



Taxonomical Exploration of Arboreal Members of the Family Anacardiaceae in District Poonch, Jammu and Kashmir (India)

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The Poonch district is part of the Pir-Panchal region of Jammu and Kashmir, which is home to a distinct landscape and a variety of climates. Even with these significant variations, this region has been able to maintain a high level of biodiversity. There are certain groups of flora that have eluded researchers' attention, including the *Anacardiaceae* family, which is one of those groups. The purpose of this study was to investigate the current occurrence as well as taxonomical studies of the arboreal members of the *Anacardiaceae* family. For several decades, the district has been observing the occurrence of these plant species both in sub-tropical and temperate zones with various ethnobotanical uses. This angiospermic arboreal flora group found at an altitude between 988 and 3004 m is composed of eight species in five genera, including one shrub and seven trees, one evergreen, and seven deciduous species, as well as two indigenous and six exotic species. Among the plant genera, *Pistacia* and *Rhus* recorded 2 and 3 species, respectively, while *Cotinus*, *Lannea* and *Mangifera* recorded one species each.

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1. INTRODUCTION

Plants play a vital role in making natural ecosystems for life support. More than 27,0000 vascular plant species have been reported from different ecosystems on the Earth. Annotated version and constantly revised list of biota has been identified as the groundwork for the evolution of the global biodiversity information foundation [1]. This has adopted considerable importance for accomplishing the demanding targets of recording, preservation and sustainable usage of biodiversity at the local, regional and global levels [2,3]. The universal wealth of biota on the planet earth is, nevertheless, so massive that only 1.7% of it is explored systematically in scientific pursuits [4]. In such a compelling situation, inventorization of biodiversity with correct taxonomic status is required to be done globally.

In the Himalayan region, acknowledged as a world-wide biodiversity hotspot [5] (Mittermeier *et al.*, 2005), vital taxonomic data about much of its territories is still not obtainable. The Indian ruled Jammu and Kashmir (J & K) in the western Himalaya is one among such areas which has been identified as floristically lesser explored by the Botanical Survey of India [2], and everywhere the biodiversity dossier is assumed to be the critical concern. The Jammu and Kashmir is bestowed with abundant plant diversity of multitudinous scientific interest and enormous economic opportunities [6,7]. Of the numerous ingredients of floristic richness of the Jammu and Kashmir region, the ones that plant species which acquire a woody habit, also called as arboreal species, constitute one of the dominant features. In the Past, it was Lambert's [8] 'List of trees and shrubs for Kashmir and Jammu forest circles, Jammu and Kashmir State' in which the woody plant species growing in this region were primarily enlisted. Not long ago, Malik *et al.* [9] have registered 521 woody plant species from Jammu and Kashmir. These revised taxonomic informations on the woody flora have achieved instant usefulness in the biodiversity conservation and its viable utilization in the region.

Within Jammu and Kashmir region, Jammu province enjoys a generous floristic diversity after Kashmir. Numerous taxonomic investigations to deal with the floristic diversity of this province have been conducted in around the last 3 decades [10,11]. Sharma and Kachroo published

the Flora of Jammu and plants of Neighbourhood providing taxonomic details in volume 1 (1981) and illustrations in volume 2 (1982). Kapur and Sarin [12] dealt with the Flora of Trikuta Hills, presented a great floristic exposition of the plants embracing these hills and the adjoining of Shri Vaishno Devi Shrine. Swami and Gupta [13] communicated the Flora of Udhampur district, which is a valuable interpretation on the higher plants of this particular zone. Bhellum and Magotra [14] documented the flowering plants of Ramban, Kishtwar and Doda districts, tackling with floristic wealth of these 3 contiguous administrative units in the Chenab Valley, while Malik *et al.* [15] presented with floristic diversity of Warwan valley. The twin districts Poonch and Rajouri, on the other hand, are floristically at the very least investigated region in the Jammu province, with inadequate, infrequent, inconsequential and isolated documentation obtainable on their flora [16,17,3,18,19]. Much is however, necessitated to be done so that all the floral elements of biodiversity are documented and taxonomically assessed and hence the present study was undertaken.

By taking the above facts under consideration, the present research was undertaken to study the biodiversity, ethnobotanical significance and taxonomy of the arboreal plant species of the family Anacardiaceae of district Poonch.

Poonch district is located at 33° 25" to 34° 01" North latitude and 73° 58" to 74° 35" East longitude and covered by survey of India degree sheet no. 43K, it has an average elevation of 1070 m sea level. It shares its borders with Pakistan occupied Kashmir (POK) on 3 peripheries viz. north, west and south and is connected with Kashmir valley through the Pir Panchal range in north-east by districts of Baramulla, Budgam, Shopian and Kulgam, while to its southwest is the Rajouri district. Broadly two types of soils with light brown colour having loamy texture are present in the district, with sub-mountainous soils towards southern part and Meadow soil over northern part. Localized wedges of alluvial soils are also present in various valleys of the area.

2. CLIMATE

The district experiences extreme temperatures in summer and winter due to variation in altitude and aspect. The entire southern aspect starting from Khorinar Poonch to Pir Panchal on the right

bank of Pulasta river/Suran Nallah is hotter and devoid of tree vegetation except bushes and scrub forests on the same altitude on northern aspect along left bank of Pulasta river / Suran nallah from Poonch to Chandimarh. The northern aspect is cooler, experiences winter snow and bears dense vegetation. The average temperature in Mendhar and Suran valleys (lower parts) mostly remains between 16.7 to 23.9°C, with January mean temperature 4°C.

Corresponding to varied altitudes starting from 800 m in Balnoi to 4700 m at Pir Ki Gali, the vegetation in the district ranges from *Pinus roxburghii* forests to *Betula utilis* stands in the Pir Panchal mountains. The Tehsil-wise overview of the district Poonch is shown in the below map (Fig. 1), while as the month wise climate data for the years of 2016, 2017 and 2018 is shown in the Table 1, Table 2 and Table 3, respectively.

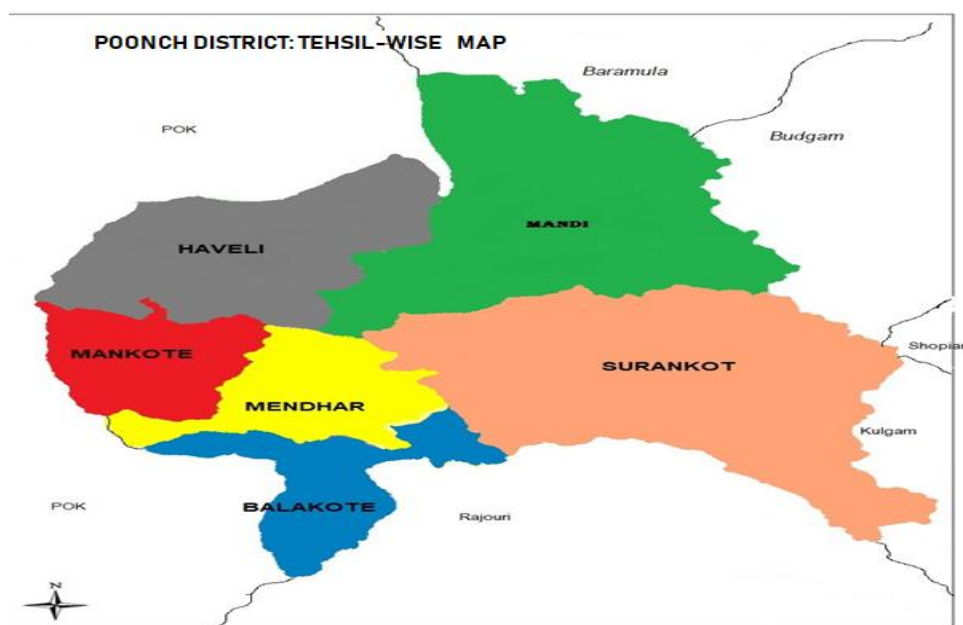


Fig. 1. Tehsil-wise map of Poonch district (Map not to the scale).

Table 1. Climate data of Poonch district for 2016

Year	Temperature C ⁰			Rainfall	Snow	Sunshine/Humidity			
	Max.	Min.	Avg.	Days	Rain Mm	Days	Snow cm	Avg. Cloud %	Avg. Humidity %
2016									
January	5	-4	-1	8	16.78	5	2.0	23	44
February	8	-2	2	6	19.39	3	3.4	17	40
March	10	2	6	19	107.24	0	0	37	60
April	15	3	9	23	84.22	0	0	36	57
May	20	8	14	19	57.28	0	0	15	49
June	26	12	19	11	33.4	0	0	9	47
July	26	13	19	17	29.35	0	0	21	57
August	25	12	18	7	18.6	0	0	12	55
September	23	9	15	1	5.7	0	0	4	49
October	18	5	11	0	0.05	0	0	4	29
November	13	1	6	1	1.35	0	0	19	25
December	12	0	4	1	0.51	0	0	14	21

Table 2. Climate data of Poonch district for 2017

Year 2017	Temperature C ⁰			Rainfall		Snow		Sunshine/Humidity	
	Max	Min	Avg	Days	Rain mm	Days	Snow cm	Avg. Cloud %	Avg. Humidity %
January	2	-6	-3	20	129.59	13	23.6	56	69
February	7	-2	2	14	56.84	2	3.8	38	59
March	19	0	4	21	63.41	4	9.8	38	57
April	16	4	10	17	131.27	0	0	17	52
May	21	8	14	25	60.04	0	0	10	50
June	24	11	17	10	29.07	0	0	7	46
July	27	13	19	13	29.94	0	0	8	59
August	26	11	18	8	21.41	0	0	8	57
September	23	8	15	1	2.17	0	0	4	47
October	18	4	10	0	0.23	0	0	2	31
November	11	0	5	5	9.73	0	0	15	35
December	7	-2	2	8	32.1	3	0.9	28	41

Table 3. Climate data of Poonch district for 2018

Year 2018	Temperature C ⁰			Rainfall		Snow		Sunshine/Humidity	
	Max.	Min.	Avg.	Days	Rain Mm	Days	Snow cm	Avg. Cloud %	Avg. Humidity %
January	7	-3	1	3	5.53	2	1	16	31
February	7	-1	2	14	39.32	3	4.2	29	47
March	10	2	6	13	50.11	0	0	28	50
April	14	3	8	19	78.42	1	3.3	31	55
May	19	7	13	15	35.23	0	0	12	45
June	23	11	17	6	22.31	0	0	11	49
July	26	13	18	9	15.58	0	0	9	60
August	26	12	18	6	15.77	0	0	10	62
September	23	8	15	4	11.8	0	0	8	51
October	21	7	16	3	1.7	0	0	11	34
November	16	4	11	6	36.7	0	0	24	37
December	12	0	7	6	15	3	2.8	15	28

Source: [www: worldweatheronline.com](http://www.worldweatheronline.com)

2. MATERIALS AND METHODS

The present study was carried out in district Poonch of the Kashmir Himalaya by employing standard methods used in taxonomic field studies [20]. The materials and methods used include.

Exploration: The study area falls to the south of the Pir Panchal range, along the line of control in Poonch district of Jammu province in the Jammu and Kashmir. Elaborate and extensive plant collection trips were conducted to the study area from 2012 to 2018. Floristic visits to the whole area were carried out on weekly basis, in different seasons.

Collection: All the basic principles and standard taxonomic procedures [21] were followed while

collecting the plant specimens. Collection was aided by using the required field equipment, a large and strong knife, a garden saw, a garden pocket knife, garden clipper, a pocket magnifier, a compass and altimeter, GPS unit, labels, pruning shears, a pair of scissors, thick and durable transparent polythene bags, a field notebook, and a digital camera.

Photography: In the field before collecting the specimens the plants were photographed to capture many views so that the information regarding plant habit, habitat, populations, individuals, flowers, phyllotaxy, and foliage could be gleaned. Digital cameras (Canon power shot, Sony Handy cam, iPhone 6 Plus, Samsung Galaxy Note7) were used to accomplish this job. In the taxonomic lab, the photographs of the diagnostic characteristics of plant specimens

were also taken with Aven Handheld Digital Microscope 10x-200.

Procedure for pressing and drying:

Processing of plant specimens was carried out by using the standard taxonomic procedures [21]. The collected specimens were dried fast in order to be preserved from deterioration, which was achieved by pressing the specimens by placing them in between the folded newspapers in the plant press.

Processing, Storage and Preservation:

Standard herbarium techniques [22] were used to store and preserve the pressed and dried specimens. This was carried out by mounting and labelling the specimens on the standard herbarium sheets (size 41.5 x 29 cm).

Description: Each processed and preserved specimen was thoroughly examined in the laboratory using a dissection microscope and magnifying lenses of 10x and 20x magnification. The nomenclature of plants is governed by International Code of Nomenclature for Algae, Fungi and Plants (ICN) through its rules and recommendations. The circumscription of the plant species under the families was done as per Bentham and Hooker's System [23].

Identification: The identification of plant specimen was achieved by using the relevant available floristic literature, chiefly: *An annotated Catalogue of the Vascular Plants of West Pakistan and Kashmir* [24], *Flora of British India* [25], *Flora of Pakistan* [26].

Nomenclature: Each of the described and identified plant specimens i.e., RM167, RM286, RM087, RM215, RM060, RM261, RM202 and RM271 were provided with a correct scientific name followed by its author citation, first valid publication, place of publication, and other nomenclatural aspects by using the available literature: The Plant List [27], Catalogue of life [28] and GRIN-Germplasm Resources Information Network [29].

Flowering Phenology: During the period of collection, the flowering duration in species / cultivar was noted for all woody plants, and subsequently a flowering calendar was prepared.

Determination of local / common names and local uses: Wherever, local names of plants were not known, these were ascertained from the native people living nearby. Information on local

uses of plants was collected from the people living in their vicinity, especially the elderly men and women having experience of local plant-use. The local "Hakeems" and other people dealing with medicinal plants were also consulted to verify the information regarding local plant-use. Ethnobotanical information was collected from locally experienced people living in remote villages and from nomadic Gujjars, Bakarwals and shepherds.

3. RESULTS AND DISCUSSION

An attempt was made to tabulate *Anacardiaceae* arboreal flora alphabetically with genera and species, habit wise and geographical location wise inventory in Table 4, Table 5 and Table 6, respectively and thereafter a brief taxonomical characters recorded.

COTINUS L.

Cotinus coggygria Scop., Fl. Carn. ed. 2. 1: 220. 1772.

Rhus cotinus

Many-branched deciduous shrub, or rarely a small tree, growing up to 2 m tall. Bark thin, reddish-brown; young shoots reddish, tomentose or pubescent. Leaves long-petioled, elliptic or obovate, entire, obtuse; lateral nerves 10-15 pairs, parallel, straight below, arcuate above. Flowers small, 3 mm, unisexual, yellow to pale-purple, in lax, spreading or drooping branched hairy clusters, 8-15 cm long. Fertile flowers few. Pedicels of numerous sterile flowers elongated and feathery due to being covered with long, grey or purple silky hairs. Sepals ovate-oblong. Petals elliptic, pale-yellow, much exceeding the sepals. Filaments short, anthers long. Fruit a drupe, 5 mm long, ovoid or unequally lobed, reddish, covered with white hairs.

Flowering period: April-June.

Distribution: From Kashmir in India to Pakistan, Central Nepal, West Asia, Southern Europe, Northern China. 1100-2400 m, in forests.

Specimen examined: Khorinar hill and village Konian, tehsil Haveli, 18.06.2015, RM167, plate 1.

Local/common name: Bhan in Pahari, Smoke Tree.

Uses: Plant parts such as bark, leaves and young branches are used for tanning and dyeing purposes. Wood is used for inlay works. Also grown as an ornamental plant.

The leaves and flowers emit a characteristic resinous odour of mango when bruised.

LANNEA A. Rich.

Lannea coromandelica (Houtt.) Merr., J. Arn. Arbor. 19: 353, 1939. *Dialium coromandelicum* Houtt., Nat. Hist. II, 2: 39, t. 5, f. 2, 1774. *L. grandis* (Dennst.) Engl. U. Prantl., Pflanzenf. Nachtr. 1: 213, 1897.

Medium-sized, deciduous tree, attaining a height up to 16 m. Bark greyish-white, branchlets minutely covered with starry hairs. Leaves alternate, imparipinnate; leaflets 5-9, opposite, subsessile, ovate to ovate-oblong, glabrous above, rusty tomentose on the under surface. Flowers preceding the foliage, fascicled on simple and branched racemes crowded at extremities, the male and female flowers on different branches or trees, tetramerous, pale yellow, 5-7 mm diam. Sepals 4, 1 mm long, broad-ovate. Petals 4, 2 mm long, oblong, green-yellow. Stamens 8, as long as the petals and inserted below the annular disk, anthers about 1.2 mm long, basifixed, filaments glabrous. Ovary oblong, styles 3-4, stout. Fruit a drupe 10-12 mm long, oblong, compressed, reddish when ripe.

Flowering period: March-April.

Distribution: Sub-Himalayan tract to the Indus, Myanmar, Assam, Sri-Lanka and the Andaman Islands.

Specimen examined: Mangnar, tehsil Haveli, 03.05.2016, RM286, Plate 2. .

Local/Common name: Kamlai (Rawalpindi District), Mohin in Hindi, Indian Ash tree.

Uses: Cultivated as hedge plant in some areas of tropics and as a roadside tree. Gum obtained from the trunk is often used in confectionery. The powdered bark is used as flavouring agent. Bark also yields a coarse fibre for cordage.

The plant is easily propagated by cuttings and can be grown as a living fence.

MANGIFERA L.

Mangifera indica L., Sp. Pl. 200. 1753. J. L. Stewart & Brandis, l.c.; Brandis, l.c.; Talbot, l.c.; R.R Stewart, l.c. 458.

Large, evergreen tree, up to 15 m tall, with rough and thick, dark-grey bark. Stem woody cylindrical, with resin canals. Leaves 11-24 x 4-8 cm, dark-green, coriaceous, approximate near the extremities of branches, oblong-lanceolate, entire, the margins often wavy; petioles swollen at the base; lateral nerves numerous, arcuate, with shorter intermediate nerves. Inflorescence a terminal panicle. Flowers bracteate, pedicellate, polygamous, actinomorphic, hermaphrodite, hypogynous, small, yellowish-green, scented. Sepals 5 partite; segments imbricate, ovate, concave, deciduous. Petals 5 imbricate much longer than calyx-segments, ovate, yellow, with 3-5 longitudinal ridges; a fleshy 5-6-lobed disc present between the stamens and petals. Stamens 5, polyandrous, antisepalous, only one fertile, remaining 4 reduced to staminodes; filaments long, anthers dithecous. Ovary sessile, tricarpeal syncarpous, only one ovule functional, with marginal placentation; style short, stigma lobed. Fruit a fleshy drupe with luscious mesocarp.

Flowering period: March-April.

Distribution: Native of southern Asia, especially eastern India, Myanmar and the Andaman Islands.

Specimen examined: Mohalla Dungus, tehsil Haveli, 25.05.2015, RM087, plate 3.

Local/common name: Amm in Pahari, Mango.

Uses: Mango, popularly known as the king of fruits, is largely consumed as a fruit. Unripe fruits are used in making of very delicious pickles at home as well as on commercial scale. Wood is grey, coarse-grained, soft, liable to attack of insects; it is made into planks, tea boxes and sometimes used in the manufacture of cheap furniture.

Mango tree is known to be the largest fruit tree in the world, reaching a height of 30 m or more, with a canopy of 10 m or more. It is also the National Fruit of India, Pakistan and Philippines.

PISTACIA L.

Pistacia chinensis subsp. *integerrima* (J. L. Stewart) Rech. f., Fl. Iran. 63: 8. 1969.

Medium-sized, deciduous, dioecious tree, up to 17 m tall or more. Bark rough, dark grey. Trunk short, branches spreading. Leaves alternate, pinnate; leaflets 4-6 pairs, glabrous, leathery, lanceolate, long-pointed, 6-13 cm long, entire, under surface pale green, lateral veins 14-20 pairs. Inflorescence a lateral panicle. Flowers small, red, appearing with or just before the leaves; petals absent. Male flowers 5-19 cm long, in compact clusters, pubescent; stamens 5-7, on a small disc; anthers large, red. Female flowers in lax, thyrsoid panicle; ovary sessile, 1-celled; styles 3, cohering near the base. Fruit globular drupe, greyish-brown, wrinkled, about 5 mm broad.

Flowering period: March-May.

Distribution: Eastern Afghanistan, Pakistan, northwestern and western Himalaya from Kashmir to Kumaon.

Specimen examined: Gursai, tehsil Mendhar, 28.07.2015, RM 215, plate 4.

Local/Common name: Kanghar in Pahari, Zebra wood.

Uses: Wood is hard and durable, so used for the making of furniture and in carvings. Also used as root stocks in the cultivation of pistachias.

Large, crooked, horn-shaped, dull-red galls growing on the leaves of this plant are used in the preparation of local medicines used against diarrhoea across north India.

Pistacia khinjuk Stocks, in Kew J. 4:143. 1852. *Pistacia acuminata* Boiss. & Buhse, Aufz. 53. 1860; Chowdhery & Wadhwa, Fl. Himachal Pradesh 1:165. 1984.

Deciduous tree, about 5 m tall. Young shoots, leaves and rachis often hairy. Leaves imparipinnate; leaflets 3-7, coriaceous, opposite to sub-opposite, subsessile, 4.5-7.6 x 2.6-5.5 cm, ovate to ovate-oblong, glabrous, young leaves puberulous, apiculate or sub-acuminate, base often oblique, terminal leaflet larger than laterals; rachis terete, sparsely puberulous. Panicles extra axillary and sub-erect. Male flowers shortly stalked; stamens 4-5, filaments rudimentary. Female flowers pedicellate; ovary 2.5 mm, style very short, stigmas longer than the ovary. Fruit a drupe, sub-globose, 5-7 mm long, compressed.

Flowering period: March-April.

Distribution: Very wide distribution, extending from India to Saudi Arabia and Yemen; in India, it is found in northwest Himalaya and Punjab.

Specimen examined: Mohalla Dungus, tehsil Haveli, 16.04.2015, RM060, plate 5.

Local/Common name: Kangar in Pahari, East Indian Mastiche.

Uses: Leaves are lopped as fodder for buffaloes and camels and the galls (kakraisingi) are used in native medicine. The latter are in the shape of a horn attaining 9-14 cm length, and are dull-red in colour. They are produced by a hemipeterous insect. Galls and bark are used in dyes and tannins. Beautifully mottled wood is used for carving.

RHUS L.

Rhus chinensis Miller, Gard. Dict. ed 8: 7. 1768. (*Rhus semialata* Murray in Comm. Gotting. 6: 27, t. 3, 1784; Hook., f. Fl. Brit. Ind. 2: 10. 1879; Osmaston, For. Fl. Kumaon 38. 1927; Duthie, Cat. Pl. Kumaon 38, 1936; Collett, Fl. Siml. 105. 1921.

Rhus javanica

Shrub or small tree, up to 12 m tall, with young parts rusty pubescent. Leaves 5-10 cm long, imparipinnate, turning red before falling, rachis winged. Leaflets 9-13(-15), opposite, sessile, 5.0-11.0 x 2.5-5.0 cm, elliptic to elliptic-oblong, serrate, rusty pubescent on the midrib and nerves (especially on the under surface), nerves raised on the under surface. Panicles terminal. Flowers numerous, in large and pyramidal clusters, pale-green, about 3 mm. Sepals ovate, cupular, pubescent, persistent. Petals oblong, ciliate, much exceeding the sepals. Disc 10-lobed; ovary ovoid, 1 mm long, styles 3, stigma capitate. Fruit, a woolly, reddish-brown drupe, sub-globose and compressed, 4 mm long.

Flowering period: August-September.

Distribution: Grows in gregarious patches from Kashmir to southwest China, Myanmar, and Japan. 1200-2400 m in forests.

Specimen examined: Chandimarh, tehsil Surankote, 20.09.2015, RM261, plate 6.

Local/Common name: The Chinese sumac, Nutgall tree.

Uses: Fruit of this species is edible, also possesses some medicinal properties. Compounds present in this plant possess antiviral, anti-bacterial, antidiarrheal and antioxidant properties. The milky juice of this and other closely related species cause irritation and blisters to the skin.

Rhus succedanea L., Mant. 2: 221. 1771; Roxburgh, Fl. Ind. (Car. ed.) 2: 98. 1824; Wight, l.c. 2: t. 560. 1843; J. L Stewart & Brandis, For Fl. 121. 1874; Brandis, Indian Trees, 199. 1906; Hooker, l.c. 12, p. p.; Banker, Pl. Punj. 114. 1916; Parker, l.c. 113; R. R. Stewart, l.c.

Small to medium-sized, deciduous tree, about 7 m tall, with dark-grey and thin bark. Leaves imparipinnate, tomentose beneath; leaflets 7-15, shortly-stalked, ovate-lanceolate, long-acuminate, entire, thinly coriaceous, with a long and slender apex about 7-16 cm, toothed or entire, shining. Flowers pedicelled, small, greenish-yellow, arranged in slender drooping branches, about half the length of leaves. Sepals ovate, obtuse. Petals much larger, oblong or obtuse, with numerous dark veins. Disc 5-lobed. Fruit a compressed drupe, about 6 mm long, glabrous, rugose, globular, light brown or yellow. Epicarp thin, bursting irregularly; mesocarp fibrous; kernels compressed, hard and surrounded by vegetable wax.

Flowering period: May-June.

Distribution: Kashmir, Pakistan to Bhutan, China and Myanmar; 1200-2400 m, in forests; cultivated in China, Japan and Vietnam for wax and lacquer (Varnish).

Specimen examined: Mahra, tehsil Surankote, 01.07.2015, RM202, plate 7.

Local/Common name: Arkhal in Pahari, Wax tree.

Uses: The plant is of medicinal value. Fruits are edible, but their consumption is not recommended because of the toxic nature of plant. Though the juice of this plant is acrid, yet its white wax is much appreciated in Japan, where it is planted along roads. The wax is made into candles.

The fresh sap of the plant causes skin blisters, and the leaves contain a carcinogen called as shikimic acid.

Rhus wallichii Hook. f., Fl. Brit. Ind. 2:11. 1879; Osmaston, For. Fl. Kumaon 137. 1927; Duthie, Cat. Pl. Kumaon 38. 1906; Collet, Fl. Siml. 105. 1921.

Toxicodendron wallichii

Small, deciduous tree resembling walnut tree in appearance, up to 18 m tall. Bark smooth, greyish, exudes a black acrid varnish; all parts rusty, tomentose. Leaves imparipinnate; leaflets 7-11; terminal leaflet long-stalked, large, elliptic to oblong, 8-23 cm long, entire, often long-pointed, grey-tomentose beneath, pubescent above, base rounded, oblique. Flowers ca 2 mm, in dense axillary panicles, much shorter than the leaves, yellowish-green with dark veins. Calyx-lobes ovate, obtuse, pubescent. Petals oblong, greenish-yellow, with dark veins, glabrous. Stamens 5, 1.5 mm long; disc 1 mm diam., 5-lobed. Ovary conical, tomentose, styles 3, stigma capitate. Fruit a drupe, ca 8 mm long, ovoid, epicarp thin, tomentose, splitting into 5 segments arranged in a star and exposing the central stone; mesocarp waxy.

Flowering period: May-June.

Distribution: Himalaya, in temperate regions, between 1950-2300 m: Kashmir, Himachal Pradesh to Bhutan. Commonly associated with species of *Aesculus*, *Juglans* and *Ulmus* in mixed deciduous forests.

Specimen examined: Chandimarh, tehsil Surankote, 30.05.2015, RM271, plate 8.

Local/Common name: Arkhar, Arkhul, in Pahari, Godambal, Kambal.

Uses: Juice extracted from this plant is used in the manufacture of a varnish. Wood is used for making frames, handles and other implements. Wax obtained from the fruits is also of economic significance.

This plant is apt to be mistaken for walnut which, however, has aromatic leaves. The leaves bear shades of bright-orange and red before falling. The juicy extract of this plant turns black on exposure to air and is corrosive in nature.

Table 4. Arboreal flora arranged alphabetically with genera and species

Families		Genera		Species	
S.No	Name	S.No	Name	S.No	Name
1.	Anacardiaceae	1.	Cotinus	1.	<i>Cotinus coggygria</i>
		2.	Lannea	2.	<i>Lannea coromandelica</i>
		3.	Mangifera	3.	<i>Mangifera indica</i>
		4.	Pistacia	4.	<i>Pistacia chinensis</i> subsp. <i>integerrima</i>
				5.	<i>Pistacia khinjuk</i>
		5.	Rhus	6.	<i>Rhus chinensis</i>
				7.	<i>Rhus succedanea</i>
				8.	<i>Rhus wallichii</i>

Table 5. Habit wise inventory of the arboreal flora of district Poonch

S. No	Name of species	Family	Habit	Plant group	Spermatophytic group	Deciduous/Evergreen	Native/Exotic	Specimen number
1	<i>Cotinus coggygria</i>	Anacardiaceae	Sb	An	Di	Ds	Ec	RM 167
2	<i>Lannea coromandelica</i>	Anacardiaceae	Te	An	Di	Ds	Ec	RM 286
3	<i>Mangifera indica</i>	Anacardiaceae	Te	An	Di	En	Ec	RM 087
4	<i>Pistacia chinensis</i> subsp. <i>integerrima</i>	Anacardiaceae	Te	An	Di	Ds	Ec	RM 215
5	<i>Pistacia khinjuk</i>	Anacardiaceae	Te	An	Di	Ds	Ec	RM 060
6	<i>Rhus chinensis</i>	Anacardiaceae	Te	An	Di	Ds	Ec	RM 261
7	<i>Rhus succedanea</i>	Anacardiaceae	Te	An	Di	Ds	Ne	RM 202
8	<i>Rhus wallichii</i>	Anacardiaceae	Te	An	Di	Ds	Ne	RM 271

Abbreviations: Te = Tree, Sb = Shrub, Ss = Sub-shrub, Cl = Climber; An = Angiosperm ; Di = Dicot; Ds = Deciduous, En = Evergreen; Ne = Native, Ec = Exotic; RM = Rani Mughal

Table 6. Geographical location of arboreal species in district Poonch

S. No	Name of species	Location in district	Altitude (m)	Latitude (°)	Longitude (°)
1	<i>Cotinus coggygria</i>	Khorinar Hill, Tehsil Haveli	1036	33.7762	74.0941
2	<i>Lannea coromandelica</i>	Mangnar, Tehsil Haveli	1108	33.7395	74.0881
3	<i>Mangifera indica</i>	Dungus, Tehsil Haveli	988	33.7657	74.1024
4	<i>Pistacia chinensis</i> subsp. <i>integerrima</i>	Gursai, Tehsil Mendhar	1598	33.6047	74.2673
5	<i>Pistacia khinjuk</i>	Dungus, Tehsil Haveli	989	33.7666	74.1014
6	<i>Rhus chinensis</i>	Chandimarh, Tehsil Surankote BG Forest, Tehsil Balakote	1833 1955	33.6109 33.5323	74.4210 74.2085
7	<i>Rhus succedanea</i>	Mahra, Tehsil Surankote	3004	33.5584	74.4389
8	<i>Rhus wallichii</i>	Chandimarh, Tehsil Surankote	1860	33.6152	74.4237



Plate 1: *Cotinus coggygria*



Plate 2: *Lannea coromandelica*



Plate 3: *Mangifera indica*



Plate 4: *Pistacia chinensis* subsp. *Integerrima*



Plate 5: *Pistacia khinjuk*



Plate 6: *Rhus chinensis*



Plate 7: *Rhus succedanea*



Plate 8: *Rhus wallichii*

4. CONCLUSION

The present study reveals that there is rich biodiversity of the arboreal flora in the Jammu division and of district Poonch in particular. Among the angiosperm families, *Anacardiaceae* family is predominantly distributed ranging from small deciduous shrub of height 5 metres (*Pistacia khinjuk*) upto tall evergreen tree of about 15 metres height (*Mangnifera indica*). Taxonomically, most of woody plant species occurring under the present investigation exhibit across the Jammu and Kashmir; although analogous to the Kashmir province to a greater extent. This could be an indication of consistency in the environmental proximity and most linked climatic conditions among the Poonch district and that of Kashmir region. The flora indigenous to this area, which forms the core of its arboreal constituent, encounters grave dangers by the alien species by means of extensive competition, immense multiplicative ability, massive reserve utilization, and extreme habitat occupancy, etc.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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