



Dactylorhiza hatagirea (Panchaunle) and *Juglans regia* (Okhar): A review

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Abstract: Medicinal plants are the healers for human beings and Nepal holds a considerable number of medicinal plants which are used in traditional and modern medicine. *Dactylorhiza hatagirea* (D. Don) Soo and *Juglans regia* L. have been used in Nepalese medicine since time immemorial due to their healing properties. This paper aims to collect information on medicinal uses of these species. This paper is totally based on review of 55 papers regarded as secondary source of information. v helps in wound healing, stopping bleeding, improving sexual functionality and many other uses. *Juglans regia* L. can increase memory as well as is an antioxidant, antidiabetic, antimicrobial and so on. Overexploitation poses major threat to their conservation. Thus, the effective scientific plantation techniques, effective implementation of law and other conservation approaches should be emphasized and studied to protect those species as well as improving the life standard of people.

सार

औषधिय बिरुवाहरु मानवका लागि जिवनबुटी हुन र नेपालमा परम्परागत र आधुनिक कालखन्डमा प्रयोग हुने औषधिय बिरुवाहरु प्रयाप्त सङ्ख्यामा पाइन्छन् । *Dactylorhiza hatagirea* र *Juglans regia* आफ्नो चिकित्सकिय गुणहरुको कारण नेपाली चिकित्सामा अनन्त काल देखि प्रयोग हुँदै आएका छन् । यस लेखको लक्ष्य यी दुई वनस्पतिको औषधिय उपयोगको जानकारी संकलन गर्ने हो । यस लेख पुण रुपमा दोस्रो स्रोतको जानकारीमा आधारित छ र यसका लागि ५२ लेखहरुको समिक्षा गरिएको छ । *D. hatagirea* घाउ निको पार्न, रक्तस्राव रोक्न, यौन कार्यक्षमता सुधार गर्न र अन्य धेरै कार्यमा उपयोग गर्न सकिन्छ । *J. regia* ले सम्झने क्षमता सुधार गर्नुका साथै *antioxidant*, *antidiabetic*, *antimicrobial* का रुपमा पनि काम गर्दछ । वनस्पती स्रोतको अत्याधिक शोषणले उनिहरुको संरक्षणमा ठूलो खतरा उब्जाएको छ । बैज्ञानिक बृक्षारोपण र कानुनको प्रभावकारी कार्यान्वयनलाई जोड दिदै अध्ययन गरि ती प्रजातिहरुको संरक्षण संगसंगै मानिसहरुको जिवन स्तरमा सुधार गर्नुपर्छ ।

Keywords: Medicinal plant; walnut; MAPs; traditional medicine



INTRODUCTION

Nepal, with an area of 147,181 square kilometers and an average width of 193 kilometers, ranging up to an altitude of 8848 meters. Due to great altitudinal difference consisting 118 ecosystems, it is extraordinarily rich in floral diversity (DNPWC, 2018). Nepal consists of about 3.2% of world floral species. It includes algae of 807 species fungi of 2025 species, 771 species of lichen (Kunwar et al., 2010), bryophytes of 1215 species (Pradhan, 2018), pteridophytes of 550 species (Fraser- Jenkins et al., 2015), 26 species of gymnosperms and 6973 angiosperms (MoFSC, 2014). Among these, more than 2000 species comes under Non-Timber Forest Products (NTFPs) and 1624 species have been used for medicinal purposes (MoFSC, 2014).

The wild plant resources play a vital role in the health care of local communities in Nepal (Joshi et al., 2020). Ethno-medicinal traditions along with geo-climatic variation has led Nepal to be a storehouse for traditional medicinal plants (Joshi et al., 2020). A total of 300 species of medicinal plants are being traded in Nepal (Pyakurel et al., 2019). India and China are the major exporting point for traders through the means of collector to local traders to wholesale traders in Terai to India or from wholesale trader to China (Olsen, 1996; Lamichhane et al., 2021). The formally protected species which are commercial accounts for about 39% of total traded medicinal species which include even those which are banned for collection and trade (Pyakurel et al., 2019). Medicinal plants are at great risks due to climate induced changes (Applequist et al., 2020), habitat specificity, excessive grazing, high trade demand and unsustainable harvesting practices (Shrestha and Shrestha, 2012). Due to the ever-increasing demand and extensive price, the overexploitation of invaluable and rare medicinal species has resulted unmanaged and unsustainable commercial harvesting (Pyakurel et al., 2019). Medicinal plants play leading role in livelihood, socio-economic prospects, and health sector of Nepalese people (Bhattarai et al., 2009; Bhandari et al., 2021).

Panchaunle and Okhar are protected species in Nepal and commercially harvested for trading to China and India (Subedi et al., 2013). In English, *Dactylorhiza hatagirea* is called marsh orchid (Warghat, 2015) while in Nepali it is referred to as Panchaunle. It is endemic to Himalayas and undergoing great threats due to their extensive use in traditional and modern medicines. It is one of the 12 plants which has been selected by government of Nepal for agro-technology (Khadka et al., 2016). The collection, sell, use and trade of *Dactylorhiza hatagirea* has been banned by Forest Act of Nepal, 2019 (Chapagain et al., 2021). *Juglans regia* is important for its timber and nuts (Roor et al., 2017). It is a monoecious tree which prefers warmer part of temperate and subtropical regions (Leslie and McGranahan, 1998). It is extensively used for medicinal purpose. Both the species have been threatened by human activities and their latest medicinal and other uses should be gathered and published for arousing consciousness about their importance and status leading to their conservation and protection along with sustainable uses. Thus, this paper collects the information from various sources and presents in a structured way with their status, distribution and major medicinal uses.

MATERIALS & METHODS

This paper is solely based on the secondary source of information i.e., articles, government papers, and publications that are freely available in Google, Yandex, Google Scholar and Researchgate (Aryal, 2021; Timilsina et al., 2020). Altogether 55 papers were selected for the review and the papers were selected based on their citations and aligning with the objective of our study. Keywords such as *Dactylorhiza*, *Juglans*, MAPs, ethnomedicine, NTFP (Non-Timber Forest Products), etc. were used to search for articles.



RESULTS & DISCUSSION

In ancient medication system, *Dactylorhiza hatagirea* (D. Don) Soo (Panchaunle) has been regarded as the foremost supportive medicine. It belongs to the order Asparagales and family Orchidaceae (Orchids). The mature plant has height of about 45 cm. the diagnostic character of this plant is that the roots are tuberous and are slightly flattened with 3-5 fingers like lobes (Ranpal, 2009). Leaves are lanceolate (Sumalatha et al., 2010). It is widely distributed in Hindukush Himalayan Region (Shrestha et. al., 2021) which includes from Pakistan, India, Bhutan, Nepal, China to Myanmar while its regional distribution from Nepal has been studied from Dolpa, Doti, Gorkha, Kaski, Dolakha, Sindhupalchowk and Rasuwa (Raju and Rajitha, 2021). It is a threatened species and enlisted as threatened by IUCN (International Union for Conservation of Nature) while it is enlisted in Appendix-II by CITES (Samant et al., 2002).

Dactylorhiza hatagirea (D. Don) Soo is grown well with good amount of organic matter in acidic soil (pH 4.9). It is a light demanding species and found in open areas of grasslands above tree line too (Prasad, 2016). It prefers moist places in between 3000-4000 meters altitude. It reproduces both vegetatively as well as from seeds but seed propagation is difficult to find (Prasad, 2016). It is usually harvested in August and September.

Dactylorhiza hatagirea (D. Don) Soo has multiple uses. The young shoots and leaves are used as vegetables (Lama, 2012). The tubers need to be processed before medical use. Sun drying, squash and grinding are the major steps of processing (Raju and Rajitha, 2021). It has anti-inflammatory (Sharma et al., 2020), anti-cancerous (Popli and Sood, 2010), anti-pyretic and neuropharmacological use (Sirohi and Sagar, 2019). In Manaslu Conservation Area, flower is also used for religious purposes as homage (Pandey, 2009). It enhances sex organs functionality by the production of hormones (Thakur and Dixit, 2007). The anti-bacterial characteristics of Panchaunle helps to inhibit *E. coli* and treatment of disease due to *Shigella flexneri* (Ranpal, 2009). It helps during cuts to stop bleeding (Pant and Raskoti, 2013), burn (Ghimire et al., 1999), infectious wounds (Gurung et al., 2008), and all kinds of skin allergies, skin diseases for fast healing. The grinded powder can be taken with milk or may be used as a spice (Raju and Rajitha, 2021).

The abundance and distribution range of *Dactylorhiza hatagirea* (D. Don) has drastically diminished (Kulla and Hutchings, 2006). Even within the protected areas of Nepal, there is continuous threat of extinction of this species (Pandey, 2009). There will be at least 65% reduction in the distribution range even in the most favorable cases by 2070 (Shrestha et al., 2021). The uncontrolled harvesting and overgrazing (Chapagain et al., 2021), illegally collecting and trading (Raskoti, 2009), burning, shifting cultivation, deforestation and destruction of habitat resulted due to various socio-economic factors (Bhattarai and Ghimire, 2006) has been constantly posing threats to the *D. hatagirea*. At non-protected sites, people are not aware about the population ecology and conservation. The government has been lacking management and plan for conservation (Khadka et al., 2016). The basic measures to ensure the existence should be effective implementation of regulations, making plantation programs, making people aware on population ecology, alternative trainings, and regular monitoring of populations (Chapagain et al., 2021).

Juglans regia L. is highly valuable medicinal plant of order Fagales and family Juglandaceae (Walnut Family). It is commonly known as "Jupiter's royal acron" in Roman (Arya et al, 2020), "Akhort" in India and "Okhar" in Nepal (Al-Snafi, 2018). Almost 30 varieties of *Juglans* are grown all over the world. Among which 3 species are cultivated for commercial purpose i.e., *J. regia*, *J. nigra* and *J. cinerea* (Arya et al., 2020).



Juglans regia L. is naturally distributed across 19 Asian countries. It is reported in countries like Turkey, Iraq in the west, around Caspian Sea, Uzbekistan, Kyrgyzstan, Tajikistan, and Kazakhstan towards north. Similarly, Afghanistan to Himalayas Mountain ranges which includes Pakistan, India, Nepal, Bhutan, Bangladesh Myanmar, and southern China towards south (Thakur, 2011). These days *Juglans regia* L. is reported cultivated in Southern Europe, Eastern Asia, and Northern America. California walnut is found to have superior quality among all the walnut cultivated worldwide (Arya et al., 2020).

Juglans regia L. is a deciduous tree of about 25-35 m in height and can grow up to 2m diameter if the condition is favorable. It is light demander tree with smooth bark of olive brown color at younger age which turns to silvery-grey rough textured bark with the increasing age. Leaves are 25-40 cm long with 5-9 pinnate leaflets. Fruits are green colored with ridge brown nut within it which are ready to harvest in autumn season. Spherical shaped nut of 10-15 gm. weight consists of kernel which looks like human brain enclosed inside skull (Arya et al., 2020). Both sexual and asexual reproduction is possible but propagation by cutting is not favorable due to its low rooting capacity (Wani et al., 2016).

Juglans regia L. is widely cultivated for its timber as well as for medicinal value. The plant favors well aerated loam soil deeper than 80-100 cm with the pH 6.5-7.5 for the best growth. Similarly, rainfall must be well distributed up to 100-150 mm in growing period and total 700-800mm every year. Regular pruning is fruitful but early pruning results defects (Wani et al., 2016). The stem bark of *Juglans regia* L. is rich in minerals (Kale et al., 2010). Similarly, Arya et al. (2020) reported 67.4% fat and 15.7% proteins on the kernels. The phytochemical constitution of *Juglans regia* L. differs with differences in geography, soil, climate, genotype etc. Arya et al., (2020) also reported that the oil of *J. regia* consist of Linoleic acid, oleic acid, polyunsaturated fatty acid, monounsaturated fatty acid, Stearic acid, and palmitic acid.

Juglans regia L. is traditionally used as medicine, for timbers and for several rites and rituals. In Nepalese culture seeds of *J. regia* L. are used by Newari community as the significance of love and wish of the sister to keep their brothers away from the God of death and to spread the fame of their brother. Similarly, in Brahmin and Chhetri culture, sisters break the walnut in one hit on the festival of Tihar which signifies the destruction of their brother's enemies (Joshi and Dhakal, 2017). The fruit shells of *Juglans regia* L. are used in Calabria as the traditional way to heal malaria. Similarly, it is used against liver damage in Mexico, bark and roots are used against toothache, fruit peels are used to cure ringworm in India, bark, and exocarp of green fruits are used for the treatment of liver cancer and gastric in China (Arya et al., 2020). In the context of Nepal, Kunwar and Adhikari (2005) reported that stem bark is used to cure skin disease, toothache, rheumatism, and arthritis and dried bark of young shoots are anthelmintic in Dolpa district of Nepal. Similarly, people of Chepang community use the bark of the plant as anthelmintic and dye (Tamang et al., 2017). Another research carried out in Parbat district, bark and fruits are used as a detergent and leaf juice is used to prepare tonic (Malla et al., 2014). Sigdel et al. (2013) reported that the powder prepared from the bark is used for the treatment of tooth and stomach disorders in Khimti area of central Nepal. Likewise, *Juglans regia* L. is used for wide purposes in Jumla district. Seed coat and fruit juice is preferred to treat wounds, bark paste is preferred for the treatment of hair growth and arthritis (Kunwar et al, 2006), 2 gm of crushed seed coat extract is applied for itching and wounds in some villages of Jumla district (Rai and Pokhrel, 2006). And immature fruit of *Juglans regia* L. is found using as the fish poison (Joshi and Joshi, 2006).

Juglans regia L. seed kernels are highly nutritive. The fresh, dried, or toasted kernels are consumed. They have the ability of enhancing memory. The plant shows antioxidant, antitumour,



antidiabetic, antimutagenic, antimicrobial, anti-inflammatory, antihelminthic, and antiatherogenic activities (Jelodar & Nazifi-Habibabadi, 1999; Oliveira et al., 2008; Arya et al., 2020). Paudel et al. (2013) reported allelopathic activities of *Juglans regia* L., as the oil extract was found inhibiting the seed germination and root and shoot growth of perennial ryegrass and lettuce. He also reported that the leaf oil showed trace amount of antifungal activity. Likewise, Taha and Al-wadaan (2011) has reported antifungal activity on methanol, chloroform, and acetone of bark extract of *Juglans regia* L. Similarly, methanolic extract of leaves aid in decreasing blood sugar levels, which proves the antidiabetic property. Ethanolic extract on the other hand reveals anti-inflammatory activity (Taha and Al-wadaan, 2011).

CONCLUSION

Dactylorhiza hatagirea (D. Don) Soo and *Juglans regia* L. are protected species by the government of Nepal. *Dactylorhiza hatagirea* (D. Don) Soo has been used as tonic and efficient medicinal source both in traditional as well as modern medicine and all the plant parts are used. It is anti-inflammatory, anti-cancerous and used in the inhibition of *Escherichia coli*. In Nepal, *Juglans regia* L. has religious, economical, medicinal as well as traditional values. It is used to treat skin disease, arthritis, rheumatism and so on. Both species are threatened by their over exploitation. This paper highlighting the major uses of both species suggests to decrease the research gap with the study of economic aspects and conservation threats and approaches.

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DECLARATION OF CONFLICT OF INTEREST

No conflict of interest to declare.

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