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Some folk Medicinal herbs of Solan Valley, Himachal Pradesh

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ABSTRACT

In Himachal Pradesh lots of medicinal herbs and various types of plants are available. Approximately thousands of species of medicinal herbs are reported here. It contains a diverse variation in climate which possesses an environment which is suitable for various medicinal plants. Solan is a district of Himachal Pradesh, there are many medicinal plants present here because it has a rich climatic diversity. The temperature of Solan is moderate; rainfall occurs in all seasons of the year, annual precipitation is about 1413 mm so more plants grow here. Medicinal herbs play a main role in defending our health from various diseases. It's a gift of nature to live a happy and healthy life. These are trusted, safer and known as honeydew to cure various ailments. This manuscript provides data for some medicinal plants mainly found in Solan with their pharmacological properties and medicinal uses. This review article gives detail of 10 important medicinal herbs mostly found in Solan with their important biological activities.

KEY WORDS: Solan, Medicinal herbs, Chemical Constituents, Traditional.

1. INTRODUCTION

Himachal Pradesh has diverse atmospheric circumstances due to changing altitude ranging from 500 m to 7000 m from east to west and from north to south. Wide variations in topography, altitude and climate conditions make this state a suitable habitat for diverse variety of animal and plants (Balokhra, 1995; Chauhan, 1999). Generally 600 medicinal herbs and 200 aromatic plants are available here. According to WHO report 81% of the developing world depends on traditional medicines and of these, 85% use plants or their extracts as the active constituent (Sheldon, 1998). It represents a pretty high percentage out of 3500 recorded plant species in Himachal Pradesh. The Solan district is located at 31.0498° N, 76.9182° E, and 1600 m altitude, situated in south-western ranges of the Himalayas (Collett, 1902). Here is a rich diversity of medicative and other useful plants (Atkinson, 1882). Solan is also known as "Mushroom city of India". It covers an area of 1,936 km^2. More than 100 nurseries are located in Solan district. Local people were dependent on the medicinal herbs diversity for their daily needs including healthcare till the modern time of industrialization begin. With time, they started to utilize the readymade products and started ignoring the traditional knowledge collected by their ancestors. There are no data records available for the medicinal and other useful plants of Solan district. A local survey and data recording or documentation of the area based on the basis of medicinal plant diversity will be helpful to the common man, students, teachers, industry and finally science.

2. STUDY AREA & METHODOLOGY

Solan district is located at 31.0498° N, 76.9182° E in south-western Himalayas with altitude rising up to 1600 meters above mean sea level. The temperature ranges from -1^0C to 31^0C over the course of a year. The average temperature is 17^0C. The annual precipitation is 1413 mm. Snowfall can be seen in the higher altitudinal ranges of Solan district between January to February, while in low altitudinal ranges have rainfalls during that time. The climate is subtropical to warm temperate. This variation in climatic changes possesses huge diversity of medicinal herbs. Thus, the curative nature of certain plant species of this region ought to be explored to their full ability. The medicinal and different uses for these herbs were recorded from the available literature in books and journals.

Medicinal and chemical properties of Plants of Solan District:

Trichosanthes Tricuspidata: *T. tricuspidata* is a member of Cucurbitaceae family, also known as Indrayan, Lal Indrayan, Koundal, Redball snakegourd, Trichosanthes pubera, Trichosanthes palmata, Modeccca bracteata and Trichosanthes bracteata. It grows at an altitude of 1300 to 2400 m above sea level. It is chiefly found in India in Solan district of Himachal Pradesh and south China through Malaysia, southern Japan and tropical Australia. Its height is about 9-10 m. It has robust stem. The female flowers are sole whereas the male flowers are in axillary 5-10 floral racemes with huge bracts. The fruits are ball-shaped, after ripe it turns into red coloured fruit with ten orange coloured stripes (Kanchanapoom, 2002). Fruit contains several glycosides such as cucurbitane, hexanorcucurbitane and octanorcucurbitane. The leaf and stem of *T. tricuspidata* contains 3 cycloartane glycosides, their names are cyclotricuspidosides A, B and C (Saboo Shweta, 2012). The root of *T. tricuspidata* possesses many compounds as bryonolic acid, methyl palmitate, palmitic acid, 1,8-Octanedioic acid, D-glucose, glyceryl monostearate, cucurbitacin-B, isocucurbitacin-B, isocucurbitacin-D, 1-Palmitoylglycerol, α-spinasterol ($C_{29}H_{48}O$) and 23, 24-dihydrocucurbitacin D. In Ayurveda medicine system, *T. tricuspidata* is used to cure earache, asthma and ozoena, atrophy, intranasal crusting and fetid odour. Their seeds can be used as laxative and as emetics. The plant possesses various properties as laxative, anti-fever, anthelmintic and also used in migraine treatments (Chopra, 1956). The fruit

contains several activities as carminative, anti-inflammatory, abortifacient and used to decrease temperature of the brain, treat opthalmia, epilepsy, leprosy and rheumatism. The roots are used to cure lung diseases in animals and to treat diabetic carbuncles and headaches. *T. tricuspidata* is used to cure bronchitis and the application of seed paste for hoof and mouth disease in animals (Nagata, 1995).

Rubus Ellipticus: *R. ellipticus* is a member of Rosaceae family, also known as akkhe, acchuye, heere, hisalu, hinsar, golden Himalayan raspberry and yellow Himalayan raspberry (Flynn, 1998; Wu, 2013). It commonly grows in the wide areas of mountains and lowlands of India mainly in Kashauli and Ochhghat (Solan, H.P.), Nilgris, Palni hills and in Srilanka. It is found at an altitude of 1800 m (Wealth of India, 1988). *R. ellipticus* has a thorny shrub, height about 1–3 m. The branches are purply or brownish in colour, hispid, with sparse, curved prickles and dense, purplish brown bristles or glandular hairs (Chen, 2006). The flowers are small in size, white in colour and contains five petals, grow in racemes and blooms between February and April. Its fruit are sweet, detachable and red or golden yellow in colour (Stratton, 1996; Iswaran, 1980). *R. ellipticus* fruit contains major nutrients such as ash content, crude fibre, protein and crude carbohydrates as about 1.30%, 2.35%, 3.68% and 27.12%. It also contains minerals such as magnesium, calcium, potassium and phosphorus as about 5.60 mg/100 gm, 0.95 mg/100 gm, 1.82 mg/100gm and 0.20 mg/100gm (Ward, 1962; Negi, 1992). The plant contains various medicative properties as like astringent, anti-diabetic, anti-fertility, anti-pyretic, anti-microbial, analgesic and has been used to reduce fevers, typhoid and also to treat bone-fracture. The inner bark of *R. ellipticus* is used as an anti-diuretic and kidney tonic. The juice of the root of *R. ellipticus* has been used for treatment of fevers, gastric problem, diarrhoea and dysentery. The paste of root is used to heal up the wounds and injuries. The fruit juice is used to reduce fever and for colic, cure sore throats and colds (Patel, 2004). In traditional medicine system it is used as antifertility, antimicrobial, antidiabetic, analgesic, and to cure dysentery, epilepsy, ulcer, wound healing and also used as renal tonic (Vadivelan, 2009; Sylvan, 2009).

Acorus Calamus: *A. calamus* belongs to the family Acoraceae, also known as bach, vacha, gorabach, safedbach, Ugragandha, Shadgrantha, Shataparva, sweet root, sweet flag, and calamus (Singh, 2011; Balakumbahan, 2010). It is found mostly in tropical forest especially in India at Parwanoo and Dagshai (Solan, H.P.). It is found up to an altitude of 2200m in the Himalayas. *A. calamus* is a non-woody perennial with an extended indefinite branched cylindrical stalk that is concerning about ¾ inch in diameter, smooth, pink or pale green. The leaves are green coloured with brownish scars, few in quantity and distichously alternate (Arasan Elaya Raja, 2009). The roots are slender. Flowers are cylindrical shaped, brown in colour, 3 to 8 cm long, and contain many rounded spikes around it. The fruits are small sized and berry like structure with few seeds (Divya, 2011). The oil of this plant is known as 'Calamus oil'. It is mainly used in Brain tonic medicines. The stalk of it contains a wide variety of chemical constituents as calamene, a-pinene, a-asarone, eugenol, c-asarone, p-cymene, a-caryophyllene, 1,8-cineole, calamol, methyleugenol, calamenenol, b-asarone, b-pinene, isoeugenol, eugenyl acetate, calameone, eugenol methyl ether, camphene, methyl isoeugenol, azulene, dipentene, asaronaldehyde, terpinolene, camphor and hydrocarbons (Nigam, 1990; Srivastava, 1997). It also contains fatty acids such as palmitic acid and its ester, heptylic acid, an ester of butyric acid (Chaudhury, 1957). It shows pharmacological activities such as memory enhancing, CNS depressant, sedative, anticonvulsant, hypnotic, tranquilizing, behaviour modifying and acetyl cholinesterase inhibitory (Malhotra, 1961). It is used as an anthelmintic, emetic, anticancerous, anticonvulsant, antispasmodic, emmenagogue, expectorant, antibacterial, antianaleptic, laxative, hypolipidemic, aphrodisiac, bitter tonic, diuretic, stimulant, carminative, etc. Traditionally, it is used for the treatment of asthma, bronchial catarrh, colic, cough, chronic diarrhoea, dysentery, epilepsy, flatulent colic and chronic dyspepsia, intermittent fevers, glandular and abdominal tumours, kidney and liver troubles, memory disorders, otitis media, rheumatism, schizophrenia, tympanitis, and eczema (Kirtikar, 1987).

Asparagus Racemosus: It is commonly called as satmul, Bojhidan, shatavar, shatamuli, shatavari, satuli, vrishya and Spiny Asparagus (Robert Freeman, 1998), which belongs to the Asparagaceae family. It is an important medicinal plant of tropical India mostly found at Ghaggar and Joharil (Solan, H.P.) up to an altitude of 1500m. It is a ligneous creeper and 1-2 m tall. The leaves of *A. racemosus* are like pine spikes, small and uniformed. The flowers are white in colour and possess small spikes. Their roots have a finger like structure and are gathered in nature (Bopana Nishrita, 2007). The plant contains a rich range of chemical constituents which inludes borneol, myrtanol, pinocarveol, hexanal, furfural, decanoic acid, undecanoic acid, camphor, 2-ethylhexanol, perillaldehyde, 10, 14-trimethyl pentadecanone, 4-[1-hydroxyethyl] benzaldehyde, [E]-4-hexadecen-6-yne. The major bioactive constituent of *A. racemosus* are steroidal saponins groups. It contains elements like cobalt, copper, calcium, manganese, phosphorus, potassium, ferrous, selenium and zinc (Kar, 1985). Fruits and flowers of the plant contains vitamin A, $B_{1\&2}$, C, E, asparagine, folic acid, tyrosine, arginine, several flavonoids (quercetin, rutin and hyperosides) (Mohanta, 2003). *A. racemosus* contains mainly phytoestrogen properties. The root of the plant is used as antioxidant, aphrodisiac, antiseptic, anti-inflammatory, general tonic, diuretic, demulcent and antispasmodic properties. It is used to cure epilepsy, menopause syndromes, kidney disorders, infertility, leucorrhoea, hyperacidity, impotence, excessive heat, chronic fevers, stomach ulcers, liver cancer, hyperacidity and diarrhoea and certain contagious

aliments such as syphilis and herpes. It regulates the sexual behaviours and increases milk secretion ability in women. Traditionally it is to cure Premenstrual Syndrome, amenorrhea, dysmenorrhea, menopause, prevents miscarriage, childlessness, decreased libido, threatened miscarriage, menopause, leucorrhoea and pelvic inflammatory aliments such as endometriosis. It may be also use to clean, nourish, and strengthen reproductive organs of female. So, it is considered as the most dominant female health tonic.

Justicia Adhatoda: *J. adhatoda* belongs to the family Acanthaceae. It is also known as basak, vasa, vasaka, adulsa, adhatoda and Malabar nut. It is found in tropical areas of lower Himalayas upto an altitude of 1300 m. It is mostly found in Ghaggar and Ochhghat (Solan H.P.) (Aslam, 2013). *J. adhatoda* plant retains green leaves thought the year and plant living for several years. This plant height is near about 2 meter to 3.5 meter. It has opposite ascending branches with leaves about 10-15cm long and 5cm broad with white or purple flowers and 4-seeded fruits (Prajapati, 2003). The leaves are greenish above and yellowish below (Patel, 1954). The main chemical component of *J. adhatoda* is a bitter quinazoline alkaloid, vasicine, which is present in the leaves, roots, and flowers of the plant (Lahiri, 1964). The other chemical constituents present in the plant are vasicol, fatty acids, adhatonine, vasicinone, vasicinol, vasicinolone (Chowdhury, 1987), vitamin C, saponins, flavonoids and steroids. The leaves oil contain terpene, ketone and phenolic ether (Pandita, 1987). It possesses cardioprotective, abortifacient, uterotonic, antimicrobial (Atal, 1980), anticholinesterase, anti-bleeding, anti-inflammatory (Lahiri, 1964), antitussive (Chakrabarty, 2001), anti-diabetic, anti-allergic, hypoglycaemic (Muller, 1993), hepatoprotective, antiulcer, radioprotective (Shrivastava, 2006), anti-alzheimer (Meenal, 2007), bronchodilator, disinfectant and anti-jaundice properties. It is used in the treatments of cough, bronchitis, asthma, common cold, fever, excessive phlegm, menorrhagia, bleeding piles, impotence and sexual disorders (Shereen, 2013). The leaves of *J. adhatoda* are used to cure wounds, cuts, bleeding, haemorrhage, leprosy, headache and skin diseases. Their fruits are used to cure cold, Jaundice, diarrhoea, bronchitis, dysentery, fever and can be used as laxative and antispasmodic. Their root can be used to cure tuberculosis, leucorrhoea, malarial fever, diphtheria, and eye diseases. Traditionally it is used to treat various diseases and disorders such as respiratory tract ailments, cough, bronchitis, dysentery, diarrhoea, asthma, glandular tumour and common cold (Dymock, 1890).

Dioscorea Deltoidea: *D. deltoidea* belongs to the family Dioscoreacea, also known as Singli-mingli, Varahikand and wild yam. It is mainly found in tropical areas of India in Himalayas region at an altitude of about 550-3100 m. In India it is mostly found at Nehi and Rital (Solan H.P.). It is a perennial climber, height about 3 m. It is a hairless vine. Rhizomes are ligneous irregular, alternately organized. Their leaves are heart-shaped, 6-12 cm long and 5-10 cm broad, hairless from above and velvety from below, leaf stalks are thin and about 6-12 cm long. Flowers are little, distant in clusters. The stalk of the female flowers is single and thin upto 16cm long (Anand, 2011; Mudasir, 2012). It takes about 3 years to grow completely. Its harvesting season is from November-March (Rawat, 2011). D. deltoidea contains various chemical constituents such as diosgenin, cortisone, smilagenone, carbohydrates, glycosides, alkanoides, flavonoids, saponin, tannin, unsaturated triterpinoides, sterol and resin. This plant contains various nutritional and therapeutical properties. D. deltoidea tubers are used to treat various diseases such as chronic liver pain, burns, digestive disorders, sore of throat, diarrhea, wounds, dysenrty, piles, abdominal pain (Subhash, 2012), anemia, irritability, etc. *D. deltoidea* is used to treat and prevent diseases related with cardiovascular and central nervous system, female reproductive system related changes, bones and joints, metabolic disorders, skin diseases, immunodeficiency and autoimmune diseases (Kumari, 2012). It possesses antiallergic, antimicrobial, stomachic and hypoglycemic activities, it can control testosterone level. The rhizome of the plant contains diosgenin which is a basis for anti-infertility, sex hormones and supplements to increase testosterone levels.

Tinospora Cordifolia: *Tinospora cordifolia* plant is a member of Menispermaceae family, also known as amrita bali, gilloy, guduchi, amruthvalli, gulancha, and heart-leaved moonseed. It is found in the tropical areas of Himalayas mostly found in India then in Sri Lanka and Bangladesh. In India it mainly grows in the areas of Solan district of Himachal pradesh. Guduchi is a hairless, evergreen contains juicy stem fleshy bark. It mainly grows in subtropical areas. The stem is white and dark grey colored. *T. cordifolia* leaves are triangular shaped and long petiolate. Roots of this plant are big thread like structure. Flowers are medium and dioecious. Female flowers are solitary and male flowers are in clusters. The fruit drupes red once ripe, fleshy with several drupelets on thick stalk with subterminal style scars, scarlet coloured (Sangeetha, 2011). *T. cordifolia* possesses various types of chemical constituents such as aliphatic compounds, phenolics, diterpenoid lactones, alkaloids, polysaccharides, glycosides, sesquiterpenoid and steroids[92]. Some other constituents present in the plant are amritosides, arabinogalactan polysaccharide, berberine, bergenin, columbin, chasmanthin, crude giloininand, cordifol, cordioside, cordifolisides A to E, ecdysterone, giloin, gilenin, gilosterol, glucan polysaccharide, hydroxyecdysone, heptacosanol, jatrorrhizine makisterone A, magnoflorine, octacosonal, picrotene, palmarin, palmatine, palmatosides C and F, syringen, sitosterol, syringine apiosylglycoside, syringineisocolumbin, tinosporone, tinosporic acid, tinosporol, tinosporidine, tinosporide, tinosponone, tembetarine and tetrahydropalmaitine (Bishayi, 2002). *T. cordifolia* possesses various properties such as antidiabetic, antispasmodic, antipyretic, antiallergic, antihyperlypidaemia immunomodulatory(Gupta, 2011;

Aiyer, 1963), antioxidant, antimicrobial, antitoxic, antihyperglycemic, antineoplastic, antistress, antidote, antileprotic, anti-inflammatory and anticancerous (Sachindra, 1977). It is used to treat several diseases such as rheumatoid arthritis, diabetes, gout, fever, cancer, upset stomach, peptic ulcer, allergic rhinitis, high cholesterol, hepatitis, syphilis and to strong the immune system (Samant, 1998).

Cannabis Sativa: *C. Sativa* belongs to the family Cannabaceae. It is also known as bhang, vijaya, marijuana and hemp. The stem of the cannabis plant can grow up to two meters in height. The leaves of the cannabis plant grow in odd numbered bunches. The leaves vary in color and size, but are usually green with ridged edges and a sharp point. *C. sativa* usually develops flowers around the age of 6 months. The male flowers are small and grow in bunches. The female flowers contain more resin than the male flower. The fruit contains seeds, which are little dark colored balls and contain an oil substance. It is found in the tropical parts of India such as Himachal Pradesh, Maharashtra, North India, Bengal, also Africa and America. In India it is mostly found in Nalagarh and Kashauli (Solan H.P.) (Elsohly, 2005; Ross, 1995). This plant contains almost all types of chemical classes as nitrogenous compounds, amino acids, hydrocarbons, steroids, terpenes flavonoids and sugars. *C. Sativa* is mainly valuable due to the presence of C_{21} terpenophenolic cannabinoid constituent. Some other constituents present in this plant are non-cannabinoid phenols, amino acids, enzymes, glycoproteins, simple acids, lactones, simple alcohols, vitamins, flavonoids, simple ketones, fatty acids, simple aldehydes, proteins, simple esters, pigments and some other elements (Goutopoulos, 2002). *C. Sativa* can be used as anticancer, anthelmintic, antimicrobial, anti-nausea, anti-vomiting, antispasmodic, stomachic, intoxicant, antiseptic, analgesic, anodyne, narcotic, aphrodisiac, abortifacient, antispasmodic, anodyne, sedative. It is used for the treatment of diabetes, asthma, burns, cuts, boils, blisters, hysteria, sleeplessness, dysentery, hemorrhoids, skin diseases, diarrhea, indigestion, rheumatoid arthritis, epilepsy, cholera, abdominal pain, neuralgia, coughing, menstrual pain, dyspepsia, gonorrhea ,muscular pains, malaria etc. (Chopra, 1957). In Ayurveda medicine system it has been using for the treatment of phlegm, diarrhea, depression, migraines, menstrual pain and appetite loss. It also promotes retention and binding the bowels, digestion, happiness, digestive fire, and taste (Dwarakanath, 1965).

Paris Polyphylla: *P. polyphylla* belongs to the family Melanthiaceae, also known as Singpan, Satwa and Satuwa. It is mainly found in tropical Himalayan region of India. In India it is mostly found at Joharil and Ochhghat (Solan H.P.). It is also found in Uttarakhand and Manipur[112]. The herb has an aerial woodless erect stems with a rhizome. Satwa plant leaves whorled of 7-13 cylindrical, pointed, 4-6 inch light green leaves with smooth margin. This plant have bisexual flowers and androecium 6-12. It blooms in the month of July-August. The flower may last upto 3 months, ultimately displaying spherical ¾ inch green capsules that split once ripe in late summer to reveal small red seeds. A well-developed fruit contains 60-70 seeds. It contains various active chemical constituents such as Przewalskinone B, Polyphyllin C, Polyphyllin D, saponin-1, Stigmasterol, Stigmasterol-3-O-β-D-glucoside, Saponin A, Saponin B, Saponin C and Polyphyllins. The main constituents are Steroidal saponins and Diosgenin. Steroidal saponins serve as an agent for breast cancer treatment. It possesses several properties such as anti-tumour, anti-leishmania, anti-tyrosinase, haemostatic, uterine muscle contraction, immuno-stimulating, anti-bacterial, spermicidal and antifungal. It can be used to treat traumatic bleeding, inflammation, microbial infection, cancer, fractures, aprotitis, tumours, and analgesia (Zang, 2010). According to traditional medicine system it has been using to cure mastitis, parotitis, snake bites, injuries and abscess from a long time. It is used to treat female patients suffered from metrostaxis, menstruation problems, uterine bleeding and chronic pelvic inflammation.

Trillium Govanianum: *T. Govanianum*, also known as Nag chhatri and teen patra belongs to the family Melanthiaceae. It is a native species of Himalayas. It is mainly found in the subtropical areas of Himalayan region of India at an altitude of 2500–4000 m. It may also found in Bhutan and Pakistan. In India it mainly grows in Kandaghat and Salogra (Solan H.P.). Nag chhatri is near about 25-32 cm tall herb containing stout rhizomes and can easily characterized by its leaves in a whorl at the summit of the stem and this plant have purple flower in the center. Plant leaves are oval shaped and conspicuously stalked. It contains various chemical constituents which include important classes of metabolites as alkaloids, glycosides, tannins, steroids, terpenoids, saponins and phenolic compounds (Okigbo, 2009). Due to rich availability of active constituents its demand is very high in medicinal markets. It possesses various properties such as antifungal, antiparasitic, antibacterial, anticancerous, antihistaminic, anti-inflammatory, analgesic, antiseptic, antiviral, anthelmintic, hepatoprotective, antispasmodic, diuretic, emmenagogue and ophthalmic (Akihito, 2008). It is primly used to cure Cancer disease. It can also be used to cure inflammation, dysentery, boils, sexual and menstrual problems, wound healing, pain and also as an antiseptic, female health problems as menstruation problems, sex hormones and in stomach problems (Khan, 2016). In folk medicine system *T. govanianum* rhizomes can be used to cure skin boils, backache, healing of wounds, dysentery, inflammation, menstrual and sexual disorders (Rani, 2013; Mahmood, 2012).

3. CONCLUSION

In Solan, various plants are available to maintain human health and to treat several aliments. These herbs contain various properties such as anticancer, hepatoprotective, diuretic, antimicrobial, radio-protective, antidiabetic, antioxidant, anthelmintic, contraceptive, abortifacient, antiulcer, etc. Modern allopathic medicines show many side effects that because plant based medicines may be popularized and traditional knowledge of plants and folk-medicine may be conserved. New generation may be sensitized and motivated to use natural products. Several research programs should be promoted and implemented on medicinal herbs for the prosperity of humanity.

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