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Review on Botanical Discription, Phytochemistry and Ethanomedicinal Properties of *Roylea Cinera* (D.Don) Baillon

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ABSTRACT

Roylea cinerea (D.Don) Baillon, family (Lamiaceae) commonly known as 'Ashy Royleais' and locally 'kittu' which is widely spread in the Himalayan region from Kashmir to Nepal. The plant is traditionally used to cure of various ailments such as fever, jaundice, skin disease including itching and inflammation, malaria and most prominently in diabetes. The whole plant extract possesses various bioactive agents having therapeutic potential like flavonoids, glycosides, alkaloids, terpenoids, and phenols. The plant is propagated both by seeds and vegetativly. The highest seed germination was observed in sandy soil whereas the maximum vegetative propagation by stem cutting method was observed in spring season. The present review aims to document the morphology, distribution, phytochemistry and medicinal properties of *R. cinerea* and its future prospects for the further scientific investigation for the development of effective therapeutic compounds.

Keywords: *Roylea cinerea*, Botanical discription, Geographical distribution, Traditional cure.

INTRODUCTION

Roylea cinerea (D.Don) Baillon, family (Lamiaceae) commonly known as 'Ashy Royleais' and locally 'kittu' which is widely spread in the Himalayan region from Kashmir to Nepal. This plant is traditionally used to cure of various ailments such as fever, jaundice, skin disease including itching and inflammation, malaria and most prominently in diabetes.

PLANT PROFILE

Plant- *Roylea Cinerea* (D.Don) Baill.

Plant Taxonomy

Table 1: Plant Taxonomy

Kingdom	Plantae
Phyllum	Tracheophyta
Class	Magnoliopsida
Order	Lamiales
Family	Lamiaceae
Genus	*Roylea*
Species	*cinerea* (D.Don) Baill.
Botanical Name	*Roylea cinerea* (D.Don) Baill.

Vernacular Name (Swati *et al*., 2018)

Table 2: Vernacular Name

Common name	Titpatti, Kauri.
Hindi	Kadwi, Tiuna, Kouru, Karui, Patkarru, Titpatti, Kodu, Karanoi, Karway

Part used as drug

Leaf, Root, Bark, Shoot, Stem (Swati *et al.,* 2018).

Botanical Description

R. cinera is a shrub about 1.0-1.5 m in height having extremely bitter in taste and characteristic in odor.

Leaves: The leaves are ovate in shape having width (0.7-3 cm), length (2-4 cm). The margin of leaf is crenate having acute apex. The colour of leves is dark green on upper surface and light green on lower.

Stem: Stem is woody, densely with greyish hairs (Upadhayay *et al*., 2011).

Fruit: The fruits are papillose in nutlets form having rounded at the apex.

Inflorescence: The inflorescence is cymes with six flowers, tubular calyx and having five lobes.

Corolla: The corolla is white or pink in colour having two liped 4-lobed. The upper lip is long and the lower lip is slightly larger (Harley *et al.*, 2004).

Pharmacognostic Characters

The **Transverse section (T.S.) of the *R. cinera* leaf** shows various pharmacognostic characters like:

- Leaf shows the presence of a single layer of rectangular epidermal cells which is covered with unicellular and bicellular covering trichomes on both surfaces.
- Below upper epidermis, it shows presence of a single layer of green pigmented palisade cells which are absent in the midrib region and on the lower side of the lamina.
- It also shows presence of 2-4 layers of collenchyma cells also having a layer of spongy parenchyma cells in the midrib region below the upper epidermis and above lower epidermis.
- Incomplete ring of pericycle is present in the midrib region which surrounds vascular bundles.
- Lower surface of leaf shows presence of two types of stomata like anomocytic and anisocytic stomata.

The Transverse section (T.S.) of the *R. cinera* stem shows various pharmacognostic characters like:

- It shows presence of a single layer of the epidermis having various covering trichomes.
- The cortex shows presence of 2-4 layers of collenchyma cells also having 2-4 layers of parenchyma cells.

- It also shows presence of lignified pericyclic fibers group which are scattered in the form of ring throughout the cortex in the stem.
- Vascular bundles are separate from medullary rays which are extend upto the cortex.

Powder Characteristics of Stem Part of Plant Shows

- Two types of stomata like anomocytic and anisocytic stomata.
- Two types of trichomes like covering and multicellular glandular trichomes.
- It also shows presence of various characters like pericyclic fibers and xylem vessels.

Physicochemical Parameters of Plant Shows

- The **quantitative examination of the plant** showed stomatal number, stomatal index, vein islet number, and veinlet termination number values as 33, 7, 26 and 14, respectively.
- The **total ash, water-soluble ash, and acid insoluble ash values** are 6.75, 4.22 and 0.79, respectively (Upadhayay *et al.*, 2011).

Geographical Source

Roylea cinerea is a shrub indigenous to the Indian subcontinent and is native to the Western Himalayan region from Kashmir to Nepal (Sharma *et al.*, 2017a; Bisht et al., 2016; Samant et al., 2007; Khare, 2007) and in Pakistan (Khan *et al*., 2016). It is found in various regions of Uttrakhand like Pithoragarh, Uttarkashi, Chamoli, Nainital, Almora, Champawat, Bageshwar, Tehri, Pauri, Rudraprayag, Haridwar and Dehradun (Pande *et al*., 2007). In Himachal Pradesh districts, it is found in Hamirpur, Shimla, Mandi, Solan, Sirmour, Kangra, Bilaspur and Una (Sharma *et al.*, 2017, Parkash and Aggarwal, 2010).

Cultivation: The plant has the potential for cultivation in the Himalayan region.

Soil: Seeds germinate better in sandy soil.

Altitude: 1200-3700 m

Flowering: The flowering begins in the month of February and seeds are formed by end of August.

Propagation method: It propagates both vegetatively and sexually methods. The flowering begins in February and seeds are formed by end of August (Rawat, 2009).

Ethanopharmacological Reports

R. cinerea is a traditionally used medicinal plant from Western Himalayas and its different parts of plants are used for medicinal purpose.

Fresh leaves juice is useful in diabetes, mouth and throat diseases (CCRS, 1999) including antioxidant and antimicrobial activities (Munguia *et al.*, 2016) to provide strength to liver and protect skin from infection (Prakash *et al.*, 2010). It also cure stomach pain and diabetes (Vidyarthi *et al*., 2013). Fresh juice of plant are given for syphilis (Kumari *et al*., 2011).

Leaves extracts used in malarial fever and skin diseases, Garland of wood pieces are helpful to avoid jaundice (Prasad *et al.*, 2020).

Young leaves twigs is used to treat fever, malaria, and diabetes (Gaur and Sharma, 2011). The leaves are crushed and juice is filtered with a fine clean cloth piece and 1–2 drops of it are used twice as nasal drops for three consecutive days for cough and cold (Rawat and Kharwal, 2013).

A ***decoction of leaves*** used in fever and pieces of branches made into the bead and garlanded by infants to avoid jaundice (Tiwari *et al.*, 2010a). It is also used for the treatment of malarial fever (Thakur *et al*., 2016).

Leaves and Roots are used for blood purifier, fever, pimples, snuff in tonsil (Samant *et al.*, 2007).

Leaves, shoots, and flowers are crushed shoots with saltorally to strengthen the liver.

Leaves and shoot extracts are used for helpful in scabs and other skin infections (Parkash and Aggarwal, 2010).

Chewing of leaves are very helpful in itching and white water discharge in women (Leucorrhoea).

Himalayas range of plants are used for treating jaundice, diabetes, protozoal infections and malarial fever (Dua *et al*., 2011; Parkash and Aggarwal, 2010; Sidhu and Thakur, 2015).

The ***leaves*** are used for the treatment of inflammation, skin allergies and leucorrhoea. It

is also used for treating wound healing and also as laxative and antipruritic agent.

The **plant** is also part of formulations for mental ailments, seizures and as a liver tonic (Rawat, 2009).

Chemical Constituents

R. cinerea possesses various bioactive agents having therapeutic potential like;

Whole plant extract is reported to contain flavonoids, glycosides, alkaloids, terpenoids, and phenols.

Leaf part of plant reported various bioactive constituents like glucose, fructose, flavonol glycoside, anthraquinone glycoside, triterpenoid, arabinose, oxalic acid, gallic acid, palmitic acid, stearic acid, tartaric acid, oleic acid, *β*-amyrin, betulin, stigmasterol, *β*-sitosterol, cetylalcohol, quercetin 3-*O*-*β*-L-rhamnoside, 1,4-dihydroxy-6,7-dimethoxy 2-methy 3-*O*-*β*-Dglycopyranoside, moronic acid (Dobhal and Joshi, 1979; Khare, 2007; Rawat and Vashistha, 2013).

Stem part of plant reported various bioactive constituents like to contain Flavonoids, 5,6,7,4-tetramethoxy flavones and D glucoside.

Root part of plant extract showed the presence of 3-*β* hydroxyolean-12-ed-28-oic acid (Ansari et al., 1982; Rawat and Vashistha, 2013).

Bark extract of plant part of plant reported various bioactive constituents like alkaloids, tannins, flavonoids, saponins and steroids (Mathur *et al*., 2010).

The aerial part of plant reported various bioactive constituents like three diterpenes are calyenone, calyone and precalyone (Prakash *et al*., 1979).

It also contains **two furanoid diterpene isomers** like royelegafuran and royeleganin, a triterpene as moronic acid (Majumder *et al.*, 1979).

It also reported other constituents like cinerealactam E, a new *β*-lactam, rutin, isoquercetin, flavonoid, undatuside A, glycosides, martynoside, nicotiflorin, and 50-*β*-D-glucopyranosyloxyjasmonic acid (Sharma *et al.,* 2017b).

Two anti-diabetic compounds like 3*β*-hydroxy-35-(cyclohexyl-5′-propan-7′-one)-33-ethyl-34- methyl-bacteriohop-16-ene (Bhatt *et al.*, 2018) and 4- methoxybenzo[*b*]azet-2(*1H*)-one (Sharma *et al.*, 2017b).

Two novel labdane diterpenoids like cinereanoid A and cinereanoid B (Sharma *et al.,* 2015). The **plant also reported two new labdane diterpenoids** like cinereanoid C and cinereanoid D (Sharma *et al*., 2017b).

Secondary metabolites are isolated from the plants which are reported as like glycosides, beta-sitosterol, betulin, beta-amyrin, cetyl alcohol, stigmasterol, **sugars** as glucose, fructose and arabinose; **various acids** as stearic acid, palmitic acid, oleic acid, oxalic acid, gallic acid and tartaric acid; **various diterpenes** as precalyone, calyenone and calyone; and also **triterpene** as moronic acid (Rawat and Vashistha, 2013).

Pharmacological Activities

The plant have shown various types of activities which are given table-3

Table 3: Pharmacological Activity

S.No.	Activity Reported	Part Used	Extract Used	References
1	Anticancer activity	Leaves and Stem	Water soluble fraction of Hydro-alcohol	(CCNSC, 1962; Schax *et al.,* 2014; Sharma *et a*l., 2017b)
		Leaves	Ethanol	(Denizot and Lang, 1986; Bahuguna *et al.,* 2015)
2	Antiprotozoal activity	Ariel part	Petroleum ether and Chloroform	(Matile and Pink, 1990; Dua *et al.*, 2011)
3	Antidiabetic activity	Ariel part	Methanol, Ethyl acetate and Petroleum Ether	(Bernfield, 1951; Kim *et al*., 2005; Etuk, 2010; Bhatt *et al.,* 2015)
			Petroleum ether,	Cui *et al*., 2006;

		Ariel part	Ethyl acetate, Ethanol And Methanol	Wu and Huan, 2008; Bahuguna *et al.,* 2015; Bernfield, 1951; Kim *et al.,* 2005; Etuk, 2010; Bhatt *et al.,* 2018; Sharma *et al.*, 2017c)
4	Hepatoprotecti ve activity	Leaves	Hydro-alcoholic	(Huang *et al.,* 1993; Upadhyay *et al.,* 2017)
5	Antioxidant activity	Stem and Bark		(Fargere *et al.,* 1995; Sharma *et al.,* 2017d; Ozgen *et al.,* 2006; Benzie and Strain, 1996; Al-Mamun *et al.*, 2007; Mathurfner, 2018)

CONCLUSION AND FUTURE PROSPECTIVE

The present review aims to document the morphology, distribution, phytochemistry and medicinal properties of *R. cinerea* and its future prospects for the further scientific investigation for the development of effective therapeutic compounds. Finding of this study can be employed as suitable quality control measures to ensure the quality, safety, and efficacy of this herbal drug material and also these studies may be employed as supplement information in respect of identification parameters in the way of acceptability and quality control of this plant. Now everyday phytochemical and pharmacological studies are conducted on different parts of these plants. The present literature supports the possible of *R.cinerea* as a medicinal plant.

SUMMARY

Roylea cinerea (D.Don) Baillon, family (Lamiaceae) commonly known as 'Ashy Royleais' and locally 'kittu' which is widely spread in the Himalayan region from Kashmir to Nepal. This plant is traditionally used to cure of various ailments such as fever, jaundice, skin disease including itching and inflammation, malaria and most prominently in diabetes. The whole plant extract possesses various bioactive agents having therapeutic potential like flavonoids, glycosides, alkaloids, terpenoids, and phenols. The extent of each of these chemical constituents varies depending on the type of species or cultivators as well as cultivation conditions such as soil type, weather, irrigation, pruning and other horticultural practices. The plant growth has been recognized as a recent thrust area for growth of other plants due to biodiversity. In recent times, there has been increased attention toward the study of conventional plants for pharmaceutical applications because of its small toxicity and economic capability.

Quality control deals with the study of purity, safety, potency and efficacy. Thereby, standardization and quality control of herbal medicines and raw material are always required. Quality standard of any herbal drug is related to its uniformity in quality which are numerical quantities by which the quality of commodities may be assessed. The information upon which standards may be based is obtained by a study of the genuine drug, the method used for adulteration and means adopted for the detection of adulterants. There are various several aspects are to be considered as pharmacognostical standards. The popularity of the herbal drugs is increasing worldwide generally and particularly in the developed countries but one of the obstacles in its acceptability is lack of standard quality control profile. World health organization (WHO) emphasizes physic-chemical and phytochemical evaluation of crude drug materials for developing standardized quality control profile of herbal medicine.

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