urgency to record biocultural diversity comes from the realization of an impending crisis, of a looming threshold of both biotic and cultural impoverishment.

The wealth of vegetation that adorns the earth shows a vast array of diversity, ranging from microscopic algae to the gigantic *Eucalyptus*. Among these, gymnosperms form an important group of plants by way of their immense ecological and socio-economic value. Although, Hooker (1888), Dhar (1966, 1975, 1978), Javeid (1970, 1979), Singh and Kachroo (1977) and Rashid (2004) have treated taxonomically this group of plants from this region to some extent, but other aspects have altogether been neglected.

Gymnosperms, being the dominant component of our forests, are of diverse economic importance, providing timber, fuel, resins, gum, medicine and many more useful products. Most of the timber used in modern buildings is derived from conifers because of their straight-grain wood and its ease of manipulation. Deodar is the strongest of the Himalayan coniferous woods; the blue-pine is much used in the house construction and light furniture. Notable as a source of pulpwood for paper manufacture are pines, firs and spruces. Conifers are effective windbreakers, especially the evergreen species. They are important for soil erosion control and protection of watersheds. Conifer forests are typical of the Himalaya and provide a cool and soothing environment for recreation and health. Cones of pines and other conifers are sources of food for the wild life, providing nutrient-rich seeds for birds in winter. The wood of Junipers is used as incense, while their fruit is medicinal; spruces and pines are sources of oils, which are used as scent in soap, air freshness and in perfumes. Chilgoza seeds are popular as dry fruits during the winter. Some gymnosperms, especially conifers, are valued as ornamentals in formal gardens and are also used as bonsai.

Despite their immense ecological and socio-economic values, economic and medicinal potential of gymnosperms has met negligence, especially in Kashmir Himalaya. Medicinal plants are already important to the global

economy and it is increasing not only in developing countries but also in the industrialized nations. It is in this backdrop that the present study has been undertaken to workout economic, medicinal and ethno botanical potential of gymnosperms of Kashmir Himalaya.

Study area: The State of Jammu and Kashmir is known for its rich natural environmental heritage. Since Bernier culled the world of Cachemir (in lit.), the paradise of Indies, much has been written about it and botanists have also added to this lore. The Valley of Kashmir is acknowledged as paradise on earth for its diverse rationale. The entire territories of the Kashmir Valley form two distinct topographic divisions, the mountain ranges and the valley proper. Mountains of varying heights (up to 5,420 m at Kolahoi) surround the Valley (1600 m at Srinagar) on all sides. The Valley, securely placed in the bosom of the Himalaya, is an oval plain with a girdle of mountains and lies between 33° 20' and 34° 54' N latitudes and 73° 55' and 75° 35' E longitudes. It extends roughly 187 km in length and about 116 km in breadth along the latitudes of Srinagar. The Vale covers an area 15,948 sq. km. Its long diameter lies northwest, while its southwest lies parallel to the northwest Himalaya. The alpine zone starts from 3,400 m and is followed by a region of perpetual snow.

Geologists such as Lydeker (1883) believe that about 100 million years have elapsed since Kashmir Valley, which was once *Satisar*-a lake, came into present form. On an average, the climate of Valley is sub-Mediterranean with bixeric regimes, having two dry spells in June and September and high precipitation during the cool season. A unique feature of the climate is the four clear-cut seasons (seasonal rhythm): spring, summer, autumn and winter. Spring marks the beginning of regeneration of almost all life due to an increase in daily mean maximum and minimum temperatures, coupled with an increase in day-length. In summer the days are longest, with maximum temperature ranging between 29.5° to 31.2°C and minimum temperature between 18.6° to 20.6°C. Autumn is a relatively dry season, registering an overall decrease in temperature. The winter season experiences short day-length and temperature dropping even below the freezing point. Annual rainfall in the Valley is about 75 cm, with sufficient rain during March and April and also July and August; precipitation in winter is in the form of snow. August is the warmest month when temperature rise to 29.5°C. January is the coldest month. The maximum relative humidity (80%) occurs during November-December and lowest (71%) during May.

MATERIALS AND METHODS

During the course of present study various forest habitats in the Kashmir Valley were explored from March 2002 to April 2004. For collection purposes, heavy duty polythene bags, shears, tags, specimen bottles and field notebook were used. Four or five specimens of each species in a locality were collected in the form of twigs, usually cone bearing ones. The specimens were assigned a specific field number and on spot diagnostic field characters were noted in the field book. In the laboratory, the specimens were arranged in paper folds and pressed. In case of *Abies*, *Picea* and *Cedrus*, where all the leaves (needles) fell down the twigs a few days after direct pressing, the method proposed by Page (1979) proved effective in these cases. The specimens were kept in 70% alcohol for 10 min and then transferred to 50% aqueous glycerol solution for 4 days. After this, the specimens were air-dried for sometime and placed in paper folds to be pressed as usual. The specimens were identified using the available literature on floristic of this region. The identifications were confirmed by matching our specimens with those deposited in the Kashmir University Herbarium (KASH) at the Centre of Plant Taxonomy (COPT).

For ethno botanical uses (wherever available), local elderly and experienced people in nearby habitations were consulted, where as in sub alpine and alpine zones the *Gujjars* and *Backarwalls* were interviewed. The experienced persons were either taken along with to the exploration trips or complete specimens brought, were shown to them. They were asked for their experience about the use of these plants. Also the medicinal uses mentioned in the literature pertaining to the gymnosperms were shared with these people and checked for it being correct. The species have been assigned to their respective families, each family is provided with author citation. Each species is provided with complete author citation, common name, specimens examined, economic and medicinal utility and ethno botanical uses (wherever available).

RESULTS

Pinaceae lindley

1. *Pinus wallichiana*. A.B Jackson in Kew Bull: 85. 1938. Common names: English: Blue-pine; Hindi: *Kail*; Kashmiri: *Kaaur*; Urdu: *Kairo*. Specimens examined: Sonamarg, forests, 2800 m, 10.08.2002, A.R. Dar and G.H. Dar, 08 (KASH); Boniyar, forests, 1550 m, 13.08.2002, A.R. Dar and G.H. Dar, 09 (KASH); Naranag, forests, 1900 m, 15.09.2002, A.R. Dar, 10 (KASH).

Economic and medicinal utility: The timber from blue pine is very useful in buildings, furniture, bridges and viaducts, railway sleepers, street paving blocks, pattern making, toys, carving, box boards, paper pulp, etc. when used in contact with ground, the mould should be treated with creosote or some other preservatives. Blue pine is well known for useful joinery wood which is usually considered to be superior to chir pine wood for most purposes. It is good for cores of Lenin boards, drawing boards and plane-tables.

By tapping, it yields an oleo-resin which by distillation furnishes turpentine and rosin. Using destructive and steam distillation, a number of valuable by-products, such as gases, light and heavy tar oils, turpentine pitch, pyroligneous acids, etc. are obtained. The residue of wood is withdrawn as charcoal. Pine leaf oil, chiefly used for medical purposes, is produced by distillation of leaves. Early in the present century, efforts were made to use leaves by reducing them to fibre which was used for weaving into medicinal underclothing, for the manufacture of coarse matting, resembling coconut matting, for surgical dressings and for stuffing upholstery, mattresses, etc. The water used in the reduction of the leaves to fibre was used for medicinal articles.

Ethno botanical uses: During the recent past, in many rural areas of Kashmir, blue-pine wood pieces were used to obtain a dark-brown, viscous and sticky substance, called *killam*. This substance was traditionally applied by farmers on their arms and legs to protect them from insects (*Khase*) while working in water logged paddy fields. *Killam* would stick firmly, thereby protecting the exposed parts from insect bites (*Khase*), etc. After farming work, it was removed using kerosene oil.

2. *Pinus roxburghii*. Sargent, Silva. N. Amer. 11. 1897. Common names: English name: Chir pine; Hindi: *Dhup*; Kashmiri: *Chaero*. Specimens examined: Botanical Garden, Kashmir University, 1600 m, 10-04-2003, A.R. Dar and G.H. Dar, 12 (KASH); Lalpul (Uri), forests, 1200 m, 14-04-2003, A.R. Dar and G.H. Dar, 13 (KASH); Shankaracharya, hill slopes, 1650 m, 22-05-2003, A.R. Dar, 52 (KASH).

Economic and medicinal utility: The timber is moderately hard and of fairly good quality, but inferior to that of *P. wallichiana*. In some places, it is badly twisted and particularly valueless, for it can not even be split for firewood. The best wood is used for building purposes, general carpentry, box boards, etc. If treated with preservative, it can be utilized as sleepers. A good deal of wood is made into charcoal. The thick, soft bark is of

value for tanning. Apart from its value as timber tree, *Pinus roxburghii* is of considerable commercial importance for it is the principal resin-bearing pine of East. The quality of the resin is not quite so high as that of *P. wallichiana*, *P. khasya* and *P. armandii*, but yield is greater and, as the trees are more accessible, it is the only species that is systematically tapped. A sample of the charred leaves of this pine is preserved in the museum at Kew, with the information that they are used in that state as a dye.

Ethno botanical uses-not known

3. *Pinus halepensis*. Miller, Gard. Dict. Ed. 8: 8. 1768. Specimens examined: Shankaracharya, hill slopes, 1650 m, 22-05-2003, A.R. Dar and G.H. Dar, 51 (KASH); Gulmarg, 2800 m, Manju Kapoor (KASH).

Economic and medicinal utility: Wood is of poor quality, coarse-grained and resinous. The timber is used for inferior kinds of carpentry and joinery work, boxes, crates, mine-props, sleepers and telegraph poles; wood also used as fuel and charcoal. Resin is of good quality, but does not appear to run so freely and the absence of this species in forests makes it a less profitable species. The bark has been used for tanning. It is highly resistant and is valuable for hot and dry regions. The trees have been planted in many places to check soil erosion and as a wind break.

Ethno botanical uses-not known

4. *Picea smithiana*. (Wall.) Boiss. Fl. or 5: 700. 1881. Common names: English: Spruce, West Himalayan spruce; Kashmiri: *Kachul*. Specimens examined: Gulmarg, forests, 2800 m, 15.05.2002, A.R. Dar and G.H. Dar, 20 (KASH); Naranag, forests, 1900 m, 15.09.2002, A.R. Dar, 21 (KASH); Akhal, forests, 2250 m, 25.10.2002, A.R. Dar, 22 (KASH).

Economic and medicinal utility: Largest use of spruce is for pulpwood. Wood is rated as slightly or non-resistant to preservative treatment. It is used for framing material, general millwork, boxes and crates and piano sounding boards.

Ethno botanical uses-not known

5. *Cedrus deodara*. (Roxb. ex. Lamb.) G. Don in London. Hort. Brit. 388. 1830. Common names: English: Himalayan Cedar; Kashmiri: *Deodor*; Urdu: *Deodar*. Specimens examined: Fourbay (Ganderbal), forest slopes, 1800 m, 02.04.2002, A.R. Dar, 14 (KASH); Chandanwari (Uri), forest slopes, 1500 m, 13.08.2002, A.R. Dar, 17 (KASH).

Economic and medicinal utility: Deodar is the most important tree in the Western Himalaya. It is the strongest of the Indian coniferous woods and, weight for weight, about as strong as teak. Due to the presence of oil, seasoned heartwood is durable and is rarely attacked by white ants and fungi. It is one of the most valuable Indian timbers and is in great demand. Large quantities of the timber are floated down the rivers from the Himalaya to the plains. It is available mostly in sleepers, though logs, scantlings and sleepers of other sizes are obtainable from timber depots. The primary use of deodar is for railway sleepers, the average life of untreated sleepers being 15 years. It is an important constructional timber and is extensively employed for beams, floor boards, posts, door and window frames, shingles etc. It is also used for bridge construction, wagon building, furniture, packing cases, brush backs, carriages and several other purposes. It is suitable for pattern making, poles for carrying high tension lines and battery separators. It is considered suitable for second grade pencils. The wood of deodar on steam distillation yields reddish-brown oil with a characteristic balsamic odour. The oil may find a limited use as a substitute for cedar wood oil in soap, perfumery, but the oil appears to be too expensive. In the west, it is widely used as an ornamental in Europe and in the Western USA.

Ethno botanical uses: In some tribal areas of Kashmir, the deodar wood is broken into small pieces and boiled till an oil fluid is obtained. This fluid is quite helpful in protecting cattle from lice, mosquito and other insects when applied on their body.

In Himalayan region of Uttar Pradesh, *Cedrus deodara* is considered sacred and plays an important role in religious ceremonies. The slices of its wood are burned with butter and other plants after chanting the "mantaras" on the occasions of births, marriages, deaths and other occasions. This ceremony is called 'hawam'. The bright yellow pollen grains are used for brightening metallic idols and as a *pitham*, a small mark over the forehead on certain religious occasions.

6. *Abies spectabilis* (D.Don) Spach. Hist. Nat. Veg. Phan. 2: 422. 1842. Common names: English: Web fir, upper Himalayan fir; Hindi: *Bang*; Kashmiri: *Reia Budul*; common name; *Palunder*. Specimens examined: Dachigam (Kashmir), 2700 m, 5.06.71, G. Singh, 4416 (KASH).

Economic and medicinal utility: Wood is exploited for lumber, plywood, framing, sheathing, sub flooring, concrete forms, decking, planking, beams, posts, sliding,

paneling, millwork, prefabricated buildings and structural members, industrial crating and shook, furniture parts, fresh fruit and vegetable containers.

Ethno botanical uses-not known

7. *Abies pindrow* Royle III. Bot. Himal. T. 86, pp. 350-51. 1839. Common names: English: West Himalayan low level fir; Kashmiri: *Budul*; Urdu: *Budlu*; common name: *Palunder*. Specimens examined: Thajwas, forest slopes, 2900 m, 8.09.2002, A.R. Dar and G.H. Dar, 23 (KASH); Naranag, forests, 1900 m, 15.09.2002, A.R. Dar, 24 (KASH); Prang, forests, 1950 m, 18.06.1993, G.H. Dar, 3630 (KASH).

Economic and medicinal utility: Wood is soft, easily worked, finishing with a good surface, taking paint and polish well and suitable for indoor joinery for indoor finish of houses, the commoner kind of joinery, pit props, scaffolds poles, matchwood, paper pulp etc. It is moderately shock resistant and nail withdrawal resistant. Ethno botanical uses-not known

Taxodiaceae Warming

1. *Cryptomeria japonica* D. Don in Trans. Linn. Soc. London 18.167t13.f.I 1841. Common names: English: Japanese Cedar. Specimens examined: Kashmir University Botanical Garden, 1600 m, 10.04.2002, A.R. Dar, 34 (KASK); Botanical Garden (University of Kashmir), 1600 m, 1979, *AR Naqshi* and G.N. Dar, 6808 (KASH).

Economic and medicinal utility: The timber is extensively used in Japan for staves, tubes, casks and for building and furniture. The Darjeeling wood is inferior to that of Japan. It is, however, easy to saw and plane and can be used for making cheap toys, light packing cases and partitions. It is not suitable for packing or for plywood. With suitable, chemical treatment, bottle corks and crown liners can be made from it. Preliminary investigations have shown that it is satisfactory material for paper pulp. It is also used for tea boxes.

Ethno botanical uses-not known

2. *Sequoiadendron giganteum* Buchholz in Am. Journ. Bot. 1939, xxxvi. 536. Specimens examined: Tangmarg (Gulmarg), drug farm, 2154 m, July 1975, G.L. Dhar, (KASH).

Economic and medicinal utility: The timber is not durable and is used variously in Britain, it has been introduced as

an ornamental and avenue tree, the timber is produced quickly.

Ethno botanical uses-not known

Cupressaceae Bartlett

1. *Cupressus torulosa* D.Don. Prodr. Fp. Nep. 55. 1825. Common names: English: Himalayan Cypress. Specimen examined: Beehama (Ganderbal), forest slopes, 1800 m, 15.06.2002, A.R. Dar and G.H. Dar, 41 (KASH); Botanical garden (Kashmir University), 1600 m, 13.03.2003, A.R. Dar, 42 (KASH).

Economic and medicinal utility: The wood is hard, close-grained, even in texture, pale yellow with light-brown heartwood. It is regarded equal to deodar for sleepers and good building wood and often used in the Himalaya for temples, images and poles for carrying the sacred arks. It can be sawn, planed and machined with ease and has the advantage over deodar in that it does not exude any oil and can therefore be painted and polished. It is a timber of first class and is in great demand for building purposes, preferable to deodar for internal work, such as window frames, ceilings, panels of doors. Next to deodar, after treatment it is the best timber for pencil making and is also suitable for battery separators.

Ethno botanical uses-not known

2. *Cupressus cashmeriana* Royle ex Carriere Trait Gen. Conif. Ed. 2: 161. 1867. Specimens examined: Beehama (Ganderbal), forest slopes, 1800, 15.06.2002, A.R. Dar, 36 (KASH); Rangil master plan, rocky slopes, 1850 m 15.06.2002, A.R. Dar, 37 (KASH); Kashmir University Campus, 1600 m, 6.03.2003, A.R. Dar and G.H. Dar, 38 (KASH).

Economic and medicinal utility: It is very graceful tree, worthy of introduction in parks and gardens and as an avenue tree.

Ethno botanical uses-not known

3. *Cupressus sempervirens* Linn. Sp. Pl. 1002. 1753. Common names: English: Mediterranean Cypress. Specimens examined: Rangil master plan, rocky slopes, 1850 m, 15.06.2002, A.R. Dar, 29 (KASH); Kashmir University Campus, 1600 m, 16.03.2003, A.R. Dar and G.H. Dar, 23 (KASH).

Economic and medicinal utility: Wood close-grained, fragrant, easily worked, very durable. It has long been used for building purposes and for furniture. In South Europe, particularly, Italy, it has been much used for

family cloth chests, the fragrant wood being obnoxious to insects and said to keep moths away from clothes. It is sometime, however, attacked by larvae of boring beetles. An essential oil is obtained from shoots and leaves. Both the columnar type and the pyramidal variety form excellent garden and park trees for places where the climatic conditions are suitable.

In some places they are used for hedges with excellent results if not closely clipped with shears. The eastern Mediterranean Island of Cyprus is believed to have derived its name from extensive forests of *C. sempervirens*, which once existed there. These forests are said to have been deterrent to the development of agriculture, until copper was discovered on Island. Then the forests were cut for fuel to smelt copper.

Ethno botanical uses-not known

1. *Juniperus communis* Linn. Sp. Pl. 1040. 1753. Common names: Common: *Common Juniper* or *ground Juniper*; Kashmiri: *Yathur, Vaitro*; Pakistan: *Bhentri*. Specimens examined: Fourbay (Ganderbal), forest slopes, 1800 m, 02.04.2002, A.R. Dar and G.H. Dar, 30 (KASH); Sonamarg, open slopes, 2800 m, 10.08.2002, A.R. Dar, 31 (KASH); Khilanmarg (Gulmarg), open slopes, 3000 m, 4.10.1980, U. Dhar, 207 (KASH); Sangam, open slopes, 3600 m, 2.09.1982, U. Dhar, 1093 (KASH).

Economic and medicinal utility: The wood of common juniper is fine-grained, durable and reddish with white sapwood; currently it is of no commercial value. Common juniper female cones are beneficial in treating infections, especially within the urinary tract, bladder, kidneys and prostate. Their antiseptic properties help remove waste and acidic toxins from the body, stimulating a fighting action against bacterial and yeast infection. Juniper berries also help increase the flow of digestive fluids, improving digestion and eliminating gas and stomach cramping. As a diuretic, juniper berries eliminate excess water retention, contributing to weight loss. Juniper berries have anti-inflammatory properties which are ideal for relieving pain and inflammation related to rheumatism and arthritis. In addition Juniper berries are beneficial in reducing congestion as well as treating asthma and colds. Juniper berries make an excellent antiseptic in condition such as cystitis. But the essential oil present in this is quite stimulating to kidney nephrons and so juniper should be avoided by those suffering from kidney disease. Although the mature female cones of this species are quite often used medicinally and for flavoring in various foods and drinks, large doses of it can cause renal damage. It should not be used internally in any quantities by pregnant woman.

Ethno botanical uses: The twigs and leaves are used as incense. A decoction of the branches is used as an anti-dandruff shampoo. It yields the resin “Sandarac” used in the protection of white varnish. The stems were at one time used as strewing herb. The whole plant can be burnt as an incense and fumigant. It makes a good insect repellent. The bark is used as cordage and as tinder. Many forms of this species are good ground cover plants for sunny situations.

Wild ungulates eat only trace amounts of common juniper. Deer and mountain goats browse common juniper to at least a limited extent in some areas. Domestic livestock rarely utilize common juniper. The foliage may be poisonous to domestic goats, although livestock in parts of Europe have reportedly been fed spray of common juniper with no ill effects.

2. *Juniperus semiglobosa*. Regel. Trudy Imp. S-peterburgsk. Bot. Sada. 6(2): 487-488. 1879. Common names: English: Common pencil Juniper or cedar; West Himalaya: *shir, challai, Dhup*. Specimens examined: Chitragul, forest slopes, 1900 m, 25.05.2002, A.R. Dar and G.H. Dar, 26 (KASH); Sonamarg, forest slopes, 2800 m, 10.08.2002, A.R. Dar, 27 (KASH); Gagangir, open slopes, 2200 m, 20.08.2002, A.R. Dar, 28 (KASH).

Economic and medicinal utility: The wood is hard and fragrant, used for furniture, fuel and charcoal. It was once used in Punjab for making pencils. The female cone is medicinal.

Ethno botanical uses: Burnt as incense in monasteries as its foliage

3. *Juniperus squamata*. Buch-Han ex. D. Don in Lambert, Genus *Pinus*, II: 17. 1824. Common names: English: Single seeded Juniper or Scaly-leaved Juniper; Kashmiri: *Yathu, Vaitro*. Specimens examined: Apharwat, mountain slopes, 3700 m, 22.06.2002, A.R. Dar, 32 (KASH); Sonamarg, forest slopes, 2800 m, 10.08.2002, A.R. Dar, 33 (KASH); Razdani, open slopes, 22.07.1981, *Dhar, Yousuf, Gupta*, 548 (KASH).

Economic and medicinal utility: The wood is used for fuel, especially in alpiners where no other arboreal grow. Female cone is medicinal.

Ethno botanical uses: Burnt as incense in monasteries as its foliage.

Taxaceae Gray

1. *Taxus wallichiana* Zucc. In Abhandl. Bayer. Acad. Classe. Math. Phys. 3: 805. t. 5. 1843. Common names: English: Himalayan yew; Kashmiri: *Pastul*. Specimens examined: Chitragul, forest slopes, 1900 m, 25.05.2002, A.R. Dar, 44 (KASH); Limber (Uri), forest slopes, 24.06.2002, Zahid A.Dar, 45 (KASH); Gulamrg, forest slopes, 2800 m, 4.11.2002, A.R. Dar, 46 (KASH).

Economic and medicinal utility: Originally the pacific yew (*Taxus brevifolia*) from the north-west United States has entered the halls of fame, because research into its chemistry resulted in the discovery of now well known anti-cancer drug, taxol. High demand, combined with low yield from such a slow-growing tree, could easily result in the declination of the species. Clearly alternatives had to be found. It was discovered that taxol could be semi-synthesized from chemical precursors found in twigs and needles of European yew, *Taxus baccata*, which is taxonomically very close to the Himalayan yew (Phillip and Dinyer, 1998). The harvesting of twigs and leaves is much easier and less destructive than that of bark. Excessive use of the European yew (*Taxus baccata*) has cleared some pastures of the pacific yew and it has also taken a toll on *Taxus wallichiana* along the Himalayas.

Taxus wallichiana has gained importance in medicinal use, both in Ayurvedic and Tibetan medicine. In the latter it is used to treat fever and relieve muscular pain (Schippmann, 2001).

Ethno botanical uses: The wood is elastic, so is used in making bows and arrows and also burnt as incense. The timber is excellent and resistant to decay. The leaves are poisonous under certain conditions, but in hills it is extensively lopped for cattle fodder. Young branches are used as fodder in Pakistan (Nasir *et al.*, 1969). The foliage and seeds are toxic. The aril (but not the poisonous seed) is eaten.

2. *Taxus baccata* Linn. Sp. Pl. 1040. 1753. Common names: Common name: European yew; English: *yew*; Kashmiri: *Birmi*; Western Himalaya: *Thunner*. Specimens examined: Botanical garden (Kashmir University), 1600 m, 10.05.2003, A.R. Dar, 43 (KASH).

Economic and medicinal utility: The wood is heavy, hard, durable, elastic, takes a good polish but requires long seasoning. Highly esteemed by cabinet makers, it is also used for bows, tool handles etc. The bark is very soft and branches or even the whole tree can be killed if bark is removed by constant friction, such as children climbing the tree. The fruit is greatly relished by thrushes.

A very easy plant to grow, it is extremely tolerant of cold and heat, sunny and shady situations, wet and dry soils, exposure and any pH. Thrives in almost all soils, acidic or alkaline, as long as it is well-drained. Sensitive to soil compaction by roads. Very shade and urban pollution tolerant.

Modern research has shown that plants contain the substance Taxol in their shoots. Taxol has shown exciting potential as an anti-cancer drug, particularly the ovarian cancer. Unfortunately the concentration of Taxol in this species is too low to be of much value commercially, though it is used for research purposes (Duke, 1992). All parts of the plant, except the fleshy fruit, are antispasmodic, cardiotoxic, diaphoretic, emmingogue, expectorant, narcotic and purgative (Duke, 1992). The leaves have been used internally in the treatment of asthma, bronchitis, hicough, indigestion, rheumatism and epilepsy. Externally the leaves have been used as a steam bath in the treatment of rheumatism. A decoction of leaves is used as an insecticide. A homeopathic remedy is made from the young shoots and fruits. It is used in the treatment of many diseases, including cystitis, eruptions, headache, heart and kidney problems, rheumatism etc. (Duke, 1992).

Ethno botanical uses: All plant parts, except the fleshy covering of female cone are highly poisonous. Fruit (raw) very sweet and gelatinous, most people find it delicious though some find it sticky. A number of people who like the flavor do not like the texture which is often described as Snotty. This plant provides food and shelter for wildlife. It makes a good firewood and is also burnt as an incense.

Ephedraceae Dumortier: *Ephedra gerardiana* Wall. ex Stapf. I.C. 75 emand Florin, Kungl. Sv. Vetensk. Handl. Ser. 3, 12 (1): 21, 1933. Common name: Chinese: *Tse*; Himalayas: *Somlata*; Kashmiri: *Asmani bhuti*. Specimens examined: Noorkhah (Uri), sedimentary rock cervices, 1450 m, 1.08.2002, A.R. Dar, 50 (KASH); Noorkhah (Uri), sedimentary rock cervices, 1450 m, 16.06.2002, Z.S. Khan, 175 (KASH).

Economic and medicinal utility: Wood is very close-grained, too little for commercial exploitation, though it is used locally as fuel. It is good ground-cover plant for dry soils. It is browsed by goats.

Ephedra gerardiana is one of the "ephedrine" containing ephedras and has been used in Chinese and middle-eastern medicine the same way as *E. sinica*. It has been much used for treating allergy, asthma, cold and rheumatism (Yeung, 1985). Infusion prevented low blood

pressure in flu and pneumonia. Its use was widespread as a quick fix for colds and flu, as a stay-alert for truck drivers and shift workers and in excessive amounts as a stimulant in recreational drug use. The use of pseudoephedrine in cold remedies is regarded as safer, as it has lesser effect on blood pressure, the main health concern with ephedrine and pseudoephedrine. The total crude alkaloid extract of *Ephedra* (containing ephedrine and pseudoephedrine) has been shown to be more effective in treating cold and flu symptoms than the equivalent in combination of synthetic ephedrine and pseudoephedrine. Ephedrine is a 'TGA-Schedule 9' (same as heroin) drug in Australia and *Ephedra* plant is also scheduled. It is also a customs prohibited import. Many countries are scheduling ephedrine and *Ephedra* products, but many find their new laws challenged, ending in confusing legal mess.

Ephedra gerardiana is a highly yielding source of ephedrine, which virtually gives Pakistan a monopoly for the naturally produced drug (McEvoy, 1996). The ephedrine is extracted from the green branches and possesses the same properties as ephedrine from *E. sinica*, but with higher total alkaloid content from 1.0-2.5% (below 1.0% for *E. sinica*).

Ephedrine acts like adrenaline, but is orally active. *Ephedra* plant vary greatly in quality of drug, as the drying process is difficult and can eliminate almost all the ephedrine from the final product before it reaches market. The ephedrine is destroyed by heat, so drying is usually done at ambient temperature, in the dark at low humidity and may take several weeks. Alkaloid level in the plant also varies greatly and is the lowest after rain. Decoction of the stem and roots is used to cure rheumatism and syphilis in Russia (Reynolds, 1989).

Ethno botanical uses: Fruits are very sweet and edible. The juice of its berries is used to cure respiratory infection.

Ginkgoaceae Engler: *Ginkgo biloba* Linn. Mant. Pl. 2: 313. 1771. Common names: English: Maiden hair tree; Vernacular name: *Silver-fruit*; Chinese: *Yin-kuo*. Specimens examined: Lalmandi (Srinagar), Floriculture park, 1600 m, R.A. Qazi, (KASH); Lalmandi (Srinagar), 1600 m, M.Y. Baba and N.A. Dar, 541 (KASH); Botanical garden (Chesma Shahi), 1700 m, 15.08.2003, A.R. Dar, 52 (KASH).

Economic and medicinal utility: *Ginkgo* wood is light, brittle and yellowish; of little value owing to the paucity of supply. It is said to be used in China and Japan for class boards, chess boards, chopping blocks and for

firewood. Medicinal use of *Ginkgo biloba* can be traced back almost 5,000 years in Chinese herbal medicine. The female cones of *Ginkgo* were most commonly recommended to treat respiratory ailments. A tea of leaves was occasionally used for elderly persons experiencing memory loss (Le Bars *et al.*, 1997).

In traditional Chinese medicine, *Ginkgo biloba* is commonly used to relieve asthma and to reduce the frequency and problems associated with urination. The leaf extract is one of the most popular plant extract used in Europe to alleviate symptoms associated with cognitive disorders. Its main effect seems to be due to its anti-oxidant properties (Diamond *et al.*, 2000).

In Europe these extracts are used for the treatment of cerebrovascular and peripheral circulatory problems of the elderly. Endema, a frequent reaction of brain tissue to injury by toxic, traumatic, ischemic or other factors is completely prevented by administration of *Ginkgo* extract (Kleijnen Knipschild, 1972). Further this extract is used in memory loss associated with aging, early stages of Alzheimer's disease, poor circulation, erectile dysfunction (impotence) due to arterial insufficiency, long-term therapy in stroke victims, tinnitus, hearing loss, high flavonoid content is effective in treating asthma (Ernst Stevenson, 1999). *Ginkgo biloba* extract is essentially devoid of any serious side effects. Mild headaches lasting for a day or two and mild upset stomach has been reported in a very small percentage of people using *Ginkgo biloba* extract. This extract is prohibited for pregnant and lactating women.

Ethno botanical uses: The seeds are a regular article of commerce in Chinese and Japanese towns. They are eaten roasted at feasts and are credited with prompting digestion and diminishing the effect of drinking wine.

DISCUSSION

The gymnosperm species dominating the forests of the Kashmir Himalaya, are of immense socio-economic importance, but have not yet been utilized to best of their potential. Some species namely, *Pinus wallichiana*, *Cedrus deodara*, *Abies pindrow* and *Abies spectabilis* etc. form the most important sources of the timber for construction purposes and hence forming the backbone of the timber industry-the mainstay of the States economy. The other aspects of the gymnosperm species such as medicinal, ethno botanical and economical have great potential and market demand. Some species such *Taxus wallichiana* which has got promising potential to be capable source of anticancer drug- taxol, need to be given special attention and protection. But, instead the

already limited numbers of individuals of this species with restricted distribution are diminishing day by day due to one or the other reasons. Similarly the medicinal properties of the berries of *Juniperus communis* and other species can be of great potential, especially when our sub alpine and alpine landscapes are exclusively dominated by the shrubs of these species. Same is the case with *Ephedra gerardiana* which needs to be addressed immediately as it is an important source of ephedrine and pseudoephedrine. *Ginkgo biloba* a diverse and chief source of medicine is just cultivated to beautify some gardens and parks. It can be used for large scale cultivation (as in Germany) to serve multiset of purposes with thrust on medicinal potential. Most of the landscape of the Kashmir Valley is covered with dense gymnosperm forest forming the green gold of the State of Jammu Kashmir. They not only themselves serve mankind by providing valuable byproducts, but produce conducive conditions for very rich and diverse understudy herbal flora, of potential economic, ethnobotanical and medicinal importance. Unfortunately knowingly or unknowingly these gymnospermous forests appear dense and charming, only from outside, as they have been slaughtered from within indiscriminately. This situation if not curbed will surely lead to depletion of not only the priceless gymnosperms, but also the worthy herbal flora. So it is the need of the hour to protect these forests and make them flourish as a sustainable industry.

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