

Rosaceae of Solan District of Himachal Pradesh

Milan Jain¹, Vinod Kumar Jain¹, S. S. Sharma²

¹Department of Botany, Sunrise University, Alwar, Rajasthan, India

²Department of Basic Sciences, Dr. Y.S. Parmar University of Horticulture and Forestry, Nauni- Solan, Himachal Pradesh, India

ABSTRACT

The study is conducted to analyse the floral wealth of the members belonging to the family Rosaceae of Solan district of Himachal Pradesh. The periodic surveys to different locations of the region revealed that a total of 18 species belonging to 12 genera occur therein. Seven genera namely, *Agrimonia*, *Geum*, *Malus*, *Potentilla*, *Prinsepia*, *Prunus* and *Pyrus* are represented by single species whereas the genus *Rubus* has as many as 3 species and *Cotoneaster*, *Fragaria*, *Rosa* and *Spiraea* have two species each. Presently, six species namely, *Agrimonia eupatoria*, *Cotoneaster bacillaris*, *Geum urbanum*, *Rosa macrophylla*, *Spiraea canescens* and *S. vacciniifolia* are reported for the first time from the study area. For each species, botanical name, common names, localities, altitudinal range, flowering period along with their economic utility have been given. The species are presented in an alphabetical order.

Keywords: Rosaceae, Occurrence, Description, Economic Utility

I. INTRODUCTION

Phytodiversity is a concept, which refers to the range of variations of differences along the same set of entities, thus, refers to variety within the plant kingdom. It is the condition where different species of plants live together in the same habitat. It is described in terms of species, genus and ecosystem, corresponding to their fundamental and hierarchically related levels of biological organization i.e. Genetic diversity, Species diversity and Ecosystem diversity. People depend on plants for several purposes like for wood, timber, food, medicines, fibres, gums, resins, dyes etc.

India is one of the richest floristic region of the world which is globally known for its rich traditional heritage regarding the floral wealth. In the north of India, the Himalaya is one of the youngest and richest ecosystem on earth with a variety of species. The Himalayan Region is a mega hotspot of biological diversity (Myers *et al.*, 2000) and harbor's more than

8,000 species of flowering plants of which 25.3% are endemic (Singh and Hajra, 1996). Species richness patterns along the Himalayan elevational gradient have been analysed for flowering plants (Bhattarai and Vetaas, 2003), liverworts and mosses (Grau *et al.*, 2007), lichens (Baniya *et al.*, 2010) and birds, mammals and forests (Hunter and Yonzon, 1993).

Himachal Pradesh state (30°22'-33°12' N latitude and 75°45'-79°04' E longitude) is one of the three states of the Western Himalaya. The vegetation of Himachal Pradesh have been studied by Hooker (1872-1897), Atkinson (1882), Collett (1921), Chowdhery and Wadhwa (1984), Verma and Kapoor (2010), Jain and Sharma (2016) and Jain *et al.*, 2017 with special emphasis on taxonomy and floristic enumeration.

The study is conducted in the Solan district of Himachal Pradesh. The district (30°05'-31°15' N Latitude and 76°42'-77°20' E Longitude) with 400-3000 m altitude has a rich source of phytodiversity.

The climate of the area is generally subtropical to temperate. The present investigation has been carried out to know the flora of Rosaceae of the study area and the majority of the cultivated stone fruits occurring in the area belong to this family.

II. METHODOLOGY

A periodic field surveys are conducted in the different localities of Solan district of Himachal Pradesh. As many as fifteen representative locations are selected to cover the whole vegetation of the district. The localities are Nalagarh (400 m), Parwanoo (800 m), Kunihar (1000 m), Arki (1045 m), Ramshehar (1100 m), Subathu (1265 m), Nauni (1275 m), Shilli (1290 m), Oachghat (1300 m), Sanwara (1350 m) and moving upto higher elevation at Wagnaghat (1500 m), Barog (1600 m), Darlaghat (1800 m), Kasauli (1927 m) and Chail (2200 m). The figures within parenthesis are the mean altitudes of these localities. The plant specimens are collected, dried and pressed in the blotting paper for removal of moisture and powdered naphthalene is sprinkled over the plant against fungal growth. Blotter sheets are changed after each 2 days until the plants are fully dried. The dried plants are then mounted on the herbarium sheets. These plant specimens are identified according to the field characters, by comparison in the herbarium, consulting various floras for conformation of identity and with the help of taxonomic literature. All the reported plant species are described in an alphabetical order.

1. *Agrimonia eupatoria* L.

Common Name	: Common Agrimony
Localities	: Kunihar, Arki, Ramshehar, Subathu, Nauni, Shilli, Oachghat, Sanwara, Wagnaghat, Barog, Darlaghat, Kasauli and Chail.
Altitudinal Range	: 1000-2200 m
Description	: Medium sized perennial herb found along roadsides and moist areas; Tap roots; Stems herbaceous; Leaves compound, stalked, stipulate, alternate; Leaflets ovate; Flowers yellowish; Fruit a pome.
Flowering	: June–August

III. RESULTS

The present study is conducted to know the members of this important family Rosaceae of Solan district of Himachal Pradesh. It includes annual or perennial herbs or shrubs or trees or climbers. Roots tap root or adventitious. Stems herbaceous or woody. Leaves simple or compound, stalked or sessile or sessile, alternate or opposite, stipulate or exstipulate, reticulate. Inflorescence solitary or racemose or cymose. Flowers bracteate or ebracteate, bracteolate or ebracteolate, pedicellate or subsessile, actinomorphic or zygomorphic, bisexual, tetramerous or pentamerous, hypogynous or perigynous or epigynous. Calyx 4 or 5, gamosepalous. Corolla 4 or 5, polypetalous, rosaceous. Androecium numerous, polyandrous, bithecous, dehiscence longitudinal or transverse. Gynoecium monocarpellary or pentacarpellary or polycarpellary, apocarpous or syncarpous, superior or inferior, basal or axile placentation, ovules one or two, anatropous. Fruit simple or an aggregate. Seeds non-endospermic.

For each species botanical name, common names, localities, altitudinal range along with some diagnostic features of their habit, roots, stems, leaves, flowers and fruits have been given. The flowering period and economic utility have also been given.

Economic Utility : The herb is used as a skin wash to treat skin inflammation and irritations. Agrimony is also used in modern herbal practice as a mild astringent and a tonic.

2. *Cotoneaster bacillaris* Wall. ex Lindl.

Common Name : Reuns
Localities : Subathu, Nauni, Shilli, Oachghat, Sanwara, Wagnaghat, Barog, Darlaghat, Kasauli and Chail.
Altitudinal Range : 1265-2200 m
Description : Large sized shrub growing in forests; Tap roots; Stems woody; Leaves simple, subsessile, obovate, stipulate, alternate; Flowers whitish; Fruit a pome.
Flowering : April-June
Economic Utility : It is a good source of fuel wood and small timber.

3. *C. microphyllus* Wall. ex Lindl.

Common Name : Rockspray Cotoneaster, Bhedda
Localities : Subathu, Nauni, Shilli, Oachghat, Sanwara, Wagnaghat, Barog, Darlaghat, Kasauli and Chail.
Altitudinal Range : 1265-2200 m
Description : Small sized shrub occurring on rocky areas; Tap roots; Stems woody; Leaves simple, subsessile, elliptic-ovate, stipulate, alternate; Flowers whitish; Fruit a pome.
Flowering : May-June
Economic Utility : The twigs are used for making walking sticks and baskets. It is also used against cold, cough, fever, arthritis, asthma and eye disorders.

4. *Fragaria indica* Andr.

Common Name : Fragaria
Localities : Nalagarh, Parwanoo, Arki, Ramshehar, Subathu, Nauni, Oachghat, Sanwara, Wagnaghat, Barog, Darlaghat, Kasauli and Chail.
Altitudinal Range : 400-2200 m
Description : Small sized perennial herb present in cool and shady localities; Tap roots; Stems herbaceous; Leaves compound, stalked, stipulate, alternate; Leaflets ovate; Flowers yellowish; Fruit an etaerio of achenes.
Flowering : April-June
Economic Utility : The whole plant is an anticoagulant, antiseptic, depurative, febrifuge and is used for the treatment of digestive disorders. The fruits are edible.

5. *F. vesca* L.

Common Name : Wild Strawberry
Localities : Nalagarh, Parwanoo, Arki, Ramshehar, Subathu, Nauni, Oachghat, Sanwara, Wagnaghat, Barog, Darlaghat, Kasauli and Chail.
Altitudinal Range : 400-2200 m
Description : Small sized perennial herb growing along trails and roadsides, embankments,

meadows, sparse forest and woodland edges; Tap roots; Stems herbaceous; Leaves compound, stalked, stipulate, alternate; Leaflets oblong-ovate; Flowers whitish; Fruit an etaerio of achenes.

Flowering : May-June

Economic Utility : *F. vesca* acts like a mild laxative, astringent as well as a liver tonic. It is also used against fever, arthritis and respiratory problems. The fruits are edible.

6. *Geum urbanum* L.

Common Name : Avens

Localities : Darlaghat, Kasauli and Chail.

Altitudinal Range : 1800-2200 m

Description : Small sized perennial herb growing in shady places; Tap roots; Stems herbaceous; Leaves compound, stalked, stipulate, alternate; Leaflets orbicular; Flowers pale yellowish; Fruit an etaerio of achenes.

Flowering : May-July

Economic Utility : Avens is used against liver disease, stomach upsets, rheumatism, gout, infections, fever, diarrhoea, heart diseases, mouth ulcers etc.

7. *Malus baccata* (L.) Borkh.

Common Name : Siberian Crab Apple

Localities : Nalagarh, Parwanoo, Arki, Ramshehar, Subathu, Nauni, Oachghat, Sanwara, Wagnaghat, Barog, Darlaghat, Kasauli and Chail.

Altitudinal Range : 400-2200 m

Description : Medium sized tree found in forests; Tap roots; Stems woody; Leaves simple, stalked, elliptic, alternate; Flowers whitish; Fruit a pome.

Flowering : April-September

Economic Utility : The fruits are edible and are eaten fresh or dried. A paste of the fruit is applied to the forehead to relieve headache. It is also a good source of fuel wood.

8. *Potentilla nepalensis* Hook.

Common Name : Nepal Cinquefoil, Bajradanti

Localities : Nauni, Shilli, Oachghat, Sanwara, Wagnaghat, Barog, Darlaghat, Kasauli and Chail.

Altitudinal Range : 1265-2200 m

Description : Small sized perennial herb growing in fields; Tap roots; Stems herbaceous; Leaves compound, stalked, stipulate; Leaflets oblong-ovate; Flowers reddish pink; Fruit an etaerio of achenes.

Flowering : June-September

Economic Utility : The root is depurative and is used against headache, cold, asthma, dysentery and skin diseases. It is also a good source of tans and dyes.

9. *Prinsepia utilis* Royle

Common Name : Himalayan Cherry Prinsepia, Bhekal

Localities	: Subathu, Nauni, Shilli, Oachghat, Sanwara, Wagnaghat, Barog, Darlaghat, Kasauli and Chail.
Altitudinal Range	: 1265-2200 m
Description	: Large sized spiny shrub growing in forests, scrub and hedges; Tap roots; Stems woody; Leaves simple, stalked, oblong to ovate-lanceolate, stipulate, alternate; Flowers whitish; Fruit a drupe.
Flowering	: April-July
Economic Utility	: The leaves and seed oil of the species are used against rheumatism, pain, arthritis and joint ailments. The fruits are edible. It also has an ornamental value.

10. *Prunus cerasoides* D. Don.

Common Name	: Wild Himalayan Cherry, Padam
Localities	: Nalagarh, Parwanoo, Kunihar, Arki, Ramshehar, Subathu, Nauni, Shilli, Oachghat, Sanwara, Wagnaghat, Barog, Darlaghat, Kasauli and Chail.
Altitudinal Range	: 400-2200 m
Description	: Medium sized tree occurring in open sites, roadsides and forests; Tap roots; Stems woody; Leaves simple, stalked, ovate-lanceolate, stipulate, alternate; Flowers whitish pink; Fruit a drupe.
Flowering	: October-November
Economic Utility	: The fruits and the leaves of <i>Prunus cerasoides</i> give a dark green dye. The fruits are edible. The wood is hard, strong and durable. The branches are used as walking sticks. It is also a good source of fuel wood.

11. *Pyrus pashia* Buch.-Ham.

Common Name	: Wild Himalayan Pear, Kainth
Localities	: Kunihar, Arki, Ramshehar, Subathu, Shilli, Oachghat, Sanwara, Wagnaghat, Barog, Darlaghat, Kasauli and Chail.
Altitudinal Range	: 1000-2200 m
Description	: Medium sized tree occurring along roadsides and forests; Tap roots; Stems woody; Leaves simple, stalked, ovate-lanceolate, stipulate, alternate; Flowers whitish pink; Fruit a pome.
Flowering	: March-April
Economic Utility	: The fruits are edible. It is used in the treatment of diarrhoea, dysentery, fever and eye disorders. The wood is used for agriculture implements.

12. *Rosa macrophylla* Lindl.

Common Name	: Himalayan Rose, Big Hip Rose
Localities	: Nauni, Shilli, Oachghat, Sanwara, Wagnaghat, Barog, Darlaghat, Kasauli and Chail.
Altitudinal Range	: 1275-2200 m
Description	: Large sized shrub occurring in forests; Tap roots; Stems woody; Leaves compound, stalked, stipulate, alternate; Leaflets ovate; Flowers pinkish; Fruit an etaerio of achenes.

Flowering : June-July
 Economic Utility : The fruits are a very rich source of vitamins and minerals especially, in vitamins A, C, E, flavanoids and other bio-active compounds. It is also a fairly good source of essential fatty acids. It is used to treat cancer. It also has an ornamental value.

13. *R. moschata* Herrm.

Common Name : Musk Rose, Ban Gulab, Kuja
 Localities : Parwanoo, Kunihar, Arki, Ramshehar, Subathu, Nauni, Shilli, Oachghat, Sanwara, Wagnaghat, Barog, Darlaghat, Kasauli and Chail.
 Altitudinal Range : 800-2200 m
 Description : Large sized shrub growing along forest margins, shady areas and along roadsides; Tap roots; Stems woody; Leaves compound, stalked, stipulate, alternate; Leaflets ovate; Flower whitish; Fruit an etaerio of achenes.
 Flowering : May-October
 Economic Utility : The fruit of *R. moschata* is used for the treatment of abdominal spasm and diarrhoea. An oil extracted from flowers is used as a perfume. The paste of flowers is used against skin burning.

14. *Rubus ellipticus* Smith

Common Name : Golden Himalayan Raspberry
 Localities : Nalagarh, Parwanoo, Arki, Ramshehar, Subathu, Nauni, Oachghat, Sanwara, Wagnaghat, Barog, Darlaghat, Kasauli and Chail.
 Altitudinal Range : 400-2200 m
 Description : Large sized shrub found in forest and shady habitats; Tap roots; Stems woody; Leaves compound, stalked, stipulate, alternate; Leaflets orbicular-ovate; Flowers whitish; Fruit an aggregate of drupels.
 Flowering : January-May
 Economic Utility : The plant is astringent and febrifuge. A decoction of the root is used in the treatment of fevers. The fruits are edible. It is also a dye yielding shrub.

15. *R. lasiocarpus* Smith

Common Name : Kala-Akha, Kala Hinsalu
 Localities : Nalagarh, Parwanoo, Arki, Ramshehar, Subathu, Nauni, Shilli, Oachghat, Sanwara, Wagnaghat, Barog, Darlaghat, Kasauli and Chail.
 Altitudinal Range : 400-2200 m
 Description : Large sized shrub occurring in shady and moist areas; Tap roots; Stems woody; Leaves compound, stalked, stipulate, alternate; Leaflets ovate-lanceolate; Flowers dark pinkish; Fruit an aggregate of drupels.
 Flowering : January-May
 Economic Utility : The fruits and the roots are used in the treatment of dysentery, cold, headache, asthma, fever, stomachache and digestive disorders.

16. *R. paniculatus* Smith

- Common Name : Heart-Leaf Raspberry
Localities : Kunihar, Arki, Ramshehar, Subathu, Shilli, Oachghat, Sanwara, Waknaghat, Barog, Darlaghat, Kasauli and Chail.
Altitudinal Range : 1000-2200 m
Description : Large sized shrub growing in forests; Tap roots; Stems woody; Leaves simple, stalked, broadly ovate-cordate, stipulate, alternate; Flowers whitish; Fruit an aggregate of drupels.
Flowering : April-June
Economic Utility : The bark is used in the treatment of scabies, cold, headache, asthma and injuries. A purple to dull blue dye is obtained from its fruit.

17. *Spiraea canescens* D. Don

- Common Name : Grey Stems Spiraea
Localities : Darlaghat, Kasauli and Chail.
Altitudinal Range : 1800-2200 m
Description : Large sized shrub growing in moist areas and forest margins; Tap roots; Stems woody; Leaves simple, subsessile, elliptic-obovate, stipulate, alternate; Flowers whitish; Fruit an etaerio of follicles.
Flowering : May-June
Economic Utility : It is a good source of tans and dyes.

18. *S. vaccinifolia* D. Don.

- Common Name : Blueberry Leaved Spirea
Localities : Nalagarh, Parwanoo, Arki, Ramshehar, Subathu, Nauni, Oachghat, Sanwara, Waknaghat and Barog.
Altitudinal Range : 400-1600 m
Description : Medium sized shrub existing in forest margins; Tap roots; Stems woody; Leaves simple, stalked, elliptic, stipulate, alternate; Flowers whitish; Fruit an etaerio of follicles.
Flowering : April-July
Economic Utility : It is used against fever, cough, nausea, bodyache, arthritis, infections, gout, headache, dysentery and respiratory disorders.

IV. DISCUSSION

The most important part of any floristic survey is the correct scientific identification of the plant wealth found in that particular area. Sindhi (1996) recorded

only 9 species belonging to 8 genera of family Rosaceae from Nauni area of the Solan district of Himachal Pradesh. Verma (2000) studied the flora of Kunihar forest division, district Solan (HP) and recorded 5 species belonging to 5 genera of this family. Meenakshi (2002) reported 11 species belonging to 8

genera of the family from Shilli wildlife sanctuary situated in Solan district of Himachal Pradesh.

Out of 18 species belonging to 12 genera, *Rubus* has maximum 3 species followed by two species each in *Cotoneaster*, *Fragaria*, *Rosa* and *Spiraea* and one species each in *Agrimonia*, *Geum*, *Malus*, *Potentilla*, *Prinsepia*, *Prunus* and *Pyrus*. Six species namely, *Agrimonia eupatoria*, *Cotoneaster bacillaris*, *Geum urbanum*, *Rosa macrophylla*, *Spiraea canescens* and *S. vacciniifolia* are reported for the first time from the study area.

Although, in the present study, a survey is conducted to know the wild flora, but many species of this family are either cultivated as ornamental or as fruit plants. Some important cultivated species are *Chaenomeles japonica*, *Cydonia oblonga*, *Eriobotrya japonica*, *Malus pumila*, *Prunus amygdalus*, *P. armeniaca*, *P. avium*, *P. domestica*, *P. padus*, *P. persica*, *Pyrus communis*, *Rosa alba*, *R. indica* etc.

V. CONCLUSION

This study provides the basic information about the floral wealth belonging to the family Rosaceae of Solan district of Himachal Pradesh. A total of 18 species belonging to 12 genera are recorded from the area, out of which, 6 species are reported for the first time. The study shows that 7 genera are represented by single species whereas 5 genera are represented by two or more species.

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