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A Review On Crataegus Songarica K

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ABSTRACT

Objective *The main goal of the present study was to examine, provide knowledge of uses of Crataegus Songarica and provide recommendations for its future studies.*

Material and Methods *Scientific literature on ethnomedicinal studies conducted in various parts of the world including J&K state of India available in the journals, edited books and other scientific databases viz., Google Scholar, PubMed, CAB international, DOAJ, Scopus, Science direct, SciFinder, and Web of Science were searched. Ethnomedicinal surveys on the Crataegus songariica from last decades up to January 2018 were included in this study.*

Results *Crataegus Songarica belongs to the genus: crataegeae, family: Rosaceae, having 200 species. It is distributed in Iran, Afghanistan, northern Pakistan, northern India, Tadzhikistan, Uzbekistan, Kyrgyzstan, Kazakhstan, and Sinkiang. It is vernacularly called as ban-Sangli, ring, goni, dakh, batsinga, pingyat, dolana. It is rich in phytoconstituents viz. alkaloids, terpenoids, flavonoids, carbohydrates, tannins and phenolic compounds, saponins and proteins etc. It possesses various traditional uses. Pharmacognostic study exhibits its hepatoprotective, antioxidant, DNAprotective, antimicrobial, antiproliferative, antitumor, cardioprotective, nephroprotective and many more properties*.

Conclusion *Crataegus Songarica possesses attributes of the medicinal plant due to the presence of phytoconstituents.*

Keywords: *Crataegus Songarica, phytochemistry, Pharmacognosy.*

I. INTRODUCTION

Crataegus L. is a well-defined genus conventionally referred to tribe Crataegeae belongs to subfamily Maloideae, of the family Rosaceae (Phipps 1983a [1], 1988 [2]). (Kalkman, 1988 [3]) divided the family Rosaceae into four subfamilies on the basis of fruit types viz., Spiraeoideae, Maloideae, Rosoideae, and Prunoideae. Many Crataegus (Hawthorn) species are polyploids and can reproduce both sexually and apomictically (Lo, 2010 [4]). *Crataegus songarica* **(**Koch, 1853 [5]) has about 200 species (Hobb Foster, 1990 [6]). It is cultivated in Asia, Australia (Phipps, 1983 [1]), Canada (Dickinsan, 1985 [7]). *Crataegus Songarica* is an ornamental small hard,

spiny, deciduous tree or shrub up to 9 m tall, bark peeling off in long flakes (Anwar *et al*, 1979 [8]), covered with straight axillary or terminal thorns; leaves deep and sharp irregularly 4¬7 lobed; with rose- like white flowers (Wealth of India, 2003 [9]), flowers terminal corymbose cymes, releasing spicy smell (Anwar *et al*, 1979 [8]), fruit, globose, ovoid or scarlet, red, yellow, blue or black in colour, containing 2-3 more bony Pyrenes (Nadkarnis, 1976 [10]). ripening of fruit occurs in early to mid-autumn (Brown, 1995 [11]). Fruit is 16 mm in diameter, flesh is mealy and dry (Anwar. et al. 1979 [8] and Shinwari *et al*, 2006 [12]), *Crataegus songarica* grows in a soil with ph 7.3, organic carbon 9.0, nitrogen 297, phosphorous 19.6 (Lone *et al*, 2016 [13]). *Crataegus songarica* is used for cardiovascular conditions such as congestive heart failure, coronary circulation problems, and arrhythmias. It is also used to protect pulmonary disease, to support hypotension and hypertension, atherosclerosis, hyperlipidemia, and Buerger's disease. The barriers are used for antihypertensive and cardio ionic potential. It improves cardiac activity in patients with congestive heart failure (Kiritikar and Basu, 1918 [14]).

1.1, Distribution

Crataegus Songarica is distributed in Iran, Afghanistan, northern Pakistan, northern India, Tadzhikistan, Uzbekistan, Kyrgyzstan, Kazakhstan, and Sinkiang on limestone, granite, on mountain slopes, in woodlands, and along rivers at an altitude of 800-2700 m (Pojarkova, 1939a [15]) and (Rechinger 1969 [16]). It grows in river valleys and ravine slopes in the mountain zone in India, found in the temperate Himalayas of Kashmir and Himachal Pradesh, the altitude of 1800-3000m (Nadkarni, 1976 [10]). It is also found in Afghanistan and Uttar Pradesh at an altitude of 1500-2700 m (Kiritikar and Basu, 1918 [14]). In Jammu and Kashmir, it is distributed in Jehllum, Lolab, and Sindh valley, Gulmarg, Pahalgam, Pirpanjal Range (Lone, 2013 [18]).

1.2, Trade name English Hawthorn (Anwar *et al*., 1979 [8]), Bansangli (Shinwari *et al.*, 2006 [11]).

1.3, English name Hawthorn (Anwar *et al.*, 1979 [8]). **1.4, Habit** Tree (Shinwari *et al.*, 2006 [12]).

1.5, Status Common (Shinwari *et al.*, 2006 [12]).

1.6, vernacular names *Crataegus Songarica* has various vernacular names viz., Ban-Sangli, (Hindi), Ring (Kashmiri), Ban-Sangli (Punjabi) (Anwar *et al.*, 1979 [8]), Goni (Chitrali) (Shah and Hussain 2012 [18]), Dakh (kishtwar) (Kumar *et al.*, 2009 [19]), Batsinga (Allai Valley, Western Himalaya Pakistan) (Haq, 2012 [20]), Pingyat (Lahaul Himachal Pradesh) (Rawat *et al.*, 2010 [21]), Dolana (Guldara, Kabul) (Amini and Hamdam, 2017 [22]).

1.7, Taxonomical classification of Crataegus Songorica

Kingdom: Plantae
Class: Dicotyledoneae
Order: Rosales
Family: Rosaceae (Phipps, 1988 [2])
Sub family: Maloideae (Kalkman, 1988 [3])
Genus: *Crataegus*

Species: s*ongarica* **(**Koch, 1853 [5]).

II.MACROSCOPIC AND MICROSCOPIC EXAMINATION

Crataegus songarica is a small tree or Shrub. Twigs sparsely villous; thorns long, stout up to 1.5 cm. Buds are 1.9-2.5 mm long and 1.6-2.5 mm in diameter (Duthie 19424a [23]). Leaf blades are bright green and sparsely villous above, pale green and villous-lanate along major veins beneath, cuneate to truncate at base, lobes more or less acute, margin irregularly crenate-serrate or incised-serrate, with coarse or very coarse teeth, a basal pair of veins divergent. Subterminal leaf blades of flowering shoots are 3.5-6.2 cm long, 2.7-7.7 cm wide, lobes 3-4 pairs, basal pair 2.6-3.9 times as long as wide, extending 0.7-0.9 times the width of lamina to midrib, each lobe with 3-8 teeth in the distal 11/20-1/8, basal pair of sinuses in the basal 2/5-3/10 of lamina; petioles are 10-26 mm, 0.3-0.5 times as long as lamina; stipules are 7-16 mm long, entire or irregularly serrate with 1 8 teeth (Khan s.n. [24] (MEL). Subterminal leaf blades of short shoots are 3.5-6.9 cm long, 3.2-6.0 cm wide, lobes 3-4 pairs, basal pair 2.5-3.6 times as long as wide, extending 0.8-0.9 times the width of lamina to midrib, each lobe with 3-9 teeth in the distal 2/5-3/10, basal pair of sinuses in the basal 2/5-1/5 of lamina; petiole 17-34 mm and 0.5 times as long as lamina(Duthie 19424a [23] (W)). Leaf blades of elongate shoots are 3.2-6.8 cm long, 3.0-7.7 cm wide, lobes 3-5 pairs, basal pair 2.1-2.6 times as long as wide, extending 0.7-0.9 times the width of lamina to midrib, each lobe with 5-15 teeth in the distal 3/5-1/4, basal pair of sinuses in the basal 2/5-1/5 of lamina; petiole 14-29 mm, 0.4-0.5 times as long as lamina; stipules are 8-14 mm long, more or less irregularly serrate with 2-18 teeth (Lace s.n. 1730 [25] (B)).

Inflorescence 3.0-5.5 cm long, corymbose, 10-19-flowered, lax, sparsely villous; pedicels 4-30 (-50) mm long, more or less villous-lanate; bracts 2.6-3.0 mm long, caducous 0.4 mm wide, 7.5-8.5 times as long as wide, caducous, margin with 1 tooth (Lace s.n . (B) 1730 [25]). Hypanthia are 3-5 mm long, more or less densely villous-lanate, rarely more or less glabrous; sepals 2.1-3.5 mm long, 2.1-2.8 mm wide, triangular, 0.9-1.4 times as long as wide, margin entire, apex subacuminate, acute or obtuse; petals 4-7 mm long, 4-8 mm wide; stamens 18-20, anthers purple; styles (1-) 2 (-3). Fruits are 8-14 mm long, 6-14 mm in diameter, 1.0-1.3 times as long as wide, subglobose or slightly pyriform, blackish purple, more or less villous-lanate, crowned by the persistent, reflexed (Khan s.n. [24]) sepals; flesh yellowish (Karelin 320 [26] (LE)); pyrenes (1-) 2 (-3), dorsally sulcate (Makarov 858 [27]), ventro-laterally smooth or sulcate, hypostyle pilose (Paulsen 1463 [28]) (Fig.1 and Fig.2). Chromosome number: 2n (4x) - 68. (Gladkova, V. N. 1968 [29]).

2.1, Phenology Flowering occurs in April and May and fruiting occurs in July to October (Christensen, 2012 [30]).

2.2, Pollen characteristics (Perveen and Qaiser, 2014 [31]).

Shape: oblate-spheroidal.

Measurements:

Polar axis P= 22.5 (24.31+.23.6) µm.

Equatorial diameter E = 26.0 (18.21+_.96) µm.

colpus= 13.1(26.10+_0.65) µm in length.

Fig. 1: Crataegus Songarica

Mesocolpium= 15.6 (10.4+_0.87) µm.

Apocolpium= 10.11 (11.6+_6.44) µm.

Exine thickness= 1.15 (1.51+_0.05) µm.

P/E ratio: 22.5/26.0 µm.

Fig. 2: Crataegus Songarica

III.PHYTOCHEMICAL INVESTIGATIONS

The ethanolic extract of leaves of *crataegus songarica* possesses alkaloids, terpenoids, flavonoids, carbohydrates, tannins and phenolic compounds, saponins and proteins (Bhat *et al.*, 2017 [32]).

Phytochemically, different groups of compounds have been reported such as vitamin C, flavonoids, glycosides, anthocyanidins, saponins, tannins, antioxidants and phenolics (Ljubuncic *et al.*, 2005 [33] and Schussler *et al.*, 1995 [34]).

IV.TRADITIONAL APPLICATIONS

Crataegus Songarica possess various traditional uses, its Fruits are edible and considered as cardiotonic (Haq, 2012 [20]).

Bark extract in Ghoni Pakistan is given to the pregnant woman to reduce labour pain (Shah and Hussain 2012 [18]).

Fruits are used by people of kishtwar, Jammu and Kashmir to keep the heart healthy and against constipation (Kumar *et al.*, 2009 [19]).

It is used as a sedative, antispasmodic, astringent, and diuretic, as well as for gastrointestinal conditions such as indigestion, enteritis, epigastric distension, diarrhoea, and abdominal pain. It relaxes the uterus and intestine smooth vessel, it constricts the bronchi and coronary vessels (Holubarsch *et al.*, 2000 [35]).

Fruits are used for palpitation of heart and hypertension (Lone. et al, 2014 [36]).

Fruit may also be effective orally for tapeworm infections, acute bacillary dysentery, and amenorrhea. Fruit liquid preparations are used to wash sores, itching, and frostbite. Fruits are also used as a popular remedy for diarrhoea or slight phlegmasia (Khan *et al.*, 1979 [37] and Bhattacharjee, 2004 [38]).

It may be used as tincture and has got antioxidant properties (Rahman *et al.*, 2003 [39]).

The leaf and unripe fruit decoction are used for the treatment of cancer, diabetes and sexual weakness (Bahorun *et al.*, 1994 [40]).

Fruits are used in Treatment of cardiovascular diseases, diabetes, constipation in Guldara District of Kabul, Afghanistan (Amini and Hamdam, 2017 [22]).

V.PHARMACOGNOSTICAL INVESTIGATIONS

Pharmacognostical studies exhibit various protective properties of *Crataegus Songarica* as

5.1, Hepatoprotective potential

The investigation of methanolic extract of the *Crataegus songarica* leaves against CCl4- and paracetamol-induced liver damage exhibit increase in ALT, AST, bilirubin, and alkaline phosphatase levels in rats administered with 500 mg/kg body weight of paracetamol. Decreased antioxidant defense system as glutathione (GSH), catalase (CAT), glutathione peroxidase (GPX), glutathione reductase (GR), glutathione-S-transferase (GST), and superoxide dismutase (SOD) were observed in rats treated with CCl4 and paracetamol. Treatment with the extract reduced the elevated serum GOT, GPT, LDH, bilirubin, and alkaline phosphatase and increased the antioxidant enzymes in a dose-dependent manner. Therefore, the extract may be an efficient hepatoprotective agent for treating hepatic disorders and other oxidative stress-related diseases (Ganie *et al.*, 2014 [41]).

5.2, DNA protective potential

The protective effect of methanol extract of *Crataegus songarica* on calf thymus DNA was investigated. Hydroxyl radicals produced by Fenton reaction were found to induce breaks in calf thymus DNA. H_2O_2 in the presence of ferric nitrate and ascorbic acid induce DNA strand breaks and help the DNA molecule to run fast. The extract at 10–80 μg offered complete protection to DNA damage induced by hydroxyl radicals in calf

thymus DNA (lanes 3–7). Thus, the hydroxyl radical quenching ability of polyphenolic compounds of *Crataegus songarica* could be responsible for the protection against oxidative damage to DNA (Ganie *et al.*, 2014 [41]).

5.3, Antiproliferative and antitumor potential

The methanolic, ethanolic and ethyl acetate extracts of *Crataegus songarica* inhibits the proliferation of six human cancer cell lines. The cytotoxicity effect found was highest with MFC-70 and SW480 cell lines. The effect was analyzed at different concentration levels via 20, 50 and 80mg mL^{-1} and the inhibitory effect was concentration-dependent and cell line specific. This indicates the presence of potent bioactive principles in the extracts might be useful as antiproliferative and antitumor agents (Ganie *et al.*, 2016 [42]).

5.4, Nephroprotective potential

Administration of *Crataegus songarica* extract at the dose of 300mg/kg body weight significantly decreases serum creatinine (59.74%), urea (40.23%) and cholesterol (54mg/dL), Compared with CCl4 treated group of rats (Ganie *et al.*, 2016 [42]).

5.5, Antifungal potential

The extract *Crataegus songarica* and its hexane (11% w/w), chloroform (31.9% w/w), n-butanol (38.8% w/w) and finally the water (18.2% w/w) fractions showed marked antifungal activity against T. longifusus, A. flavus, M. Canis and F. solani with MICs ranges from 670 µg/mL to 110 µg/mL (Tariq *et al.*, 2013 [43]).

5.6, Cardioprotective potential

Alteration in antioxidant defense system, such as GPx, GR, GST, CAT, and GSH on CCl4 intoxication markedly lessens the antioxidative status of cardiac tissue in comparison to control group. The methanolic extract of *Crataegus songarica* ameliorated the toxic effects of CCl4 near to control by elevating the activity of suppressed antioxidant enzymes. In the heart tissue, GR, CAT, GPX and GST activities were reduced to 16.05, 536.1, 22.0 and 15.51 in CCl4-treated animals. Treatment with *Crataegus songarica* extract in a dose-dependent manner increased antioxidant enzymes activity (Ganie *et al.*, 2016 [42]).

5.7, Antibacterial potential

The extract of *Crataegus songarica* exhibit possible antibacterial activity against E. coli, B. subtilis, and S. Flexneri with MICs 310 µg/mL, 760 µg/mL and 220 µg/mL respectively. The n-hexane fraction was active against E. coli with MIC 270 µg/mL while the chloroform fraction was active against B. subtilis with MIC 490 µg/mL. The ethyl acetate fraction exhibited significant activity against E. coli and B. subtilis with MICs 150 µg/mL and 390 µg/mL, respectively. The then-butanol fraction was active against P. aeruginosa with MIC 540 and water fraction was active against S. Flexner with MIC 470 µg/mL (Tariq *et al.*, 2013 [43]).

5.8, Antioxidant potential

Crataegus songarica ethanolic leaf extract of possesses free radical scavenging activity, in-vitro models like DPPH and reducing power assay reveal. The flavonoids and phenolic compounds have already been explored to possess the antioxidant activity and the extract is well versed with these two depicting its efficacy (Bhat *et al.*, 2017 [32]).

The in vitro antioxidant capacity of methanol leaf extract of *Crataegus songarica* observed through different methods (DPPH, reducing power, lipid peroxidation, and DNA damage) confirmed that phenolic compounds present in the extract are powerful scavengers of free radicals (Ganie *et al.*, 2014 [41]).

VI.CONCLUSION

Crataegus Songarica is a medicinal plant with enormous protective activity against ailments. The medicinal value of *Crataegus Songarica* is due to the presence of phytochemicals viz., alkaloids, terpenoids, flavonoids, carbohydrates, tannins and phenolic compounds, saponins, vitamin C, glycosides, anthocyanidins, proteins. Hence further evaluation is needed to expose fully the medicinal value of the plant in order to combat various health-related complications.

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