

PRELIMINARY STUDY ON *Primula* SPECIES OF TAWANG DISTRICT,  
ARUNACHAL PRADESH

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ABSTRACT

Arunachal Pradesh, the largest state of North East Region is a beautiful state with its steep mountains and virgin forests with many loving flowers. The wide range of altitude starting from 150 msl to 7000 msl is another gift of God for having different agro-climatic zones with different forest types. Thus it has been recognised as HOTSPOT of Biological Diversity. The State has about 4500 flowering plants with starting from tropical to alpine meadows. Mostly, the temperate and alpine zones are store house on many medicinal and economically important plants including rare, endangered and threatened (RET) plants. There are also many endemic plants like *Coptis teeta*, *Pinus merkusii* in these zones. Most of the temperate and alpine meadows are full of beautiful flowering plants like *Aster*, *Aconitum*, *Rhododendron*, *Meconopsis*, *pedicularis*, *Primula*, *Swertia* etc. *Primulas* are one of the most beautiful plants found in temperate to alpine areas of Arunachal Pradesh. Here 23 species of *Primulas* are described found in Tawang district in a preliminary survey.

INTRODUCTION

*Primulas* are herbaceous flowering plants in the family of Primulaceae. They are one of the most beautiful gifts of the spring as they bloom mostly during the spring. The *Primula* name for the genus comes from Latin *primus* which means first (prime); and; *ulus* which means tiny, alluding to early spring blooming; and from the Italian, *primarossa*, which means first rose. There are about 425 species with over 300 of them found in Asia. more than 33 are found in Europe and 20 found in North America. In Arunachal Pradesh, more than 50 species of *Primulas* are expected in all temperate and alpine areas.

*Primula* are perennial herbs or semi-evergreen,

forming a basal rosette of simple leaves, with salver-shaped or bell-shaped flowers with different colours which may be solitary or carried in an umbel or in whorls on an erect stout stem arising from basal rosettes of leaves; their flowers can be purple, yellow, red, pink, blue, or white. Some species show a white mealy bloom (farina) on various parts of the plant. Flowers are very attractive and mostly used as ornamental plants. But in Arunachal Pradesh, a few species are cultivated as ornamental plants which are used for traditional treatments.

TAXONOMY

Class : Equisetopsida  
Subclass : Magnoliidae

Superorder : Asteranae  
 Order : Ericales  
 Family : Primulaceae  
 Genus : *Primula*

#### METHODOLOGY

Three tours were undertaken to Tawang district, Arunachal Pradesh in different seasons for floristic survey and collection of herbarium specimens under various projects. The route of tours to Tawang district was Sela – Jaswantgarh – Jang – Tawang – PTSO – Y junction – Geshila - Songesur Lake- Takshang Gompa – Zemithang – Lumla – Tawang. The first tour was undertaken from 23.03.2010 to 31.03.2010, second tour was from 11.07.2010 to 18.07.2010 and third tour was from 21.05.2011 to 27.05.2011. During the tours, preliminary survey was made on the *Primulas* grown in different localities of Tawang district and documented all the species with photographs. In addition to these, different publications on *Primulas* have been consulted for detailed information in the district.

#### ENUMERATION

1. *Primula atrodentata* W.W. Smith.: Perennial herbs, farinose with glandular pubescent. Leaves forming a rosette; leaf blade elliptic to oblong or spatulate, tapering to base, minutely glandular. Flowers mauve or pale blue-violet, with a white eye. Capsule sub- globose, shorter than calyx.  
 Habitat : Moist meadows, among shrubs.  
 Fl. & Fr.: April – July.  
 Distribution: 3500- 4000 m.

2. *P. bhutanica* H.R. Fletcher: A rosette-forming deciduous perennial herbs bearing spoon-shaped, finely toothed crinkled medium green leaves with a white mealy coat; stalk short. Flower blue with yellow eyes.

Habitat : Deep or partial shade in humus-rich soil, avoiding excess winter moisture.  
 Fl. & Fr. : March - June.  
 Distribution: 3000- 4000 m.

3. *P. calderiana* I. B. Balfour & Cooper: Perennial herbs, glabrous, strongly scented.; Leaves spatulate to oblanceolate, tapering into a broadly winged petiole, margin denticulate, efarinose or sparsely

pale yellow farinose abaxially. Flowers in umbel, dark purple with a golden- yellow eye. Capsule discoid, shorter than calyx, disintegrating at maturity. The whole plant has an unpleasant smell which has been likened to fish.

Habitat : Alpine meadows, streamside, humus soil, grassy slopes and among shrubs.

Fl. & Fr. : April-June

Distribution: Se la Pass;3600-4800m.

4. *P. denticulata* Smith. (drumstick primula): The drumstick primula is the most common Himalayan primula in the wild grouped in section *Denticulata*. *Primula denticulata* is a deciduous, herbaceous perennial upto 30- 45 cm(18 in) tall and wide, with rosettes of oblong, oblong- obovate to obovate spatulate, minutely toothed, minutely hairy on both surface leaves mealy beneath and sturdy stems bearing spherical umbels of purple flowers in late spring and early summer. Flower many, purple to pinkish-purple with a yellowish eye, borne in dense rounded compact heads on the erect stout stems with thick roots. Capsule subglobose or oblong. *Primula denticulata* is cultivated as an ornamental.

Habitat : Meadows, grassy slopes, amongst open shrubs and other areas which tend to be evenly moist throughout the year.

Fl. & Fr.: March – June.

Distribution: Jung; 1500- 4500 m.

Part used: leaf, root & flower.

Uses: Cough& cold. *P. denticulata* is use topically for treating acne and reducing the appearance of oil or pores on the skin, hair and scalp. Raw flowers make a very attractive addition to salads. Fruits of *P. denticulata* is used in veterinary ethno-medicine for cough which is useful for mammary glands.

*P. denticulata*, contain primin and other quinoid compounds which are contact allergens

5. *P. dickieana* G.Watt: Small perennial herbs, efarinose, glabrous, base with few lanceolate to linear bud scales.; leaves elliptic-obovate to oblanceolate, tapering at base, margin nearly entire to remotely denticulate, apex sub- acute. Flowers yellow, white,

or purple. Capsule ovoid, nearly as long as calyx.

Habitat : Wet meadows.

Fl. & fr : April- May.

Distribution: Near Se La Pass; 3500- 4200 m.

6. *P. euosma* Craib: Perennial herbs. Leaves elliptic to obovate, glabrous, glandular, denticulate, apex rounded. Flowers purplish rose to deep blue-purple, exannulate, puberulous outside; Capsule globose, included in calyx, disintegrating at maturity.

Habitat : Wet meadows, shaded moist areas near streams.

Fl. & fr : April- Sept.

Distribution: 3500- 4700 m.

7. *P. filipes* Watt.: Perennial herbs. Leaves orbicular to ovate or cordate, toothed; stalk equalling the leaf in length. Flowers pale pink, broadly bell-shaped, in umbels of six to eight on stems 1-3cm high.

Habitat : moss covered rocks in shady areas.

Fl & fr : April- May

Distribution: 2000- 4000 m.

8. *P. glabra* Klatt: Perennial herbs. Leaves forming a compact rosette, obovate-elliptic to oblanceolate or spatulate, dentate. Flowers pinkish purple to bluish violet, rarely white; tube as long as to slightly longer than calyx. Capsule as long as calyx.

Habitat : On peat, grassy hillsides, along lake stream, cliffs, alpine meadows, on moist rocks.

Fl. & fr : Sept- October .

Distribution: Sela Pass; 4000- 5000 m.

9. *P. glomerata* Pax in engler, Pflanzenr: Perennial herbs. Leaves forming a rosette, reddish at base, oblong to oblanceolate or obovate- spatulate; petiole winged. Flowers erect or nearly so, blue in pendent, compact, globular head.

Habitat : Open and bushy slopes .

Fl. & Fr : Sept- Oct.

Distribution: Jung; 3000- 5000 m.

10. *P. hookeri* Watt.: Perennial herbs, Leaves oblong-obovate to spatulate, tapering to base, apex rounded to obtuse. Scales less than 3 mm, Flowers white. Capsule disintegrating at maturity.

Habitat : Alpine meadows, rocky slopes, forests,

gravelly avalanche deposits.

Fl. & Fr : June- July.

Distribution: P'TSO; 3900- 5000 m.

11. *P. irregularis* Craib.: Rhizomatous herbs. Leaves oblong to elliptic, toothed, yellow farinaceous beneath; stalk short. Flowers pink with yellow eye surrounded by a white ring, in umbels of twelve to twenty on stems which are so short that they lie amongst the leaves.

Habitat : Wet and moist areas.

Fl. & Fr : April - June.

Distribution: 2700- 5000 m.

12. *P. kingii* Watt *ex* Hook.: Perennial herbs, efarinose, glabrous, with few oblong bud scales at base. Petiole winged. Leaves elliptic-lanceolate to lanceolate. Flowers dark wine-red, narrowly campanulate, glabrous inside, with a cylindric base nearly as long as calyx and an expanded campanulate upper part. Capsule ovoid, nearly as long as calyx.

Habitat : Alpine meadows.

Fl. & Fr :Sept - Oct.

Distribution: 3500- 4300 m.

13. *P. mollis* Nutt. *ex* Hook: Perennial herbs. Leaves suborbicular to reniform, cordate at the base and denticulate-crenulate at the margin, softly hairy. Flowers rosy-pink to purple with a yellow eye. Capsule ellipsoid, slightly shorter than calyx.

Habitat : Broad-leaved forests and on moist steep slopes.

Fl. & Fr : April - May.

Distribution: 2400- 3500 m.

14. *P. obtusifolia* Royle.: Perennial herbs with a stout rootstock sheathed in basal brown scales. Leaves elliptic-obtuse or oblanceolate, tapering into a broadly winged stalk, glabrous or with yellow or white farina beneath. Scape solitary, rarely more, stout, 10- 20 cm long. Flowers bright bluish-purple in one to three umbels. Capsule oblong, cylindric, included in the calyx.

Habitat : Moist slopes.

Fl & fr : May- June.

Distribution: 3500- 5000 m.

15. *P. prenantha* I. B. Balfour & W. W. Smith :

Perennial herbs, efarinose, glabrous. Leaves oblong-ovovate to obovate-elliptic forming a rosette. Flowers small, tubular, yellow colour. Capsule sub-globose.

Habitat : Wet and alpine meadows, bog margins

Fl & fr : Feb- Sept.

Distribution: 2400- 4000 m.

16. *P. primulina* (Sprengel) H.Hara, J. Jap. : Perennial herbs, with remains of old leaves at base. Petiole narrowly winged, usually shorter than leaf blade, occasionally longer. Leaves hairy, in tight rosettes, spatulate to oblanceolate, strongly rounded-toothed. Flowers purple or blue-purple, rarely white, hairy in the throat, in umbels of one to four on stalks to 8cm high. Capsule cylindrical as long as calyx.

Habitat : Rocky slopes, stream sides, moist meadows, among *Rhododendron*.

Fl & fr : July- Oct.

Distribution: 3600—5000 m.

17. *P. prolifera* Wall : *P. prolifera* is commonly known as Candelabrum Primula. It is annuals, biennials and perennials, some times evergreen. Leaves oblong obovate to lanceolate, finely toothed to 35cm long by 7cm wide. Flowers bright golden-yellow, fragrant, 2.5cm across in four to six whorls of up to twenty, on stems to 90cm or more high. They are produced in rosettes of basal leaves with tubular, bell or primrose-shaped flowers. The flower stems, leaves and sepals are covered with farina (a waxy powder). Whorls of bright yellow fragrant flowers are held on tall strong stems above shiny, toothed leaves.

This rosette forming evergreen Candelabra primrose bears up to 7 whorls of up to a dozen salver form fragrant golden yellow flowers. Height and spread 24 inches.

Habitat: Moist places/Slopes.

Fl & fr: May- August.

Distribution: PTSO, Tawang; Above 3000m.

18. *P. scapigera* (Hook. f.) Craib: Perennial herbs. Leaves dimorphic, spatulate or elliptic-oblong to broadly ovate minutely glandular along veins, glabrous. Flowers pink. Capsule subglobose, shorter than calyx.

Habitat: Moist hill slopes.

Fl & fr: July- Oct.

Distribution: 2000- 3700 m.

19. *P. sikkimensis* J. D. Hooker: Perennial herbs; Leaves elliptic to oblong in a basal rosette with long-stalked; stem erect bearing terminal umbels of nodding, fragrant. Flowers funnel-shaped, yellow to creamy-white in one or two umbels on stems 30-90cm. Capsule oblong, nearly as long as calyx.

Habitat : Wet meadows, streamside, at margins of bogs and wet forests.

Fl & fr : June- Oct.

Distribution: Near Sela Pass, PTSO; 3200- 4400m.

20. *P. stirtoniana* Watt.: Very small herb, no more than 3cm tall. Leaves spatulate incised-dentate in the upper margin, and scabrid on both surfaces. Flowers blue-purple with a white eye, exannulate, a few hairs in the throat and emarginate lobes.

Habitat : Moist hill slopes.

Fl & fr : May - June

Distribution: Lugathang; 2800 - 4500 m.

21. *P. strumosa* I.B. Balfour & Cooper.: Perennial herbs. Leaves oblanceolate to obovate or oblong, Flowers densely yellow farinose, parted to middle; lobes ovate to ovate-oblong, margins overlapping, apex obtuse. Capsule disintegrating at maturity.

Habitat : Alpine meadows, *Abies* and *Rhododendron* forests, margins of *Abies* forests.

Fl & fr : May- June

Distribution: Sela Pass; 3500- 4300m.

22. *P. tanneri* King: Perennial herbs. Leaves forming a rosette; petiole winged, as long as leaf blade; leaf blade ovate-deltoid, sometimes puberulous abaxially, base cordate to subsagittate, margin irregularly coarse dentate, apex acute. Flowers light purple to deep purple, sometimes pale blue or white. Capsule discoid, shorter than calyx, disintegrating at maturity.

Habitat : Grassy slopes & woodlands.

Fl & fr : April- July.

Distribution: Above 3600 m.

23. *P. waltonii* Watt ex I. B. Balfour: Perennial herbs. Leaves forming a rosette; elliptic to oblanceolate, sharply and irregularly toothed, glabrous. Flowers



## Plate-I

*Primula* at bloom near Sela Pass (3,500m)*Primula* at bloom near Sela Pass (3,500m) *Primula calderiana**Primula primulina**Primula denticulate**Primula strumosa**Primula waltonii*



Plate-II



*Primula glomerata*



*Primula prolifera*



*Primula sikkimensis*



*Pr imula sikkimensis*

pendent on pedicels, funnel-shaped, dull purplish-lilac to deep red-purple, in umbels, on stems 20-60cm tall. Petiole nearly as long as to shorter than leaf blade; leaf blade elliptic-oblong to oblanceolate, efarinose, abaxially sparsely minutely glandular, base cuneate-attenuate, margin erose-dentate, apex rounded. Flowers pink to deep wine purple; tube 8--11 mm; capsule cylindrical, as long as calyx.

Habitat : Moist shady areas ,grassy mountain slopes, streamsides.

Fl & fr : June-Sep.

Distribution: Geshila; 3900--5300 m.

### CONCLUSION

During the study, it is observed that, *Primulas* are mainly wild beautiful flowers and some of them are used by the local people for treatment of diseases as medicinal plants. Of course, some people, now-a-days, plant a few species as aesthetic/ ornamental plants. It may be cultivated as ornamental plant and may be used for beautification, both in outside and inside the Hotels, Restaurants and other premises of Meetings, Seminars and Tourist places. Definitely, it will attract the tourists for its attractive and beautiful colours and interested students, scientists and other researchers. Nursery for development of these plants may be established for propagation, cultivation and conservation of the plant in commercial basis which will provide livelihood to the people of high hill areas. Because, due to development of roads and modern lifestyle, many species have been destroyed and facing threats. Government should also take some measurement to conserve the plant.

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