

# Diversity in the species of *Panax* in Sikkim Himalaya

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## ABSTRACT

The Himalayan Ginseng of Sikkim is the potential plant having the efficacies of treating diseases. This paper attempted to discourse the diversity of this Himalayan ginseng and is presented for the taxonomic usages.

**Keywords:** Himalayan Ginseng, *Panax*, Sikkim Himalaya.

## 1. INTRODUCTION

Himalayan ginseng is growing in natural vegetation at the different altitudes from sub-temperate to alpine regions. Moreover, it was also noted that the Himalayan ginseng, growing in the different areas of Sikkim, depicts the different morphological characters. Several authors reported leaves variation, nature of tubers, habitat of the plants, inflorescences etc are the factors in *Panax* and the same do exist especially in Sikkim Himalaya (Banerjee, 1968; Hara, 1966, 1970, 1971). Such discrepancy in the identification is prevalent among the end users of medicinal plants, managers academicians and taxonomists (Banerjee, 1968; Hara, 1970).

This paper presented to discourse the morphological characters of *Panax* L. growing in the Sikkim Himalaya comparing with the available herbarium specimens in Sikkim State Forest Herbarium (SSFH).

## 2. MATERIAL AND METHODS

Herbarium specimens of the representative specimens were prepared following standard method (Ranjan 2018). All the specimens are deposited at SSFH. Extensive literature surveys were conducted to confirm the representative specimens (Banerjee, 1968; Hara, 1966, 1970, 1971).

## 3. RESULTS AND DISCUSSION

The taxonomic information of new varieties of *Panax bipinnatifidus* Seeman, and *Panax pseudoginseng* Wall var *angustifolius* Hara, new forma of *Panax sikkimensis* Ban. and *Panax pseudoginseng* Wall. subsp *hamalicus* Hara of Sikkim Himalaya is presented hereunder:

**Taxonomy**

*Panax bipinnatifidus* Seeman

**I.** *Panax bipinnatifidus* Seeman var *bipinnatifidus* var. nov.

*Panax bipinnatifidus* Seeman. In: J. Bot. 6:54 (1868).

**Typotype:** SSFH SK002994 I. **Locality:** Yumthang. **Coll.:** S.T. Lachungpa. **Date of Collection:** 25.5.1994.

**Holotype:** *Panax bipinnatifidus*, Samdung, 11500 ft, July 22/ 1849, Herbarium Hookerianum, 1867, K000820817, RBG, Kew.

**Lectotype:** *Panax bipinnatifidus* Seeman, Elevation: 3505m, Det. Jun, Wen, United States. Feather –leaf Bamboo ginseng.

**DISTRIBUTION:** INDIA: Sikkim: Yumthang, North Sikkim.

Perennial herbs in moist rich soil. Plant ca. 41 cm tall. Stem unbranched, erect, glabrous, diameter ca. 4 mm. Leaves whorled at the apex of stem, incised, serrate, lobed leaf, petiole length ca. 8 cm. Five large leaves and five leaflets in each, pinnatifid, largest leaflet length ca. 12.5 cm and ca. 2.5 cm wide; sparse setae on the dorsal surface along veins. Solitary umbel inflorescence. Peduncle ca. 26 cm long. Flower pedicel ca. 0.7 cm, smooth. Long creeping rhizome, nodes ca. 1cm long, ca. 0.4 cm diameter, average internodal distance ca. 1 cm.

Note: The type specimen, holotype, has two varieties of *Panax bipinnatifidus* Seeman. Large plants is designated as *Panax bipinnatifidus* Seeman var *bipinnatifidus* var. nov.

**II.** *Panax bipinnatifidus* Seeman var. *parvus* var. nov.

**Holotype:** SSFH SK002994II. **Locality:** Yumthang. **Coll.:** S.T. Lachungpa. **Date of Collection:** 25.5.1994.

**DISTRIBUTION:** INDIA: Sikkim: Yumthang, North Sikkim.

Plant ca. 32 cm tall. Stem diameter ca. 4 mm. Incised, serrate, lobed leaf, petiole ca. 4.5 cm long. Five leaves and small incised leaflets in each, pinnatifid, serrate, lobes, largest leaflet ca. 6 cm long and ca. 1 cm wide. Peduncle ca. 11 cm long. Flower pedicel ca. 0.7 cm. Long creeping rhizome, nodes diameter ca. 0.7 cm. Short rootstock ca. 3cm long along with ca. 1 cm internode.

Note: The type specimen, holotype, has two varieties of *Panax bipinnatifidus* Seeman. Two small plants of the type herbarium of Herbarium Hookerianum, 1867, K000820817, RBG, Kew is designated as *Panax bipinnatifidus* Seeman var *parvus* var. nov.

*Panax pseudoginseng* Wall.

2 a *Panax pseudoginseng* Wall. subsp. *pseudoginseng* Hara var. *pseudoginseng* var. nov.

**Specimen examined:** *Panax pseudoginseng*; Isolectotype Wallich, N (1832), Nepal; MNHN p p02428493; Herbarium Museum Paris, Herbarium of Museum National d’Histoire Naturelle (MNHN-Paris) 1861, Herb. Wallich No 3730, Nepal, Herb. Mus. Paris. *Panax pseudoginseng* Wall. In : Trans Med. Soc. 4: 117 (1829). SSFH SK005148.

**DISTRIBUTION:** Nepal, China.

Plant perennial **fleshy carrot like roots**, very short rhizome, obovate –oblong leaflets with cuspidate close teeth on the margin, setae on nerves on the upper surface, stipule like appendages at the base of petioles, slender smooth pedicels, inconspicuous bracts.

**Note:** *Panax pseudoginseng* Wall. is necessary to understand properly which was also pointed by Hara (1970). The typical *Panax pseudoginseng* Wall of Nepal characterized by Hara has following characters like fleshy carrot like roots, sometime fascicled, very short rhizome with obovate-obovate –oblong leaflets with cuspidate close teeth on the margin, setae on nerves on the upper surface, stipule like appendages at the base of petioles, slender smooth pedicels, inconspicuous bracts, flattish seeds etc. In contrary to this, he stated that the specimen across the Darjeeling and Sikkim Himalaya differ with the typical *Panax pseudoginseng* Wall and has long creeping rhizomes of variable shapes.

2b. *Panax pseudoginseng* Wall. subsp *himalicus* Hara

**I.** *Panax pseudoginseng* Wall. subsp *himalicus* Hara var. *himalicus* var. nov.

**Holotype:** SSFH SK002992. **Locality:** Jakchen. **Alt.:** 3275m. **Coll.** S.D . Lepcha. **Date of Collection:** 20. 08.1990.

**DISTRIBUTION:** INDIA: Sikkim: Jakchen, North Sikkim.

Plant ca. 41 cm tall. Stem diameter ca. 4 mm. Narrowly Ovate, serrulate, petiole length ca. 7.5 cm. Five leaves and five leaflets in each. Largest leaflet length 5.2 cm and 2.3 cm wide. Peduncle ca. 23 cm long. Flower pedicel ca. 0.7 cm. Fruit diameter ca. 3 mm.

Rhizome slender ca. 6 cm long, thick nodulous rhizome; After this thick rootstock, the nodes and internodes differentiate. Nodes diameter ca. 4 mm, average internodal distance ca. 1.2 cm. Ripe fruit, bright red and black in the apical portions.

II. *Panax pseudoginseng* Wall. subsp *hamalicus* Hara var. *nyet* var. nov.

**Holotype:** SSFH SK005066. **Locality:** Lachen (2640m)-Tarum chu bridge- Chachu (2960m). **Coll.:** K. Yonekura. Field no. 320343. **Date of Collection:** 22.06.2002.

**DISTRIBUTION:** INDIA: Sikkim: Lachen (2640m)-Tarum chu bridge- Chachu (2960m).

Plant height ca. 17 cm. Stem diameter ca. 4 mm. Narrowly Ovate, bi-serrulate, rounded at base, acute at the apex, petiole length ca. 7.5 cm. Three leaves and four leaflets in each. Largest leaflet length 7 cm and 2.7 cm wide. Peduncle ca. 17 cm long. Flower pedicel ca. 0.7 cm. Fruit diameter ca. 3 mm. Rhizome slender like bead ca. 6 cm, thick rhizomatous nodes; Ripe fruit, bright red and black in the apical portions.

III. *Panax pseudoginseng* Wall. subsp *hamalicus* Hara var. *sam* var. nov.

**Holotype:** SSFH SK005154. **Locality:** Lachen (2640m)-Tarum chu bridge- Chachu (2960m). **Coll.:** K. Yonekura. Field no. 320344. **Date of Collection:** 22.06.2002.

**DISTRIBUTION:** INDIA: Sikkim: Lachen (2640m)-Tarum chu bridge- Chachu (2960m).

Plant height ca. 40 cm. Stem diameter ca. 2 mm. Narrowly Ovate, bi-serrulate, rounded at base, acute at the apex, membranous, petiolule ca. 1 cm. Four leaves and five leaflets in each. Largest leaflet length ca. 6 cm and ca. 1.8 cm wide. Peduncle ca. 25 cm long. Flower pedicel ca. 1 cm. Fruit diameter ca. 3 mm. Rhizome creeping. Ripe fruit, bright red and black in the apical portions.

Note: the subspecies, subsp. *himalicus* described by Hara and has stated the plant with key characters such as internodes elongated slender with thick subglobose nodes, leaflet caudate-acuminate at the apex, with cuspidate sharp teeth and densely or sparsely bristly. Rhizomes usually slender and nodulose. Bracts often inconspicuous, Leaflet broader, coarsely serrate, irregularly double serrate, rhizome long creeping, seeds ovoid ca. 4-5 mm long and ca. 3-4 mm thick. Notably, this is dominated subspecies of Sikkim Himalaya (Hara, 1970).

#### *Panax pseudoginseng* Wall. var *angustifolius*

I. *Panax pseudoginseng* Wall. var *angustifolius* Hara f. *angustifolius* f.nov.

**Holotype:** SSFH SK002993 I. **Coll.:** Anonymous. **Date of Collection:** 07. 10.1983.

**DISTRIBUTION:** INDIA: Sikkim: Jakchen, North Sikkim.

Plant ca. 35 cm tall. Stem diameter ca. 5 mm. Leaves lanceolate, acuminate at the apex, thick, minute serrate, leaflets pinnatifid, petiole length ca. 8.5 cm. Four leaflets. Largest Leaflet ca. 6.3 cm long and ca. 1.7 cm wide. Peduncle ca. 17 cm. Flower pedicel ca. 0.9 cm. Rhizomes long creeping, nodes diameter ca. 1.2 cm, average internodal distance ca. 2 to 3 cm. Ripe fruit, bright red and black in the apical portions.

Note: Likewise, other variety of *Panax* of Sikkim Himalaya is *Panax pseudoginseng* Wall. var *angustifolius* Hara that has unique identity in the himalaya. The characters of the plant are long creeping rhizome, seeds smaller ovoid, ca. 4-5 mm long and ca. 3-4 mm thick. Leaflet narrower lanceolate (up to 2.5 cm wide), more uniformly serrate with small and close teeth on the margin, caudately long, acuminate at the apex (Hara, 1970).

II. *Panax pseudoginseng* Wall. var *angustifolius* Hara f. *nyet* f.nov.

**Holotype:** SSFH SK002993 II. **Locality:** Yumthang. **Coll.:** S.T. Lachungpa. **Date of Collection:** 25.5.1994.

**DISTRIBUTION:** INDIA: Sikkim: Yumthang, North Sikkim.

Plant ca. 47 cm tall. Stem diameter ca. 7 mm. Leaflets lanceolate, minute, serrate, acuminate at the apex, petiole length ca. 5 cm. Four leaflets. Largest leaflet length 6.3 cm and 1.6 cm wide. Peduncle ca. 12 cm long. Flower pedicel ca. 1 cm long. **Thick Rhizomatous nodes** ca. 1.5 cm long and diameter ca. 2.5 cm. Average internodal distance ca. 5 mm. Ripe fruit, bright red and black in the apical portions.

III. *Panax pseudoginseng* Wall. var *angustifolius* Hara f. *sam* f.nov.

**Holotype:** SSFH SK005149. **Locality:** Lachen (2640m)-Tarum chu bridge- Chachu (2960m). **Coll.:** K. Yonekura. **Date of Collection:** 22.07.2002.

**DISTRIBUTION:** INDIA: Sikkim: Lachen (2640m)-Tarum chu bridge- Chachu (2960m).

Plant height ca. 55 cm. Stem diameter ca. 0.5 mm. Leaflets lanceolate, narrow, minute, serrate, petiole length ca. 9 cm, petiolule ca. 1.8 cm. Six leaflets. Largest leaflet length 11.2 cm and 1.8 cm wide. Peduncle ca. 21 cm long. Inflorescence umbel, solitary with one lateral appendage below at 5-6 cm (possibly reduced lateral umbel). Flower pedicel ca. 1 cm long. **Rootstock** ca. 9 cm long and diameter ca. 1 cm. Average internodal distance ca. 5 mm. Ripe fruit, bright red and black in the apical portions.

IV. *Panax pseudoginseng* Wall. var *angustifolius* Hara f. *flee* f.nov.

**Holotype:** SSFH SK005140. **Locality:** Lachen (2640m)-Tarum chu bridge- Chachu (2960m). **Coll.:** K. Yonekura. **Date of Collection:** 22.07.2002.

**DISTRIBUTION:** INDIA: Sikkim: Lachen (2640m)-Tarum chu bridge- Chachu (2960m).

Plant ca. 44 cm tall. Stem diameter ca. 0.3-0.4 mm. Leaflets lanceolate, narrow, membranous serrate, rounded at base, not minutely serrate, petiole length ca. 14 cm, petiolule ca. 2 cm, acute at the apex. Four leaves and five leaflets in each leaf. Largest leaflet length ca. 10 cm and ca. 1.8 cm wide. Peduncle ca. 7 cm long. Inflorescence umbel with one lateral umbel. Flower pedicel ca. 1 cm long. Creeping rhizome, node 0.4 cm long. Ripe fruit, ca. 0.5 cm, stalk 1.5 cm, bright red and black in the apical portions.

V. *Panax pseudoginseng* Wall. var *angustifolius* Hara f. *fnoo* f.nov.

**Holotype:** SSFH SK001236. **Locality:** Lachen (2640m)-Tarum chu bridge- Chachu (2960m). **Coll.:** K. Yonekura. **Date of Collection:** 22.07.2002.

**DISTRIBUTION:** INDIA: Sikkim: Lachen (2640m)-Tarum chu bridge- Chachu (2960m).

Plant ca. 42 cm tall. Stem diameter ca. 0.3-0.4 mm. Leaflets lanceolate, narrow, membranous minute, serrate, petiole length ca. 7 cm, petiolule ca. 1.2 cm, acute at the apex. Four leaves and five leaflets in each leaf. Largest leaflet length ca. 9.2 cm and ca. 2.0 cm wide. Peduncle ca. 27 cm long. Inflorescence umbel. Flower pedicel ca. 1.2 cm long. Rhizomatous nodes ca. 0.4 cm, internode ca. 4 cm long. Ripe fruit, bright red and black in the apical portions.

. VI. *Panax pseudoginseng* Wall. var *angustifolius* Hara f. *tarok* f.nov.

**Holotype:** SSFH SK001201. **Locality:** Yumthang-Lachung Chhu. **Coll.:** D.G. Long and H.J. Noltie. **Date of Collection:** 13.07.1996.

**Voucher No.:** 155. **Alt.:** 3610m. **Remarks:** Flowers greenish. Among boulders in *Abies* forest.

**DISTRIBUTION:** INDIA: Sikkim: Lachen (2640m)-Tarum chu bridge- Chachu (2960m).

Plant ca. 26 cm tall. Stem diameter ca. 0.3-0.4 mm. Leaflets narrow lanceolate, minute, serrate, petiole length ca. 8.5 cm, petiolule ca. 0.5 cm, acute at the apex. Six leaves and five leaflets in each leaf. Largest leaflet length ca. 8 cm and ca. 1.0 cm wide. Peduncle ca. 14 cm long. Inflorescence umbel. Flower ca. 2 mm, pedicel ca. 1.2 cm long. Ripe fruit, bright red and black in the apical portions.

Additionally, this paper also attempted to document the characters of specimen *Panax sikkimensis* Ben. collecting from its type habitat.

Though Hara did not agree with the status of species to *Panax sikkimensis* Ben., during the study, the species of same habitat was studied and found that the species holds merit to define as species. It is completely different in several characters. To avoid the taxonomic confusion among the taxonomist, medicinal plants buyers, seller and academic purposes, the rank of species has been maintained in this paper. In this paper, the additional descriptions were added to *Panax sikkimensis* Ben.

#### *Panax sikkimensis* Ban.

I. *Panax sikkimensis* (Ben.) Pradhan f. *sikkimensis* f. nov.

**Specimen examined:** SSFH [SK002340]. **Locality:** Lachen(2640m), Tarum Chu bridge(2210m)- Chachu (2210m). **Coll.:** K. Yonekura.

**Date of Collection:** 22.07.2003 20390057.

**Holotype:** Lachung, 2593 m, May, 1885, King's Coll. Sn. (CAL).

**DISTRIBUTION:** INDIA: Sikkim: North Sikkim.

Plant ca.40 cm tall. Stem diameter ca. 4 mm. Leaves ovate, membranous, serrulate, petiole ca. 8.5 cm long. Three leaflets. Largest leaflet ca. 7.4 cm long and ca. 1.9 cm wide. Peduncle ca. 18 cm long. Flower pedicel ca. 0.6 cm. Rhizomes short creeping with nodes ca. 8 mm diameter.

II. *Panax sikkimensis* (Ben.) Pradhan f. *kat* f. nov.

**Holotype:** SSFH SK001658 I. Locality: Hiley (2700m)-Barsey (2790m)-Below Tal Danda(2840m)-Barsey (2790m). **Coll.:** K. Yonekura.

**Date of Collection:** 26.06.2003.

**DISTRIBUTION:** INDIA: Sikkim: West Sikkim.

Plant ca. 27 cm tall. Stem diameter ca. 3 mm. Leaves lanceolate, membranous, serrulate, petiole length ca. 6 cm. Five leaflets. Largest leaflet 4.4 cm long and 1.1 cm wide. Peduncle ca. 11 cm, 3mm thickness. Flower pedicel 0.6 cm. Fruit 0.6 cm diameter. Long creeping rhizome.

III. *Panax sikkimensis* (Ben.) Pradhan f. *net* f. nov.

**Specimen examined:** SSFH SK001658II. Locality: Hiley (2700m)-Barsey (2790m)-Below Tal Danda(2840m)-Barsey (2790m). **Coll.:** K. Yonekura.

**Date of Collection:** 26.06.2003.

**DISTRIBUTION:** INDIA: Sikkim: West Sikkim.

Plant ca. 27 cm tall. Stem diameter 3 mm. Narrow leaf, membranous, irregularly serrulate, petiole length ca. 5 cm. Three leaflets. Largest leaflet 4 cm long and 1 cm wide. Peduncle ca. 10cm long and 2mm thickness. Flower pedicel ca. 0.6 cm. Long creeping rhizome.

IV. *Panax sikkimensis* (Ben.) Pradhan f. *sam* f. nov.

**Specimen examined:** SSFH SK002340. **Locality:** Lachen(2640m), Tarum Chu bridge(2210m)- Chachu (2210m). **Coll.:** K. Yonekura.

**Date of Collection:** 22.07.2002. 20390057

**DISTRIBUTION:** INDIA: Sikkim: North Sikkim.

Plant height ca. 30 cm. Stem diameter 3 mm. Leaves lanceolate, membranous, irregularly serrate acuminate, petiole length ca. 5.5 cm. Five leaflets. Leaflets pinnatifid. Largest leaflet ca. 5.9 cm long and ca. 1 cm wide. Peduncle ca. 12.5 cm. Flower pedicel ca. 0.7 cm. Long creeping rhizomes.

V. *Panax sikkimensis* (Ben.) Pradhan f. *fonoo* f. nov.

**Specimen examined:** SSFH SK001391. **Locality:** Chachu (2960m)- Sebang (3200m). **Coll.:** K. Yonekura. **Date of Collection:**

23.07.2002.

**DISTRIBUTION:** INDIA: Sikkim: Chachu (2960m)- Sebang (3200m).

Plant ca. 21 cm tall. Stem diameter ca. 3mm. Leaves lanceolate, irregularly serrate acuminate, petiolule ca. 1 cm, petiole length ca. 7 cm. Five leaves and 5 leaflets in each. Leaflets pinnatifid. Largest leaflet ca. 8 cm long and 2 cm wide. Doubly serrate. Peduncle ca. 30 cm. Flower ca. 2mm, pedicel ca. 0.7 cm. Long creeping rhizome. with nodes and internodes.

VI. *Panax sikkimensis* (Ben.) Pradhan f. *tarok* f. nov.

**Specimen examined:** SSFH SK005153. **Locality:** Chachu (2960m)- Sebang (3200m). **Coll.:** K. Yonekura. **Date of Collection:**

23.07.2002.

**DISTRIBUTION:** INDIA: Sikkim: Chachu (2960m)- Sebang (3200m).

Plant ca. 22 cm tall. Stem diameter ca. 3mm. Leaves ovate, irregularly bi serrate acuminate, petiolule ca. 0.3 cm, petiole length ca. 5.3 cm. Four leaves and 5 leaflets in each. Leaflets pinnatifid. Largest leaflet ca. 5.3 cm long and 1.8 cm wide. Doubly serrate, membranous. Peduncle ca. 27 cm. Flower ca. 2mm, pedicel ca. 1 cm. Long creeping rhizome, node 0.8 cm, internode ca. 3 cm.

VII. *Panax sikkimensis* (Ben.) Pradhan f. *kokyuk* f. nov.

**Specimen examined:** SSFH SK002340 I. **Locality:** Chachu (2960m)- Sebang (3200m). **Coll.:** K. Yonekura. **Date of Collection:**

23.07.2002.

**DISTRIBUTION:** INDIA: Sikkim: Chachu (2960m)- Sebang (3200m).

Plant ca. 30 cm tall. Stem diameter ca. 2-3mm. Leaves narrowly ovate, irregularly bi serrate, acute at the apex like arrow shaped, petiolule ca. 0.6 cm, petiole length ca. 6 cm. Four leaves and 5 leaflets in each. Leaflets pinnatifid. Largest leaflet ca. 5.9 cm long and 2.3 cm wide. Doubly serrate, membranous. Peduncle ca. 19 cm. Flower ca. 2mm, pedicel ca. 1 cm. Long creeping rhizome.



As *Panax* is one of the taxonomically confused taxa in Eastern Himalaya due to their variation in the different altitudes in their rhizomes, plant height, flower's peduncle, leaves shapes and number etc. In virtue of these variation, the discrepancy exists. Such diversity is discussed in this paper.

*Panax bipinnatifidus* Seeman and its variations differ in their leaflets sizes, peduncle length and rhizomes node length. For instances, *Panax bipinnatifidus* var. *parvus* var. nov. has ca. 3 cm long rhizome in compare to ca. 1 cm in *Panax bipinnatifidus* Seeman var *bipinnatifidus* var. nov. Both *Panax bipinnatifidus* var. *parvus* var. nov. and *Panax bipinnatifidus* Seeman var *bipinnatifidus* var. nov have incised, irregular serrate leaflet but these have differences in their lengths and widenesss. The peduncles of the *Panax bipinnatifidus* Seeman var *bipinnatifidus* var. nov is longer than *Panax bipinnatifidus* Seeman var *parvus* var. nov

Besides these, there were different types of var. *angustifolius* found in Sikkim. In general, it is identified by the narrow leaf having uniform minute serrate margin. The herbarium of all types of var. *angustifolius* prepared which are basically differ in their leaves, length of pendule, rhizome shapes and sizes. All these types of var. *angustifolius* are designated here as new formas. In line to these, the varieties of subsp. *himalicus* and forma of species *sikkimensis* were also included to avoid the discrepancies.

Looking into all these aspects, several literatures of Hara (1970), Wallich (1829) etc studied and found that the nature of tubers, habits, leaves and the number of the inflorescence are the taxonomic characters of *Panax* whereas Banerjee (1966) emphasized on the leaves and flower's style.

Moreover, Hara pointed that the rhizome's thickness might have occurred due to the cytological and nutritional conditions and described that the fleshy tuberous roots might have produced at the first period of the life that decayed and detached growing old. One of the instances, Hara stated that the individuals in one population propagate by branching of the rhizome and the few designated wild habitat has different characters whereas some are intermediate reflecting outbreeding. Thus, he hinted that the dealing with the variability of *Panax* of Asiatic races is critical.

But the author believed the characters of rhizome, leaflets height etc are the stable taxonomic characters of plant representing particular taxa of Sikkim Himalaya.



**Fig 1:** [A.] *Panax pseudoginseng* Wall. var *angustifolius* Hara f. *angustifolius* f.nov. [B.] *Panax pseudoginseng* Wall. var *angustifolius* f. *nyet* f.nov. [C.] *Panax pseudoginseng* Wall. var *angustifolius* f. *sam* f.nov. [D.] *Panax pseudoginseng* Wall. var *angustifolius* f. *flee* f.nov. [E.] *Panax pseudoginseng* Wall. var *angustifolius* f. *fnoo* f.nov. [F.] *Panax pseudoginseng* Wall. var *angustifolius* f. *tarok* f.nov. [a.] *Panax sikkimensis* (Ben.) Pradhan f. *sikkimensis* f. nov. [b.] *Panax sikkimensis* (Ben.) Pradhan f. *kat* f. nov. [c.] *Panax sikkimensis* (Ben.) Pradhan f. *net* f. nov. [d.] *Panax sikkimensis* (Ben.) Pradhan f. *sam* f. nov. [e.] *Panax sikkimensis* (Ben.) Pradhan f. *fonoo* f. nov. [f.] *Panax sikkimensis* (Ben.) Pradhan f. *tarok* f. nov. [g.] *Panax sikkimensis* (Ben.) Pradhan f. *kokyuk* f. nov.



**Fig 2:** [A.] *Panax bipinnatifidus* Seeman var. *bipinnatifidus* var. nov. [B.] *Panax bipinnatifidus* Seeman var. *parous* var. nov. [C.] *Panax pseudoginseng* Wall. subsp. *pseudoginseng* Hara var. *pseudoginseng* var. nov. [D.] *Panax pseudoginseng* Wall. subsp. *himalicus* Hara [E.] *Panax pseudoginseng* Wall. subsp. *himalicus* Hara var. *himalicus* var. nov. [F.] *Panax pseudoginseng* Wall. subsp. *himalicus* Hara var. *nyet* var. nov. [G.] *Panax pseudoginseng* Wall. subsp. *himalicus* Hara var. *sam* var. nov.



**Fig 3:** Variations of rhizomes of *Panax* collected from Sikkim Himalaya

#### 4. CONCLUSION

The diversity of *Panax* is presented referring to the representative specimens to address the taxonomic discrepancy. Most of the Himalayan collection of *Panax* has long creeping rhizomes bearing nodes with varying shape, sizes and intermodal distances. Which is why, the treatment of *Panax* widely differs among botanists. Li (1942) referred all other Chinese plants to *Panax pseudoginseng*. Moreover, some regarded *Panax bipinnatifidus* as an independent species considering *Panax japonicus* as an endemic species to Japan (Li, 1942; Graham, 1966). One more species was reported from Sikkim however the study cannot be performed due to unavailability of representative specimen during the study.

Eventually, *Panax* is the concern for the conservation due to the low population in the Sikkim Himalaya. Nevertheless, there is the commercial usage of this plant so the systematic planning of *Panax* and its taxonomic treatment were essential. Thus, it warrants more researches on the mapping of *Panax* diversity of Sikkim and its bio-efficacies.

#### Ethical approval

*Panax L.* from Sikkim Himalaya were recored in the work. The herbarium specimens were deposited Sikkim State Forest Herbarium (SSFH). The ethical guidelines for plants & plant materials are followed in the study for sample collection & identification.

#### Funding

This study has not received any external funding.

#### Conflicts of interests

The authors declare that there are no conflicts of interests.

**Data and materials availability**

All data associated with this study are present in the paper.

**REFERENCES AND NOTES**

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