IJBPAS, March, 2014, 3(3): 462-489

ISSN: 2277–4998

International Journal of Biology, Pharmacy and Allied Sciences (IJBPAS)

'A Bridge Between Laboratory and Reader'

www.ijbpas.com

PHYTOCHEMICAL INVESTIGATION AND USES OF SOME OF THE MEDICINAL PLANTS OF KASHMIR HIMALAYA -A REVIEW

MUDASIR A. SHEIKH

Department of Botany, University of Kashmir, Srinagar, J&K, India

***Corresponding Author: E Mail: mudasir_ssm@yahoo.com**

ABSTRACT

The valley of Kashmir, also called the bio-mass state of India is very rich in aromatic and medicinal plants. More than 50% of plant species described in the British pharmacopoeia are reported to grow in Kashmir valley and it is established that nearly 570 plant species are of medicinal importance. Natural products utilized in the correct form and dosages are less harmful than synthetic products. The use of these herbal remedies is not only cost effective but also safe and almost free from serious side effects. Modern pharmacotherapy has included a range of drugs of plant origin, known by ancient civilizations and used throughout the millennia. The increasing consumer preference for natural products over their synthetic counterparts is quite evident, so there is a growing demand for analysing unsurveyed plant species. This review article is an attempt to shade a small beam of light on the profiles of some medicinal plants which emphasizes on the need of extensive study for reporting the additional information on the medicinal importance of other unattended species of Kashmir Himalaya.

Keywords: Herbal medicine, GC analysis, Pharmacognosy, Kashmir Himalaya.

INTRODUCTION

Kashmir Himalaya is bestowed with diverse habitats which support a rich floristic wealth that has been used as a resource-base by its people since times immemorial and has also attracted people of different fields from distant places. The application of plants as medicines dates back to prehistoric period. In India the references to the curative properties of some herbs in the Rig-Veda seems to be the earliest records of the use of plants in medicines. Plants are more potent healers because they promote the repair mechanisms in the natural way **(Chitra *et al.*, 2009)**. Plants provide the predominant ingredients of medicines in most medical

traditions. Plant based therapy accelerate the healing process **(Galal *et al.*, 1965)**. These plant products are used as first aid, as antiseptic coagulants and in wound wash **(Kumar *et al.*, 2007)**. More than 13,000 plants have been studied during the last five year period **(Biswas *et al.*, 2003)**. There are no reliable figures for the total number of medicinal plants on earth, and the number and percentages of countries and regions vary greatly **(Schippmann *et al.*, 2002)**. Estimates for the number of the species used medicinally include 35000-70,000 worldwide **(Schippmann *et al.*, 2002)** and 7500 species in India **(Shiva 1996)**.

Thus medicinal and aromatic plants are valued for their biological activities which can be justified by the fact that about 80% of the local population still depend on these plants for primary health care. The formation and accumulation of essential oil in plants have been reviewed by many workers **(Guenther, 1972; Corteau, 1986; Fischer, 1991)**. The compounds from the plant based essential oil are useful as an alternative therapy, either directly or as models for new synthetic products (Houghton, 2000). In India, the collection and processing of medicinal plants and plant products contributes a major part each year to the national economy **(Holley *et al.*, 1998)**. Phytochemical constitution and pharmacological uses of some of the medicinal plants of Kashmir Himalaya are highlighted here:

1. ***Origanum vulgare (L.)* (Lamiaceae)**

   Origanum vulgare (L.) is a medicinal, perennial plant, locally known as Jungli Tulsi or Oregano or Himalayan marjoram. This is the only species of genus *Origanum* which is found in India. It is found in the temperate Himalayas from Kashmir to Sikkim at an altitude of 1500-3600m AMSL. **Vokou *et al.*, 1993; Kokkini *et al.*, 1997; D'antuonu *et al.*, 2000; Skoula, 2002**, reported carvacrol and thymol as dominant components of its essential oil. Andreas *et al.*, 2013 found carvacrol as the dominant component in the essential oil of *O. vulgare* ssp. hirtum. **Lagouri *et al.*, 1993; Aeschbach *et al.*, 1994; Yanishlieva *et al.*, 1999**, have revealed that the antioxidant effect of this plant is because of carvacrol and thymol. **Mastelic *et al.*, 2008** reported its antimicrobial and antioxidant properties and in addition revealed carvacrol's antiproliferative activity on tumor cells of Hela. Essential oil of this plant possesses a variety of biological activities viz. antiradical

(Cervato *et al.*, 2000; Ahmad *et al.*, 2010a; 2010b; 2011a; 2011b), antifungal **(Farag *et al.*, 1989; Sahin *et al.*, 2004; Cleff *et al.*, 2010)**, anti-hyperglycaemic **(Lemhadri *et al.*, 2004)**, **antibacterial (Dorman and Deans, 2000; Harpaz *et al.*, 2003; Burt and Reinders, 2003; Burt, 2004)**, antithrombin **(Goun *et al.*, 2002)**. Antioxidant **(Lagoun and Boskou, 1996; Nakatani, 2000; Vichi *et al.*, 2001; Stashenko *et al.*, 2002)** function of this species could become helpful agent in treatment of cancer, heart diseases and high blood pressure. **Cervato *et al.*, 2000** reported that antioxidant activities of *Origanum vulgare* leaves can inhibit all places of lipid peroxidative processes.

2. ***Artemisia annua (L.)* (Asteraceae)**

Artemisia annua (L.), also known as annual or sweet wormwood, or sweet Annie, is an annual herb native to Asia. It has been used for the treatment of fever and malaria since ancient times **(Chaturvedi *et al.*, 2010)**. The main active constituent in *Artemisia annua* is a sesquiterpenoid known as artemisinic acid which is very effective against *Plasmodium falciparum, Plasmodium vivax* and also drug resistant parasites. **Meshnick, 2002** reported that Artemisinin has no toxicity if taken in recommended doses for short periods in the treatment of malaria. *A. annua* leaves **(Zheng and Wang, 2001)** and crude extracts have been reported to be a good source of antioxidants **(Cai *et al.*, 2004)**. It is among the four medicinal plants with the highest ORAC (oxygen radical absorbance capacity) level **(Zheng and Wang, 2001)**. This high antioxidant capacity is probably due to the high content **(Bilia *et al.*, 2006)** and diversity of its leaf flavonoids, including the newly-reported C-glycosyl flavonoids as a possible component of the antioxidant and antiviral activity **(Han *et al.*, 2008)**. Recently, there was also report about anti-Hepatitis B Virus activity of artemisinin **(Koo *et al.*, 2000)**. Scopoletin, a coumarin isolated from *A. annua* has been reported to possess anti-inflammatory activity **(Huang *et al.*, 1993)**. **Jutea *et al.*, 2002** has found that its essential oil contains camphor, germacrene D, transpinocarveol, beta selinene and beta caryophyllene. In addition

artemisia ketone (3%) and other twenty substances of which the content is less than 1% have also been reported by them. Many secondary metabolites of terpene peroxides have also been isolated from *Artemisia annua L.* such as artemisia ketone, artemisinic alcohol, arteannuin B and myrcene hydroperoxide **(Bertea *et al.*, 2005; Ma *et al.*, 2007)**. An ointment made with *Artemisia* oil is most effective to cure experimental ringworm infections of guinea pigs within 7 to 12 days **(Kishore *et al.*, 1993)**.

3. ***Lavendula officinalis Chaix syn. Lavendula angustifolia Mill.* (Lamiaceae)**

Lavendula officinalis is commonly known as lavender or English lavender and is native to the mountainous zones of the Mediterranean. Lavender growing in the highlands of Kashmir is cherished and keenly sought for perfumery, skincare and hair care. The plant was introduced in Kashmir in 1983 and its cultivation and processing of essential oil and dried flowers was quite successful **(Tajjudin *et al.*, 1983)**. Lavender is popular for its colourful flowers and its fragrance. Essential oils and plant extracts derived from the genus *Lavendula* have been used therapeutically for centuries and there are some reports on the biological activities of its essential oil **(Cavanagh *et al.*, 2002; Moon *et al.* 2006)**. It promotes calmness, reduces inflammation, fights infection and promotes skin healing. Since ancient times lavender oil is traditionally believed to be antibacterial, antifungal, antimicrobial, antidepressive, carminative and an excellent remedy for insect bites and burns **(Grieve, 1931; Gattefosse, 1937)**. Lavender oil helps in wound healing, reduces pain and supports healthy tissue growth and is used in the relief of headaches especially migraine, fainting and dizziness. Linalool and linalylacetate are the two major important constituents of the essential oil of *Lavendula officinalis* **(Barazandeh, 2002)**. The U.S. National Institute of Health (NIH) states that lavender is considered safe in carefully regulated doses for both food and medicinal purposes. Lavender oil distilled from the flowering spikes is used in high grade perfumes and cosmetics. Lavender oil is famous

for creating perfumes for men **(Shawl and Kumar, 2000)**. The continuing popularity and commercial value of lavender was recently confirmed when it was named 'Herb of the year' 1999 by the Herb Growing and Marketing Network in USA **(Anonymous, 1999)**. During the World War I, the essential oil of lavender was used as disinfectant in hospitals.

4. ***Viola odorata*** **(L.) (Violaceae)**

Viola odorata (*L.*) is a species of the genus *Viola* native to Europe and Asia, but has also been introduced to North Africa. It is distributed in Kashmir and western Himalayan regions at an altitude of 1500-1800 m AMSL. It is commonly known as sweet violet, English violet, common violet, or garden violet. The essential oil of *V. odorata* L. flowers contains high percentages of monoterepenes and sesquiterpene. The dominant constituents are 1-phenyl butanone, linalool, benzyl alcohol, α-cadinol, globulol and viridiflorol. Pulegone, epi-α-cadinol, terpinen-4-ol, germacrene A and paramethyl anisole were also found to be minor components of the *V. odorata* L. flower oil **(Ines *et al.*, 2011)**. *Viola odorata* contains alkaloids, glycosides, saponins, methyl salicylate, mucilage and vitamin C **(Stuart, 1989)**. The syrup made from the leaves and flowers of *Viola* is used as an alternative medicine mainly for respiratory ailments associated with congestion, coughing and sore throat **(Singh *et al.*, 1983)**. The sweet scent of this flower has proved popular throughout the generations and has consequently been used in the production of many cosmetic fragrances and perfumes **(Perfume and Flavor Materials of Natural Origin, 1961)**. A decoction made from the root (dry herb) is used as a laxative. The plant has been reported to possess antioxidant **(Ebrahimzadeh *et al.*, 2010)** and diuretic **(Vishal *et al.*, 2009)** properties as well. Tea made from the entire plant is used to treat digestive disorders and new research has detected the presence of a glycoside of salicylic acid (natural aspirin) which substantiates its use for centuries as a medicinal remedy for headache, body pains, as a sedative and in migraine (Phillips, Natural herbs). It is used for treatment of whooping cough. Its drug is also anti-inflammatory,

diaphoretic, diuretic, emollient, expectorant, antipyretic and laxative **(Chatterjee and Pakrash, 1991; Kaul, 1997)**. The roots of the plant yield an alkaloid violin which is used as an expectorant.

5. ***Allium cepa (L.*) (Liliaceae)**

Allium cepa (*L.*) is a member of the Liliaceae family which consists of over 250 genera and 3700 species. It is commonly known as the bulb onion or common onion and is commercially cultivated worldwide, mainly as a food ingredient. *A. cepa*, a potent antioxidant, is one of the richest source of flavonoids and organosulphur compounds **(Dorsch *et al.*, 1991; Patil *et al.*, 1995; Goldman *et al.*, 1996)** and is proved to have anti diabetic **(Dahanukar *et al.*,2000)**, antioxidant, anti hypertensive, anti thrombosis, hypoglycemic and hyper lipidemia activities **(Galal *et al.*,1965)**. Phytochemical screening of *Allium cepa* L. revealed the presence of tannins, flavonoids, alkaloids, proteins and other important constituents. These include quercetin **(Slimestand *et al.*, 2007)** and its glycosides like quercetin 3, 4'-diglucoside and quercetin-4'-glucoside **(Williamson *et al.*,1997; Olsson *et al.*,2007)**. It also contains kampferol, β-sitosterol, ferulic acid, myritic acid and prostaglandins **(Dhanprakash *et al.*, 2007)**. These constituents of the bulb extract are shown to have ecobolic effect in rats **(Chatterjee 1997)**. These flavonoids are believed to be one of the most potent sources for wound healing. The pungent juice of onions has been used as a moth repellent and can be rubbed on the skin to prevent insect bites. It is also used to polish glass and copperware and to prevent rust on iron. Pharmacological studies by **Brewster 1994, Griffiths *et al.* 2002** have shown that *A. cepa L.* has antimicrobial and antifungal properties, and may also be of benefit in preventing or treating heart diseases, atherosclerosis, diabetes, cancer and possibly asthma. The liquor obtained from pouring boiling water over chopped onions can be sprayed onto plants to increase their resistance against pests and insects. Onion skins are also used to produce a yellow-brown dye.

6. ***Nymphaea alba* (L.) (Nymphaeaceae)**

Nymphaea alba (*L.*) commonly known as white water lily is an

aquatic herb with perennial rhizomes or rootstocks anchored within the mud. It is globally distributed in Europe, North Africa, Southwest Asia, India, China and Russia. It is found in the lakes of Kashmir, at altitudes below 1800 m. It is rich in tannic acid, gallic acid, alkaloids, sterols, flavonoids, glycosides, hydrolyzable tannins and high molecular weight polyphenolic compounds **(Eliana *et al.*, 2008)**. All the parts of the plant have medicinal uses in traditional system of medicine. The dried root and rhizome of the white water lily is used orally to treat gastrointestinal, genital, and bronchial diseases **(Naghma and Sarwat, 2005)**. The leaves and roots have also been used externally, as infusions to treat lesions and inflammations associated with mucous membranes and in treatment of a variety of dermatological conditions **(Robin 2001)**. Tea made from the plant is used to combat kidney and bladder problems **(Vergeera and Vander 1997)**. Further, it also produces calming and sedative effects upon the nervous system and is useful in the treatment of insomnia, anxiety and similar disorders **(Robin, 2001; James, 2008)**. An infusion of the flower and fruit is given in diarrhoea and as a diuretic **(Kang *et al.*, 2006)**. Its anti carcinogenic action and inhibition of renal oxidative stress and hyper proliferative responses are also reported **(Naghma *et al.*, 2005; Naghma *et al.*, 2005)**. Rhizomes contain starch, crude fiber, crude proteins and ash. An alkaloid nymphaeine is present in all parts of the plant except the seeds, glycosides and tannins are also present. Seeds contain starch, fatty oil of seeds contain di, tri and tetraenoic acid **(Wehmer, 1949)**. Alcoholic extract of rhizome containing alkaloids has a mild sedative and spasmolytic action and do not significantly depress the heart in large doses but are reported to have a paralyzing action on medulla **(Irvine *et al.*, 1945)**. The leaves of this plant contain a flavone glycoside, myricitin. A glycoside nymphalin with digitalis like action has been identified in the flowers. Various parts of the plants contain ascorbic acid **(Hoppe, 1943)**.

7. ***Inula royleana (D.C)* (Asteraceae)**

Inula royleana (D.C) an ornamental plant of great medicinal value. The genus *Inula* is cosmopolitan in

distribution, comprising about 90 species. India is represented by 20 species and Pakistan along with Kashmir is represented by 11 species. In Kashmir it is found at an altitude of 2800-3400m AMSL **(Khuroo *et al.*, 2007)**. On extraction of the plants belonging to this genus, major compounds isolated are mainly sesquiterpene lactone e.g. dihydroisoalantolactone, isoalantolactone and alantolactone **(Kirt *et al.*, 1953)**. It is reported that the roots of this plant contain sesquiterpene lactones of eudesmane type **(Bohlmann *et al.*, 1978; Qurishi *et al.*, 1980)**. The above quoted components are reported to have numerous biological activities viz. insecticidal **(Jennings *et al.*, 1986)**, insect repellant **(Ulubelen *et al.*, 2001)**, antimicrobial **(Yang *et al.*, 2001)**, anti-inflammatory **(Dirsch *et al.*, 2000)** and antiproliferative **(Lawrence *et al.*, 2001; Konishi *et al.*, 2002)**. Some abietanes obtained from *Inula royleana* have a vasodepressor effect as well **(Clark *et al.*, 2001; Ulubelen *et al.*, 2002)**. The roots of this plant are known to have neuromuscular blocking properties **(Manchanda *et al.*, 2000)** and are used to cure headaches **(Kala, 2006)**. In Kashmir Himalayas, shoots of *I. royleana* are used for curing dermatitis **(Kaul, 1997)** and its dried flowers are used for curing throat sores, wounds and inflammation of the hooves after boiling in water for half an hour and adding few drops of edible oil **(Khuroo *et al.*, 2007)**. The alkaloid of the roots of this plant also helps in lowering hypertension **(Haq and Alam, 2010)**. The chemistry of genus Inula is diverse and represents many important compounds from the chemical world, many of whose activity has been determined. Its roots have been shown to be rich in derivatives of the diterepenoid alkaloid lycoctonine **(Talapatra *et al.*, 1958; Khaleque *et al.*, 1959)**. In addition, the presence of a yellow pigment has been reported **(Handa *et al.*, 1958)** which consist mainly of a mixture of diterpenoid Quinones called 'royleanones'. It possesses biological and therapeutic activities including anti- inflammatory, antitumor, antimicrobial, anthelmintic and antifeeding **(Picman, 1986)**.

8. ***Mentha arvensis* (L.) (Lamiaceae)**

Today, the Lamiaceae family is considered as one of the most important sources for extraction of compounds with antioxidant activity. *Mentha arvensis (L.)* is popularly known as cornmint or pudina and is a common household remedy in India. Mentha is distributed mostly in temperate and sub-temperate regions of the world and plays a pivotal role in Ayurveda for treatment of a number of ailments. Mints have played an important part in human society for a long period. There are 30 species of mint and all species of the genus *Mentha* are aromatic. The essential oil profile of *Mentha arvensis L.* is useful for commercial purpose as it possess a range of aroma chemicals used in perfumery, flavor, pharmaceutical and other allied industries. Phytochemical analysis of the *Mentha arvensis* L. shows the presence of menthol, menthone, isomenthone, limonene, methyl acetate and neomenthol **(Verma *et al.*, 2010)**. *M. arvensis* grown in foothill conditions showed high menthol content along with menthone, iso-menthone, menthyl acetate, neo menthol and limonene as other major constituents **(Rao *et al.*, 2000; Singh *et al.*, 2005)**. The effect of the plant extract on bacteria have been studied worldwide by a large number of researchers such as **Farnz Malik *et al.*, (2012)** who have evaluated the phytochemical, anti-allergic and anti-inflammatory activity of *Mentha arvensis* on animals. **Gupta *et al.*,2010; Henrique *et al.*, 2010** and **Suresh *et al.*, 2012** have also studied the phytotoxic properties of *Mentha arvensis,* where it is highly considered as an antiseptic, antipyretic, antimicrobial and stimulant with anti-ageing properties.

9. *Nepeta govaniana* (Wall. ex Benth.) Benth. (Lamiaceae)

The genus *Nepeta* is a widespread genus of the family Lamiaceae consisting of about 250 species distributed in central and southern parts of Europe, Asia and Middle East. It is commonly known as yellow catmint. In India about 30 species are found, mostly distributed in temperate Himalayas and few on foothills and plains. The literature survey reveals that *the N. govaniana* has been the focus of earlier studies, especially with respect to its

essential oil from the aerial parts. Several species of *Nepeta* are used as laxative to treat dysentery, kidney and liver diseases and tooth troubles **(Baser *et al.*, 2000)**. They are also used as antispasmodic, expectorant, diuretic, antiseptic, antiasthmatic and febrifuge **(Zargari, 1990 ; Rapisarda *et al.*, 2001; Dabiri *et al.*, 2003)**. Some species are also used to reduce serum lipids and have anti-inflammatory effects **(Agarwal *et al.*, 1978; Prokopenko *et al.*, 1985)**. The leaves have a sweet aromatic fragrance when crushed. **Bisht *et al.*, 2010** have reported the antifungal activity of the essential oil of *N. govaniana* against *Candida albicans* and *Trichophyton rubrum*. The oil from the aerial parts contains a high percentage of sesquiterpene hydrocarbons followed by oxygenated sesquiterpenes **(Thappa *et al.*, 2001). Thappa *et al.*, 2001** has reported 4aα, 7α, 7aα-nepetalactone, β-elemene, germacrene D, allo-aromadendrene and α-pinene as the major constituents of essential oil of aerial parts of *N. govaniana*. Some minor components are elemol, germacrene-D-4-ol, α-cadinol and α-eudesmol.

10. ***Mimosa pudica (L.)* (Mimosaceae)**

It is commonly known as sensitive plant or touch-me-not as it folds itself when touched and spreads its leaves once again after a while. The stimulus can be transmitted to neighboring leaves (seismonastic movement). It is an annual or perennial herb and invites attention of the researchers worldwide for its pharmacological activities. It is used in folklore medicine in arresting bleeding and in skin diseases. *Mimosa pudica* has been reported to contain mimosine a toxic alkaloid **(Agharka, 1991; Chauhan *et al.*, 2009)**. The phytochemical screening of the *M. pudica* leaf extract shows the presence of bioactive components such as terepenoids, flavonoids, glycosides, alkaloids, quinines, phenols, tannins, saponins, coumarins and carbohydrates **(Gandhiraja *et al.*, 2009; Kamlendra *et al.*, 2010)**. The drug is also found to be rich in tannins **(Nadkarni, 1927)**. The root is also stated to have anti-convulsant activity **(NgoBum *et al.*, 2000)**. Successive extracts of the whole plant are reported to have antibacterial activity **(Pawaskar *et al.*, 2006)**. In preliminary screening of *Mimosa pudica* extract it was

found to exhibit anti-venom activity against common sea snake (*Enhydrina schistosa*) poisoning **(Prashanth *et al.*, 2007)**. It was found that the root of *Mimosa pudica* has acetylcholine esterase inhibitory activity. The wound healing studies on the roots of *Mimosa pudica* indicate that phenols and tannins play an important role in the wound healing process **(Muthusamy *et al.*, 2008)**. The extracts of *Mimosa pudica* immobilize the filariform larvae of *Strongyloides stercoralis* in less than an hour **(Robbinson *et al.*, 1990)**.

11. ***Parthenium hysterophorus* (L.)** (**Asteraceae**)

Parthenium hysterophorus (*L.)* grows wild in different regions of India including Jammu & Kashmir. The plant extract is used as a folk remedy against skin diseases, ulcerated sores, facial neuralgia fever & anaemia **(Kupchan *et al.*, 1971)**. In traditional medicine its decoction has been used for treatment of many infectious and degenerative diseases. All parts of the plant are reported to be used as a bitter tonic, febrifuge, antidysenteric **(Oudhia, 2001)**. The plant is used in the treatment of diabetes mellitus **(Patel *et al.*, 2008)** and is also reported to have antibacterial **(Pandey, 2007)** and anti tumor activity (Reddy *et al.*, 2011). The aerial portion of *Parthenium hysterophorus* contains Parthenin as the major component along with several other sesquiterpene lactones. These sesquiterpene lactones contain an alpha-methylene-gamma lactone moiety which plays a vital role for the bioactivity of the compounds especially for cytotoxicity **(Herz *et al.*, 1967)**. Besides the above mentioned compounds hexacosanol myracylalchol, β-sitosterol, β-o-glucoside of sitosterol, stigmasterol, compesterol, ursolic acid & saponins have also been reported **(Gupta *et al.*, 1977)** from the leaves of *Parthenium hysterophorus*. Five free amino acids (Arginine, Proline, methionine, amino caprilic acid & hystidine) have also been reported from the pollen of the plant **(Ruesh *et al.*, 1969)**. It is applied externally on skin disorders and decoction of the plant is often taken internally as a remedy for a wide variety of ailments **(Dominguez and Sierra 1970; Morton 1981)**. Root

decoction is useful in dysentery **(Singh *et al*., 1996)**. **Mew *et al*., 1982** has demonstrated that sublethal doses of parthenin exhibits antitumor activity in mice. Parthenium is also reported as a promising remedy against hepatic amoebiasis **(Sharma and Bhutani, 1988)**.

12. ***Nigella sativa (L).*** **(Ranunculaceae)**

Nigella sativa (L.) commonly known as Small Fennel or Black Cumin is an economically important umbel lifer growing wild in the dry temperature regions of Jammu & Kashmir, Himachal Pradesh, Afghanistan, Baluchistan and Iran. It is used as a spice in Indian and Middle Eastern cuisine. The dry roasted seeds serve as a flavor in curries, vegetables and pulses. It has been used as a stimulant, diuretic, emmenagogue, lactagogue, anthelmintic, and carminative **(Nadkarn, 1976)**. Black Seed has also been used externally where it is applied directly to abscesses, nasal ulcers, orchitis, eczema, and swollen joints. In the indigenous system of medicines, seeds are regarded as stimulants and carminatives and found to be useful in diarrhea and dyspepsia **(Abduganiew, *et al*., 1997)**. Its many uses have earned *Nigella* the Arabic approbation 'Habbatul barakah', meaning the seed of blessing **(Dwivedi, 1999; Dwivedi *et al*., 2007)**. Among the essential oils, thymoquinone was identified as the main component besides p-cymene, pinene, dithymoquinone and thymohydroquinone **(Ghosheh *et al*., 1999; Ali *et al*., 2003)**. Terpene derivatives like carvacrol, carvone, limonene, 4-terpineol, citronellol were also found in traces. Furthermore, the essential oil contains significant amounts of fatty acid ethyl esters. The seeds give on steam-distillation a yellowish brown volatile oil with an unpleasant odor. The oil contains carvone, d - limonene, and a carbonyl compound- nigellone **(Chopra *et al*., 1949)**. *Nigella sativa* exhibits significant hypoglycemic activity and hence suggest the antidiabetic action release from the mast cells, which supports an anti inflammatory role for the plant. *Nigella sativa* has been used for thousands of years in the Middle East for allergies, asthma, and for treating immune disorders. It has analgesic (Abdel - Fateh *et al*., 2000), postcoital contraceptive **(Keshri *et al*., 1995)**,

histamine release inhibitor **(Chakravarty, 1993)**, hepatoprotective **(Daba *et al.*, 1998)**, antimicrobial (Sokmen *et al*., 1999) anticancer and anti-inflammatory activities **(Mutabagani *et al.*, 1997)**.

CONCLUSION

The aim of the present review is to present comprehensive information about the medicinal importance of some valuable plant species growing in the Kashmir Himalayas. Although there are numerous species of medicinal importance growing over here, only a few species have been subjected to chemical profiling and biological analysis as evident from a perusal of the literature. Current studies have shown that the essential oil, as well as their active principles possesses several pharmacological properties. The species studied by various workers indicate that the natural wealth of Kashmir Himalayas is a potent source for isolation of a variety of bioactive molecules like terpenes, phenols, flavonoids, glycosides, alkaloids, quinines, saponins, and coumarins etc there by justifying their use in the indigenous system of medicine. Undoubtedly these plant species have important biological activities against different types of diseases and are being used for culinary and economic uses. The recent scientific data and the rich historical evidence of medicinal plants growing over here could support further research as well as their use as safe herbal medicinal products under carefully regulated doses. The antimicrobial activity, can promote the use of the above mentioned natural products as potent preservative and conservation agents, not only in the food industry after testing the toxic and irritating effects on humans but also in cosmetics and medical preparations.

Though India has rich biodiversity and is one among the twelve mega diversity centers, the growing demand of natural products is putting a heavy strain on the existing resources causing a number of species to be either threatened or under endangered category. It becomes our sole responsibility to highlight such natural medicinal treasures, which would help the herbal practitioners, conservationists and environmentalists to narrow down their cynosures to such indigenous plant species, thereby ensuring safety to the country's flora from being swept off by threatening catastrophes. A detailed and systematic study is required for identification, cataloguing and documentation of these bioresources, which may provide a meaningful way for the promotion of the traditional knowledge of the herbal medicinal plants. The present review is an attempt to set the mind of the researchers to carry out the work for developing its various

formulations on bio prospecting, which can ultimately be beneficial for all.

REFERENCES

[1] Abdel Fateh , A.M; Matsumoto, K; Watnabe H., (2000). Antinoceptive effects of *Nigella sativa* oil and its major component thymoquinone, in mice. *Eur J Pharmacol,* 400: 89-97.

[2] Abduganiew, B.E.; Abdullaev, U.A; Aripov, K.N; Baser, K.H.C; Oezek,T., (1997). Composition of the essential oil of *Bunium persicum* (Boiss.) B. Fedtsch. From Tajikistan. *J. Essent. Oil Res*., 9: 597-598.

[3] Aeschbach, R., Loliger. J., Scott, C., Murcia, A., Butler, J., Halliwell, B. Aruoma, O. I., (1994). Antioxidant actions of thymol, Carvacrol, 6–gingerol, zingerone and hydroxytyrosol. *Food Chem. Toxicol* 32: 31–36.

[4] Agarwal, O.P; Khanna, D.S; Arora, R.B.,(1978). Studies of anti-atherosclerotic action of *Nepeta hindostana* in pigs. *Arterry* 4, 487-496.

[5] Agharka, S.P., (1991). Medicinal plants of Bombay Presidency. Pbl. Scientific publishers, Jodhpur, India:142-143.

[6] Ahmed, N., Fazal, H; Abbasi, B.H; Rashid, M; Mahmood , T; Fatima, N., (2010a). Efficient regeneration and antioxidant potential in regenerated tissues of *Piper nigrum* L. *Plant, Cell, Tissue and Organ culture,* 102: 129–134.

[7] Ahmad, N., Fazal, H; Abbasi, B.H; Farooq, S., (2010 b). Efficient free radical scavenging activity of *Ginkgo biloba, Stevia rebaundiana* and *Parthenium hysterophorous* leaves through DPPH (2, 2–diphenyl –1– picrylhydrozyl). *International Journal of phytomedicine*, 2: 231–239.

[8] Ahmad, N., Fazal, H; Abbasi, B.H.,(2011 a). *In vitro* larvicidal and antioxidative enzyme activities in *Ginkgo biloba*, *Stevia rebaundiana* and *Parthenium hysterophororus*. *Asian pacific Journal of Tropical medicine*, 4(3):169–175.

[9] Ahmad, N., Fazal. H; Abbasi, B.H; (2011 b). Free radical scavenging (DPPH) potential in nine *Mentha* species. Toxicology and Industrial Health, Doi 10. 1177/0748233711407238.

[10] Ali, B .H; Blunden, G., (2003). Pharmacological and toxicological properties of *Nigella sativa*. Phytother Res; 17:299-305.

[11] Andreas, J. K; Dimitra, E.K.; Sotiropoulou., (2013). Field studies of nitrogen application on Greek

Oregano (*Origanum vulgare* ssp. hirtum (link) Ietswaart) essential oil during two cultivation seasons. *Industrial Crops and Products* 46:246–252.

[12] Anonymous., (1999). Lavender to be promoted in '99 country side. *Small Stock J*., 83:102.

[13] Barazandeh, M.M., (2002). Essential Oil Composition of *Lavandula latifolia Medik* from Iran. *J. Essent. Oil Res*., 14: 103-104.

[14] Baser, K.H.C; Kirimer, N.; Kurkcuoglu, M; Demirci, B., (2000). Essential oils of *Nepeta species* growing in Turkey, *Chem. Nat. Compd*. 36, 356-359.

[15] Bertea, C.M.; Freije, J .R; van der Woude H; Verstappen, F.W. A; Perk, L; Marquez, V; De Kraker, J; W; Posthumus, M.A; Jansen, B.J.M; de Groot, A; Franssen, M.C.R; Bouwmeester, H. J., (2005). Identification of intermediates and enzymes involved in the early steps of artemisinin biosynthesis in *Artemisia annua*. *Planta Med* 71: 40-47.

[16] Bilia, A.R.; Melillo de Malgalhães, P.; Bergonzi, M.C.; Vincieria, F.F., (2006). Simultaneous analysis of artemisinin and flavonoids of several extracts of *Artemisia annua* L. obtained from a commercial sample and a selected cultivar. *Phytomedicine* 13:487–493.

[17] Bisht, D.S; Padalia, R.C; Singh,L; Pande, V; Lal ,P; Mathela, C.S., (2010). Constituents and antimicrobial activity of the essential oils of six Himalayan *Nepeta species*, *J. Serb. Chem. Soc* 75 (6), 739–747.

[18] Biswas T.K; Mukarjee B., (2003): Plant medicine as Indian origin for wound healing activity: *A Review international journal of lower extremity wounds*, 2; 25-36.

[19] Bohlmann, F.; Mahanta, P.K.; Jakupovic, J.; Rastogi, R.C.; Natu, A.A., (1978). New sesquiterpene lactones from *Inula* species. *Phytochemistry*17: 1165- 1172.

[20] Brewster, J.L., (2008). Onions and other vegetable Alliums. *Crop production science in horticulture*, Vol. 15: Wallingford, Oxon, Great Britain: CABI Publishing. 2nd Ed.

[21] Burt, S. A.; Reinders R. D., (2003). Antibacterial activity of selected plant essential oils against *Escherichia coli* 0157: H7. *Letters in Applied Microbiology*, 2003, 36: 162–167.

[22] Burt, S., (2004). Essential oils: their antibacterial properties and potential applications in foods – a review. In *International Journal of Food Microbiology*, 94: 223 – 253.

[23] Cai, Y.; Luo, Q.; Sun, M.; Corke, H., (2004). Antioxidant activity and phenolic compounds of 112 traditional Chinese medicinal plants associated with anticancer. *Life Sciences* 74:2157–2184.

[24] Cavanagh, H.M.A.; Wilkinson, J.M., (2002). Biological activities of Lavender essential oil .*Phytother Res*., 16: 301-308.

[25] Cervato, G.; Carabelli, M.; Gervasio, S; Cittera, A; Cazzola, R; Cestaro, B., (2000). Antioxidant properties of Oregano (*Origanum vulgare*) Leaf extracts. *Journal of Food Biochemistry*, 24: 453 – 465.

[26] Chakravarty, N., (1993). Inhibition of histamine release from mast cells by nigellone. *Ann Allergy*; 70: 237-242.

[27] Chatterjee, A. and S.C. Pakrash, 1991. The treatise of Indian medicinal plants. http://openlibrary.org/b/OL1685622M/Treatise-on-Indian-medicinal-plants.

[28] Chatterjee, T.K., (1997). Medicinal plant with antifertility property. *Herbal Option*: 77.

[29] Chaturvedi, D; Goswami, A; Saikia, P. P; Barua, N. C; Rao, P. G., (2010). Artemisinin and its derivatives. *Chem. Soc. Rev.* 39. 235.

[30] Chauhan, B.; Johnson, S.; Davi, E.,(2009). Germination, emergence and dormancy of *Mimosa pudica*. *Weed Biology and Management*, 9 (1): 38-45.

[31] Chitra Shenoy; Patil M.B; Ravikumar., (2009): Preliminary phytochemical investigation and wound healing activity of *Allium Cepa Lin* (Liliaceae). *International journal of pharmacy and Pharmaceutical sciences*; Vol. 2, issue 2, July– Sep.

[32] Chopra, R.N; Chopra, I.C; Handa, K.L; Kapoor, L.D; (1958). Chopra's Indigenous drug of India, U.N. Dhar & Sons Pvt. Ltd. Calcuta, 2nd ed. 1958.

[33] Chopra, 1958, 515, 568; Modi, 677; Schindler, 145; Rangaswami & Reichstein, (1949). *Helv. chim. acta*, , 32, 939.

[34] Cleff, M; Meinerz, A.R; Xavier, M; Schuch, L.F; Carlos, M., (2010). *In vitro* activity of *Origanum vulgare*

essential oil against *Candida species*. *Braz. J. Microbiol.* , 41: 116-123.

[35] Croteau R., (1986). Biochemistry of monoterpenes and sesquiterpenes of the essential oils. Herbs, spices and medicinal plant : *Recent advances in Botany, Horticulture and Pharmacology*. Oryx press, Phoenix, AZ, 1: 81–135.

[36] Daba, M.H; Abdel Rahman, M.S.,(1998). Hepatoprotective activity of thymoquinonoe in isolated rat hepatocytes. *Toxicol Let*., 95:23-29.

[37] Dabiri , M; Sefidkon, F., (2003). Composition of essential oil of *Nepeta crassifolia Boiss Buhse*. *Flav. Fragr. J*. 18: 225-227

[38] Dahanukar, S.A.; Kulkarni, R.A.; Rege, N.N., (2000): Pharmacology of medicinal plants and natural products; *Indian journal of pharmacology*; 32: S81-S118.

[39] D'antuono L.F., Galleti G.C., Bocchini P., (2000). Variability of essential oil content and composition of *Origanum vulgare L*. populations from a North Mediterranean Area (Liguria region, Northern Italy). *Annals of Botany*, 86: 471 – 478.

[40] Dhanprakash, B.N; Garima, U.,(2007). Antioxidant and free radical scavenging activities of phenols from onion (*Allium cepa*). *Food Chemistry*; 102: 1389-1393

[41] Dirsch, V.M.; Stuppner, H.; Ellmerer -Muller, E.P.; Vollmar, A.M., (2000). The structural requirements of sesquiterpene lactones to inhibit LPS-induced nitric oxide synthesis in RAW 264.7 macrophages. *Bioorg. Med. Chem*.8: 2747-2753.

[42] Dominguez, X.A.; Sierra. A., (1970). Isolation of a new diterpene alcohol and parthenin from *Parthenium hysterophorus*. *Plant Medica* 18:275-277.

[43] Dorman, H. J. D and Deans, S.G., (20000. Antimicrobial agents from plants: Antibacterial activity of plant volatile oils. *J. Appl. Microbiol*. 88(2) : 308 – 316.

[44] Dorsch,W; Wagner,H.,(1991). New antiasthmatic drugs from traditional medicine? *Int Arch Allergy Appl Immunol*.; 94:262–5.

[45] Dwivedi, S.N., (1999). Traditional health care among the tribals of Rewa District of Madhya Pradesh with special reference to conservation of endangered and vulnerable species, *Econ. Taxon. Bot*. 23(2):315-320.

[46] Dwivedi, S. *et. al.*,(2007). Relevance of medicinal herbs used in traditional system of medicine, Farmavita. Net.

[47] Ebrahimzadeh, M.A; Nabavi, S. M; Nabavi, S. F; Bahramian, F,;Bekhradnia, A.R., (2010). Antioxidant and free radical scavenging activity of *H. officinalis* L. var. angustifolius, *V. odorata*, *B. hyrcana* and *C. speciosum*. *Pak J Pharm Sci.* 23(1):29–34.

[48] Eliana, R; Ricardo, T; Jose, C; Galduroz, F; Giuseppina, N.,(2008). Plants with possible anxiolytic and/or hypnotic effects indicated by three Brazilian cultures - Indians, afrobrazilians, and river-dwellers. *Studies in Natural Products Chemistry*. 35: 549–95.

[49] Farag R.S; Daw Z. Y; Abo-Raya S.H., (1989). Influence of some spice essential oils on *Aspergilus parasiticus* growth and production of aflatoxins in a synthetic medium. *Journal Of Food Science*, 54: 74 – 76.

[50] Farnaz, M; Hussain, S; Sadiq, A; Parveen,G; Wajid, A; Rafique ,S.S; Ahmad, C; Mahmood, R; Riaz, H; Ismail, M; Raja, F.Y., (2012): Phytochemical analysis, anti-allergic and anti inflammatory activity of *Mentha arvensis* in Animals. *Up* Vol.6 (9): 613-619.

[51] Fischer N.H., (1991). Methods in Plant Biochemistry, (Eds, B. C. Charlwood and D. V. Banthrope). Academic Press, London, 7, 187.

[52] Galal E.E; Gawad M.A.,(1965): Antidiabetic activity of Egyptian onion *Allium cepa* extract; *J Egypt Med Assoc*, 48: 14-45.

[53] Gandhiraja, N.; Sriram, S.; Meena ,V.; Srilakshmi, K.; Sasikumar, C.; Rajeshwari ,R., (2009). Phytochemical Screening And Antimicrobial Activity of the Plant Extracts of *Mimosa pudica* L. Against Selected Microbes. *Ethnobotanical Leaflets*; 13:618-24.

[54] Gattefosse, R.M., (1937). Gattefosse's Aromatherapy: Saffron Walden, England.

[55] Ghosheh, O.A; Houdi, A. A; Crooks, P.A., (1999). High performance liquid chromatography analysis of the pharmacologically active Quinones and related compounds in the oil of the black seed (*Nigella sativa L.*). *J Pharm Biomed Anal* ; 19:757-62.

[56] Goldman, I.L; Kopelberg, M; Debaene, J.E; Schwartz, B.S., (1996). Anti platelet activity in onion (*Allium cepa*) is sulfur

dependent. *Thromb Haemost*. ; 76:450–52.

[57] Goun, E; Cunnigham, G; Krasnykch, S; Miles H., (2002). Antithrombin activity of some constituents from *Origanum vulgare*. *Fitoterapia*, 73: 692- 69.

[58] Grieve, M.A., (1931). Modern Herbal Harcourt, Brace & Co. New York.

[59] Griffiths, G., Trueman, l; Crowther, T; Thomas, B; Smith, B., (2002). Onions-A global benefit to health. *Phytotherapy Research* 16: 603–615

[60] Guenther E., (1972). *The Essential Oil*. The production of essential oils: methods of distillation, effleurage, maceration, and extraction with volatile solvents. History – Origin in plants, production analysis. In Guenther, E. (Ed). Krieger Pub. Co., Malobar, FL, 1: 85 – 188.

[61] Gupta, R.K; Dutta. T.R; Patil, B.D., (1977). Chemical Investigation of *Parthenium hysterophorus, Indian Journal of Pharmacy,* 39, 64-66.

[62] Gupta, S; Ahirwar, D; Jhade, D; Sharma., (2010). Pharmacognostic Standardization, Physico and Phytochemical Evaluation of Aerial Parts of *Mentha arvensis Linn*. *Int. J. Pharm. Sci.. Drug Res*., 2 (4): 261-264.

[63] Han, J.; Ye, M.; Qiao, X.; Xu, M.; Wang, B.R; Guo, D.A.,(2008). Characterization of phenolic compounds in the Chinese herbal drug Artemisia annua by liquid chromatography coupled to electrospray ionization mass spectrometry. *Journal of Pharmaceutical and Biomedical Analysis* 47:516–525.

[64] Handa,K.L; Chaudhary,S.S; Jamwal, K.S., (1958). *Indian J. Pharm,* 20, 211.

[65] Haq, F.;Ahmad, H.; Alam, M., (2010). Traditional uses of Medicinal Plants of Nandiar Khuwarr Catchment, District Battagram, Pakistan. *Journal of Medicinal Plants Research*. 5: 39-48.

[66] Harpez S., Glatman L., Drabkin V., Gelman A., (2003). Effects of herbal essential oils used to extend the shelf life of fresh water- reared Asian sea fish (*Lates calcarifer*). *Journal of Food Protection*, 66; 410 – 417.

[67] Henrique, D; Jose,C; Galberto, M; CostaJoes, P; Siqueira, E.O. ; Lima ., (2010): *In vitro* screening by phototoxic properties of Eugenia

uniflora L., *Momordica charantia L., Mentha arvensisL.,* and *Turnera ulmifolia L. Brazilian Journal of Biosciences*. Vol. (8): 299-301.

[68] Herz, W; Watanabe.H; Miyazaki. M; Kishida. Y., (1967). The Structure of Parthenin and Ambrosin. *J. Am. Chem Soc*, 84: 2601-2610

[69] Holley J.; Cherla K., (1998). The Medicinal Plants Sector in India. International Development Research Centre. South Asia Regional Office, IDRC, Canada. Medicinal and Aromatic Program in Asia (MAPPA), New Delhi, India.

[70] Hoppe., (1943). 606; *Chem Abstract*, 37, 5758: 1935, 29, 3735: 1937, 31, 3571, 3572.

[71] Houghton, P.J.,(2000).Use of small scale bioassays in the discovery of novel drugs from natural sources. *Phytother Res* 14:419-423.

[72] Huang, L., Liu, J. F., Liu, L. X., Li, D. F., Zhang, Y., Niu, H. Z., Song, H. Y., Zhang, C. Y., Liu, X. C. and Tu, Y. Y., (1993). *Zhongguo Zhongyao Zazhi*, 18, 44.

[73] Ines, H; Nesrine, K; Ahmed, R., (2011). Biocontrol of *Botrytis cinerea* with essential oil and menthol extract of *Viola odorata L.* flowers. *Archives of Applied Sc. Res.*; 3 (5) : 44-51.

[74] Irvine and Rickett, (1945) *Kew Bull*, 1953, 363; Henry, 758; *Chem Abs*, 39, 5327. .

[75] James, A.D., (2008). Duke's Handbook of medicinal plants of the bible. USA: *Taylor and Francis group*; 302–5.

[76] Jennings, K.R.; Brown, D.G.; Wright, J.R.D.P., (1986). Methyllycaconitine, a naturally occurring insecticide with a high affinity for the insect cholinergic receptor. *Experientia* 42: 611-613.

[77] John D.B.; Sebastian S.R.; R. Mary Sujin., (2012): Antimicrobial activity of selected species of Lamiaceae against human pathogens. *Indian journal of natural products and resources*. 3 (3): 334-342.

[78] Juteau, F; Masotti ,V; Bessire, J.M et al., (2002). Antibacterial and antioxidant activities of *Artemisia annua* essential oil. *Fitoter* 73, 6: 532-5.

[79] Kala, C.P., (2006). Medicinal plants of the high altitude cold desert in India: Diversity, Distribution and Traditional uses. *International Journal of Biodiversity Science and Management* 2: 43–56.

[80] Kamlendra, K. M; Patidar, J.; Shukla, K.K; Mahajan, S.C., (2010). Pharmacognostic and preliminary phytochemical studies of *Mimosa pudica* Linn. Leaves, National Conference on "Recent Advances in Herbal Drug Technology" 26 & 27 March, 2010.

[81] Kang, T.H; Oh ,H .R.; Jung, S.M; Ryu, J.H; Park, M.W.; Park, Y.K., (2006). Enhancement of Neuroprotection of Mulberry leaves (*Morus alba L.*) prepared by the Anaerobic treatment against ischemic damage. *Biol Pharm Bull*, 29:270–274.

[82] Kaul, M.K., 1997. Medicinal Plants of Kashmir and Ladkh. Indus Publishing Company F-5, Tagore Garden, New Dehli.

[83] Keshri, G; Singh N.M; Lakshmi V; Kamboj, V.P., (1995). Post coital contraceptive efficacy of the seeds of *Nigella sativa* in rats. *Indian J Physiol Pharmacol*, 39: 59-62.

[84] Khaleque, A; Papadopoulous, S; Wright, I; Valenta, Z., (1959): Methyl-lycaconitine. *Chem. & Ind*.(London), 513- 514.

[85] Khuroo, A.A; Malik, A.H.; Dar, A.R.; Dar, G.H.; Khan, Z.S., (2007). Ethnoveterinary Medicinal uses of some Plant Species by the Gujar Tribe of the Himalaya. *Asian Journal of Plant Sciences*.6: 148-152.

[86] Kirt and Basu, (1953) II, 1352. Indian Forests. Chem abstract 1937, 31 1887 V-456, 937, 63, 414.

[87] Kapoor et al. *Journal of scientific industrial research*. 527.

[88] Kishore, N; Mishra, A.K; Chansouria, J.P., (1993). Fungotoxicity of essential oils against dermatophytes. *Mycoses* 36,5-6: 211-15.

[89] Kolak, U.; Ari, S; Birman, H.; Hasancebi, S.; Ulubelen, A., (2001) Cardioactive diterpenoids from the roots of *Salvia amplexicaulis*. *Planta Med*. 67: 761-763.

[90] Konishi, T.; Shimada, Y.; Nagao, T.; Okabe, H.; Konoshima, T., (2002). Antiproliferative sesquiterpene lactones from the roots of *Inula helenium*. *Biol. Pharm. Bull*. 25: 1370-1372.

[91] Koo, T. H.; Lee, J. H.; Park, Y. J.; Hong, Y. S.; Kim, H. S.; Kim, K. W.; Lee., J. J., (2000). *Planta Med*. 67, 103.

[92] Kumar B.; Govindarajan M.; Pusphagandan R., (2007): Ethano pharmacological approaches to wound healing- Exploring medicinal plants of India; *Journal*

of Ethano pharmacology, 114 (2): 103-113.

[93] Kupchan, S.M.; Eakin, M.A; Thomas,A.M., (1971). Tumor Inhibitors, Structure Cytotoxicity Relationship among the Sesquiterpene Lactones. *J. Med. Chem*, 14: 1147-1152.

[94] Leisure, V; Blekas, G; Tsimidou, M; Kokkini, S; Boskou, D., (1993). Composition and antioxidant activity of essential oils from Oregano plants grown wild in Greece. Z. Lenbenson. Unters. Forsch, 197: 20 – 23.

[95] Lagouri V., Boskou D., (1996). Nutrient antioxidants in Oregano. *International Journal of Food Sciences Nutrition*, 47: 493 – 497.

[96] Lawrence, N.J.; McGown, A.T.; Nduka, J.; Hadf, J. A.; Prtichard, R.G., (2001) Cytotoxic Michael-type amine adducts of α-methylene lactones, alantolactone and isoalantolactone. *Bioorg. Med. Chem. Lett.* 11: 429-431.

[97] Lemhadri, A; Zeggwagh, N.A; Maghrani, M; Jouad, H; Eddouk, M., (2004). Antihyperglycaemic activity of aqueous extract of *Oreganum vulgare* growing wild in Tafilate region. *J. Ethnopharmocal*, 92 (2 – 3): 251 – 256.

[98] Ma, C.; Wang,H.; Lu ,X; Li ,H; Liu ,B; Xu,G.,(2007).Analysis of *Artemisia annua* L. Volatile oil by comprehensive two-dimensional gas chromatography time-of-flight mass spectrometry. *J Chromatogr A* 50:50-53.

[99] Manchanda, R.; Bhat, S.V.; Mehta, B.; Karunakaran, J.; Venkateswarlu, R., (2000) .Alkaloid Extraction of *Inula royleana*. *Indian J Physiol Pharmacol*. 44: 143-152.

[100] Mastelic, J; Jerkovic , I; Blazevic, I; Poljak -Blazi, M; Borovic , S; Ivancic -Bace , I; Mrecki, V., Zarkovic , N; Brcic-Kostic, K; Vikic-Topic, D; Muller, N.,(2008). Comparative study on the antioxidant and biological activities of carvacrol, thymol and eugenol derivatives. *Journal of Agricultural and Food Chemistry*, 56: 3989 – 3996.

[101] Meshnick, S.R., (2002). Artemisinin: mechanisms of action, resistance and toxicity. *International Journal for Parasitology* 32:1655–1660.

[102] Mew, D.; Balza, F.; Towers, G.H.N; Levy, I.G., (1982). Antitumor effects of the sesquiterpene lactone Parthenon. *Planta Medica* 45: 23-27.

[103] Moon, T.J.; Wilkinson, M.; Cavanagh, H.M.A., (2006). Antiparasitic activity of two *Lavendula* essential oils against *Giardia duodenalis, Trichomonas vaginalis* and *Hexamita inflata*. *Parasitol Res.*, 99:722-728.

[104] Morton, J.F., (1981). The puzzling whitetop. *Parthenium hysterophorus:* Noxious weed, health hazard, folk-remedy, flea repellent. Unpublished report, Univ. of Miami, Florida

[105] Mutabagani, A; El- Mahdy; Samiha, H.M., (1997). A study of anti inflammatory activity of Nigella sativa L. & thymoquinone in rats. *Saudi Pharm J*, 5:110-113.

[106] Muthusamy, S.K; Kirubanandan, S; Sripriya,P.K.,(2008): Tri phala promotes healing of infected full-thickness dermal wound. *Journal of Surgical Research*, 144: 94–101.

[107] Nadkarni, A.K., (1927): Indian *Matria medica*. Popular Prakashan, Pvt. Ltd. Bombay 1st edition, P. 799–800.

[108] Nadkarni, A.K., (1976): Indian *Matria medica*. Popular Prakashan, Pvt. Ltd. Bombay 3rd edition, P.301- 340.

[109] Naghma, K; Sarwat, S .,(2005).Anticarcinogenic effect of *Nymphaea alba* against oxidative damage and hyperproliferative response and renal carcinogenis in Wistar rats. *Mol Cell Biochem.* ; 271: 1–11.

[110] Naghma, K; Sarwat, S., (2005). Inhibition of potassium bromate-induced renal oxidative stress and hyperproliferative response by *Nymphaea alba* in Wistar rats. *J Enzyme Inhib Med Chem*. 20:275–83.

[111] Nakatani , N., (2000). Phenolic antioxidants from herbs and spices. *Biofactors,* 3: 141 – 146.

[112] NgoBum , E; Dawack, D.L; Schmutz, M; , Rakotonirina, A., (2000). Anticonvulsant activity of *Mimosa pudica* decoction. Fitoterapia , 75,: 309–314.

[113] Olsson, M.E.; Gustavsson, K.E.; and Vågen, I.M., (2010). Quercetin and isorhamnetin in sweet and red cultivars of onion *(Allium cepa* L.) at harvest, after field curing, heat treatment, and storage .*Journal of Agricultural Food Chemistry* 58 (4): 2323–2330.

[114] Oudhia P., (2001). Medicinal uses of Congress weed *Parthenium hysterophorus L.:* A Review.

Raipur, India: Society for Parthenium hysterophorus L Management (SOPAM).

[115] Pandey, A.K., (2007). Anti-staphylococcal activity of a pan-tropical aggressive and obnoxious weed *Parthenium isterophorus:* an *in vitro* study**.** *Natl Acad Sci Lett* , 30: 383-386.

[116] Patel, V.S; Chitra, V; Prassanna, P.L; Krishnaraju, V., (2008). Hypoglycemic effect of aqueous extract of *Parthenium hysterophorus* L. in normal and alloxan induced diabetic rats. *Ind J Pharmacol* , 40**:**183-185.

[117] Patil, B.S; Pike, L.M., (1995). Distribution of quercetin contents in different rings various colored onion (*Allium cepa* L.) cultivars. *J Hortic Sci.*; 70:643–50.

[118] Pawaskar, S, M; Kale, K, U., (2006): Antibacterial activity of successive extracts of *Mimosa pudica*. *Indian Drugs*, 43, 476–480.

[119] Perfume and Flavor Materials of Natural Origin by Steffen Arctander, First published 1961, ISBN-10: 0-931710-36-7, ISBN-13: 978-0-931710-36-0.

[120] Phillips. R. and Foy. *N. Herbs.*

[121] Picman, A. K., (1986). Biological activities of sesquiterpene lactones. *Biochemical Systematics and Ecology* 14, 255-285.

[122] Prashanth, D.; Vinutha, B.; Salma, K., (2007): Screening of selected Indian medicinal plants for acetyl cholinesterase inhibitory activity. *Journal of Ethnopharmacology*, 109: 359–363.

[123] Prokopenko, S.A; Spiridonov, A.V., (1985). Battalion from Transcaucasian clover (*Nepeta). Farm. Zhurnal*. 6, 70.

[124] Qurishi, M.A; Dhar, K.L.; Atal, C.K., (1980). A new sesquiterpene lactone from *Inula royleana* roots. *Planta Med*.38: 282-285.

[125] Rao, B.R.R; Kaul, P.N; Mallavarapu , G. R; Ramesh, S., (2000). Comparative composition of whole herb, flowers, leaves and stem oils of cornmint (*Mentha arvensis* L.f. *piperascens* Malinvaud ex Holmes), *J. Essent. Oil Res., 12*, 357-359.

[126] Rapisarda, A; Galati, E.M; Tzakou, O; Flores,M; Miceli, N., (2001). *Nepeta sibthorpii Bentham* (Lamiaceae): Micromorphological analysis of leaves and flowers. *Farmaco* 56, 413-415.

[127] Reddy, D.M; Qazi, N.A; Sawant, S.D; Bandey, A.H; Srinivas, J; Shankar , M., (2011). Design and synthesis of spiro derivatives of parthenin as novel anti-cancer agents. *European J Med Chem* , 46**:**3210-3217.

[128] Robin D., (2001). *Nymphaea odorata*: White pond lily. Medical Herbalism. *Materia Medica Pharm*., 11:231-233.

[129] Robinson, R.D; Williams, L.A; Lindo, J.F; Terry, S.I; Mansingh, A., (1990). Inactivation of *Strongyloides stercoralis* filariform larvae *in vitro* by six Jamaican plant extracts and three commercial anthelmintics. *West Indian Medical Journal* 39 (4): 213–217

[130] Ruesh. H; Mabry. T.J., (1969). The Isolation and Structure of Tetraneurin-A New Pseudoguainolide from *Parthenium alpinium* var. Tetraneuris (Compositae). *Tetrahedron*, 25: 805-811.

[131] Sahin, F., Gulluce, M., Daferera, D., Sokmen, A., Sokmen, M., Polissiou, M., Agar, G., Ozer, H., (2004). Biological activities of the essential oils and methanol extracts of *Origanum vulgare* ssp. *vulgare* in the eastern Anatolia region of Turkey. *Food Control*, 15; 549 – 557

[132] Schippmann U.; Leaman D.J.; Cunningham A.B., (2002). Impact of cultivation and gathering of medicinal plants on biodiversity: global trends and issues. Inter-Departmental Working Group on Biological Diversity for Food and Agriculture, Food and Agricultural Organization of the United Nations, Rome, Italy.

[133] Sharma, G.L.; Bhutani, K.K., (1988). Plant based antiamoebic drugs. Part II. Amoebicidal activity of parthenin isolated from *Parthenium hysterophorus*. *Planta Medica*. 54:20-22.

[134] Shawl, A.S.; Kumar, S., (2000). Potential of Lavender oil industry in Kashmir. *J. Med. Arom. Plants*, 22:319-321.

[135] Shiva M.P., (1996). Assessment of NTFP Resources of India: A report for Formulation of the National Forestry Action Programme, Vol. 1. Ministry of Environment and Forests, New Delhi, 5 (13): 54-55.

[136] Singh, U., A.M. Wadhwani and B.M. Johri, 1983. Dictionary of

Economic Plants of India. ICAR., New Dehli.

[137] Singh, A.K; Raina, V.K; Naqvi, A.A; Patra, N.K.; Kumar, B; Ram, P; Khanuja, S.P. S., (2005). Essential oil composition and chemoarrays of menthol mint (*Mentha arvensis* L. f. *piperascens* Malinvaud ex. Holmes) cultivar, *Flavour Fragr. J., 20*, 302-305.

[138] Skoula, M., Harborne, J. B., (2002). Taxonomy and Chemistry. In: Kintzios SE (Ed) Oregano: The genera *Origanum* and *Lippia*. Medicinal and aromatic plants - industrial profiles, vol. 25. Taylor and Francis CRC Press, USA Pp 67 – 108.

[139] Slimestad, R.; Fossen, T.; Vagen, I. M., (2007). Onions: a source of unique dietary flavonoids". *Journal of Agricultural and Food Chemistry* 55 (25): 10067–80.

[140] Sokmen , A; Jones, B.M; Ertuk, M., (1999). The *in vitro* antibacterial activity of Turkish medicinal plants. *J. Ethanopharmacol* ; 67: 79-86.

[141] Stashenko, E.E., Puertas, M.A., Martinez, J. R., (2002). SPME determination of volatile aldehydes for evaluation of *in vitro* antioxidant activity. *Analytical and Bioanalytical Chemistry*, 373: 70-74.

[142] Stuart M. In: (1989). The Encyclopedia of Herbs and Herbalism. Stuart M, editor. Spain: Macdonald & Co (Publishers) Ltd; Reference section; p. 281.

[143] Suresh, S; Rathishkumar, N; Rajeshwari. V. S; Sagadevan, P; Gayathri, S; Vithya Eswari , D., (2012): Studies On Phytochemical Composition And Antibacterial Potential Of Methanolic Leaf Extract of *Mentha Arvensis .Linn*. *Ijprd*, 2012; Vol 4 (08): 1 -4.

[144] Tajudin; Shawl, A.S; Kumar, S; Nigam, M.C; Hussain, A., (1983). Production of Lavender oil in Kashmir Valley; *Indian Perfumer* 27: 56-59.

[145] Talapatra, S.K; Chatterjee, A., (1958). *Indian J. Chem. Soc*. 36, 437.

[146] Thappa, R.K; Agarwal, S.G; Srivastava, T.N; Kapahi, B.K., (2001). Essential oils of four Himalayan *Nepeta* species, *J. Essent. Oil Res.*13, 189-191.

[147] Ulubelen, A; Mericli, A.H.; Mericli, F.; Kilincer, N.; Ferizli, A.G.; Emekci, M.; Pelletier, S.W., (2001) Insect repellent activity of

diterpenoid alkaloids. *Phytother. Res.* 15: 170-171.

[148] Vergeera, L.H; Vander, V.G., (1997). Phenolic content of daylight-exposed and shaded floating leaves of water lilies (Nymphaeaceae) in relation to infection by fungi. *Oecologia* 112:481–484

[149] Verma, R.S; Rahman, L; Verma, R.K; Chauhan, A; Yadav, A.K; Singh, A., (2010). Essential oil composition of menthol mint (*Mentha arvensis*) and peppermint (*Mentha piperita*) cultivars at different stages of plant growth from Kumaon region of western Himalaya, *Open Acc. J. Med. Arom. Plants*, *1*, 13-18.

[150] Vichi, S., Zitterl-Eglseer, K; Jugl, M; Franz, C., (2001). Determination of the presence of antioxidants deriving from sage and Oregano extracts added to animal fat by means of assessment of the radical scavenging capacity by photo chemiluminescence analysis. *Nabrung* 45(2), 101-104.

[151] Vishal, A; Parveen, K; Pooja, S; Kannappan, N; Kumar, S., (2009). Diuretic, laxative and toxicity Studies of *Viola odorata* aerial parts. *Pharmacology online;* 1:739–748.

[152] Vokou, D; Kokkini, S; Bessiere, J.M.,(1993).Geographic variation of Greek oregano (*Origanum vulgare* ssp.*hirtum*)essential oils. Biochemical Systematics and Ecology 21: 287–295.

[153] Wehmer, I., (1949). *Chem. Abstract* 1933, 27, 5782 ; 43, 135.

[154] Williamson, G; Plumb, G. W; Uda, Y; Price, K. R; Rhodes, M.J.C., (1997). Dietary quercetin glycosides: antioxidant activity and induction of the anticarcinogenic phase II marker enzyme quinone reductase in Hepalclc7
cells. *Carcinogenesis* 17 (11): 2385–2387.

[155] Yang, Z.; Kitano, Y.; Chiba, K.; Shibata, N.; Kurokawa, H.; Doi, Y.; Arakawa, Y.; Tada, M. ,(2001) .Synthesis of variously oxidized abietane diterpenes and their antibacterial activities against MRSA and VRE. *Bioorg. Med. Chem*. 9: 347- 356.

[156] Yanishlieva, N.V., Marinova, E.M, Gordon, M.H., (1999). Antioxidant activity and mechanism of action of thymol and carvacrol in two

lipid systems. *Food chem.*, 64: 59-66.

[157] Zargari, A., (1990). Medicinal Plants. Tehran University Publications, Tehran. Vol. IV, pp: 325 328.

[158] Zheng, W.; Wang, Y., (2001). Antioxidant activity and phenolic compounds in selected herbs. *Journal of Agricultural and Food Chemistry* 49:5165–5170.