Journal of Medicinal Plants Studies
www.PlantsJournal.com

ISSN (E): 2320-3862
ISSN (P): 2394-0530
NAAS Rating: 3.53
JMPS 2018; 6(1): 11-13

Received: 06-11-2017
Accepted: 07-12-2017

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Trillium govanianum Wall. Ex D. Don (Nagchatri): An important Ethno medicinal Plant of Himalayan region (Himachal Pradesh)

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Abstract
Introduction: *Trillium govanianum* Wall ex D. Don is a promising medicinal plant of Himalayan region. During the last decades the medicinal plant is in high demand. Locally the plant is known as nagchatri.
Aim: The present study has been carried out to assess the quantum extraction and status, trade and conservation of this species.
Material and Method: The State of Himachal Pradesh (30°22′40″- 33°12′40″ N to 75°45′55″- 79°04′20″ E) was surveyed.
Geographical Distribution: The genus *Trillium* consists of 31 species, widely distributed in Western Himalaya.
Discussion: The root of the taxon is widely used by the local inhabitants of Himachal Pradesh in treatment of various ailments. Due to unscrupulous extraction of this species from wild in Himachal Pradesh, its population has decreased to a great extent. Such practices have left the species in Threatened condition.
Conclusion: There is urgent need to create awareness and give training to local communities about sustainable exploitation of medicinal plant wealth and to encourage its large-scale cultivation in high-altitude areas. The government should raise nurseries and provide plant material to villagers. It will not only help in its conservation, but also supplement their income.

Keywords: *Trillium govanianum* Wall. ex D. Don, Himachal Pradesh, Ethno medicinal Plant, Conservation

Introduction
Medicinal plants have been known for millennia and are highly esteemed all over the world as a rich source of therapeutic agents for the prevention of diseases and ailments. Himalaya is rich in biodiversity due to a variety of habitat available in it. India possesses the world's richest medicinal plant heritage, traditional and local knowledge, and Himalaya is one of the mega biodiversity regions of the world [1]. In the Indian Himalayan region about 1748 species of medicinal plants [2], 675 species of wild edibles [3], 279 species of fodder [4], 118 species of essential oil yielding plants medicinal and aromatic plants [5] and 155 species of scared plants [7] have been recorded. In India more than 95% of 400 species used in preparing medicine by various industries and harvested from wild populations [6]. Like other part of Himalaya, the inhabitants of Himachal Pradesh are also dependent for medicines, food/ edibles, fodder, fuel and various other purposes on forests. Himachal Pradesh forms a part of western Himalayas, Repository of Medicinal and Aromatics plants and the traditional knowledge associated with these plants.
Utilization of Plant resources in their day-to-day life has been an age old practice of the people inhabiting this hilly state. The people living in remote and tribal areas still depend on household remedies for health care.
It is highly desired to discover excellent remedies for diseases that are economical, having no or low side effects, potent and efficacious in various pathological conditions. For discovering such products, medicinal plants and herbal medicines can be the best choice as plants produce a wide range of bioactive compounds, making them a rich source of different types of medicines. Numerous drugs have entered international pharmacopoeias through ethno-pharmacological and traditional medicine studies [8]. Based on folkloric use, research on medicinal plants has proved the presence of valuable pharmacologically active compounds

with anti-cancer, anti-parasitic, antifungal, antibacterial, analgesics, and anti-inflammatory properties [9, 10].

Trillium govanianum is a promising medicinal plant, having high medicinal properties. The inhabitants of the study area, collect rootstock of nagchatri for treatment of various ailments i.e. stomach, joint pains, wounds, and are also involved in extraction of the species for trade. For this, the villagers uprooted plants before seed setting. They found it a lucrative business because extraction of *T. govanianum* has substantially improved their financial conditions. But, this unethical and unauthorized practice is to be prohibited strictly as this may lead to extinction of the species from the area.

Material and Method

Study Area

The State of Himachal Pradesh (30°22′40″- 33°12′40″ N to 75°45′55″- 79°04′20″ E) includes parts of the Trans and Northwest Himalaya and covers 55,673 km2: 9% of the IHR [11]. Like other states of the IHR (Indian Himalayan Region), Himachal Pradesh has a representative, natural, and socio-economically important biodiversity. It has a large altitudinal range (200–7109 m), with diverse habitats, species, populations, communities and ecosystems.

Geographical distribution

Trillium govanianum Wall.ex. D. Don belongs to the genus belonging to family Trilliaceae is an indigenous medicinal plant of Himachal Pradesh, India. *Trillium govanianum* is popularly known as Nagchatri, is an endangered plant species from Himalayas. It is a robust, trifoliate herbaceous plant species with deep red and green colored flower on the axis and is found in the vicinities of Himalayas especially in India, Nepal, China and Bhutan, found at an altitudinal range of 2500–3800 m.

In the earlier studies study carried by Vidyarthi, Samant, Sharma, 2013 it was reported in Upper Beas valley were, Hamta, Rani nalla, Jamu Dhug, Dundhi, Fakru, Bakru Thatch, Kothi Jot Kelgu butru, Deusu and Seri nalla; in Parbati Valley; Thunja, Kheer Ganga, Pandu Pul, Malana, etc.; in Banjar Valley; Lamba lambhri, Sakiran, Hirb, Seolsar, Chhera, Rajjandi, Raghupur Jot, etc.; in Lag Valley; Sruni, Bhabsi, Sori and Machak Jot; and in Mohal Khad Watershed; Munjhak, Nanga Dhardha, Hathipur, Tarapur Garh, Bhubu Jot, etc [13].

During the study extensive survey were made in 2017 and the plant was reported in few areas of Bajar valley forest area: Jahloripass, Sojha, Sarolshar, Great Himalayan National park area; Ranipani, Sarot, Saharan forest areas comprising of temperate and sub-alpine forests, are mainly dominated by broadleaved and coniferous species, and alpine meadows which are dominated by alpine scrubs and herbaceous species.

Taxonomical Features

Trillium govanianum is a perennial herb. Rootstock thick, creeping, stem erect unbranched. Leaves broadly ovate, acute, leaf- stalk 0.5-1.5 cm long; arranged in a whorl at the summit of stem with a solitary stalked flower in the centre. Flower brown- purple. Fruit globular, red berry 1-2 cm long, seed ovoid, numerous, having a pulpy lateral appendage [12].

Physiochemical parameters

Total ash value in the rhizome of *T. govanianum* is 12.5%, water soluble ash 0.4%, acid soluble ash 2.4%, and acid insoluble ash 0.8% w/w. Extractive values are high for solvent like water (21.5%) and methanol (18.75%) as compare to non-polar solvents, which is an indicative of abundance of sugars, and other polar compounds like glycosides, saponins, flavonoids and steroids [14].

Phytochemical Analysis

The preliminary phytochemical on *T. govanianum* rhizome revealed the presence of secondary

Metabolites in methanolic extracts and its fractions, such as glycosides, steroidal saponins, tannins, sterols and flavonoids [15].

Therapeutic Uses

T. govanianum has Analgesic, anti-inflammatory activity, Anti-cancer activity, Anti- fungal activity, anti- oxidant activity [16].

Roots contain Trillarin, which on hydrolysis yields 2.5% diosgenin - a cortico-steroid hormone. The cortico-steroid hormone isolated from the plant is used in various preparations like sex hormones, cortisone and allied preparation used in rheumatism, regulation of menstrual flow and the like. In spite of this it is also used in stomach related problems. In traditional medicines, rhizomes of this plant species are used for treating wounds, dysentery, skin boils, infections, and menstrual and sexual disorders, Stomach by the local inhabitants.

Discussion

Due to its effective medicinal properties, the demand of this drug is high in the international markets. The increasing demand of the herbal industry for nagchatri a promising medicinal plant found in the temperate zone of the Himalayas is leading to its indiscriminate and excessive exploitation and posing a serious threat to it. The herb is being smuggled out of the state in bulk. Over the last six months, large quantities of the dried herb have been seized by the Forest Department and other government agencies. There is no ban on the collection of the herb, but it cannot be transported out of the state without permit. The sudden increase in demand has also resulted in an abnormal hike in its price, which has shot up from Rs 800 per kg to between Rs 2,500 and Rs 3,000 per kg. It has become a lucrative source of income for villagers. Continuous exploitation by poaching of this important drug from its local habitat of Himalayas is a matter of concerned global concern in the near future. More appropriate techniques towards its conservation and ban on its exploitation from the Himalayas can conserve this rare herb Nag chatri. In the study sites of Himachal Pradesh was notice that the local inhabitants were collecting Nagchatri in huge quantity. There is a risk of its extinction as the plant is uprooted from the base.

Conclusion

Biodiversity has always been one of the best livelihood options, as it provides various services to mankind. Amongst the various components of biodiversity, medicinal plants are very well known as livelihood option. *T. govanianum* can be the best example as this species is commercially exploited for trade and livelihood by the villagers. During the recent 2 to 3 years, increasing demand of this species has resulted in over-exploitation from the wild. Trade in the study area is largely unregulated. The region does not have any certification standards and ends up losing hefty revenue. The inhabitants are largely dependent on forest resources for their livelihood, primarily the collection and trade of medicinal plants. The local people are unaware about the use of the plant, the reason

behind its sudden demand and the final destination of the raw material. It is the monetary benefit that counts for them**.** The foremost important thing is to create awareness and give training to local communities on multidimensional basis about sustainable exploitation of medicinal plant wealth in hillside management for plant resources. And there is need to encourage its large-scale cultivation in high-altitude areas. The government should raise nurseries and provide plant material to villagers. It will not only help in its conservation, but also supplement their income.

Fig 1: Botanical study of the important medicinal plant Nagchatri (*Trillium govanianum* Wall.ex D. Don) found in the Himalayan region

Acknowledgement
The Authors are greatly thankful to the Director General Prof. Vd. K. S. Dhiman, CCRAS, New Delhi for their motivation and for providing necessary facilities.

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