Pleione 1: 23 - 31. 2007.

Panchase Forest: An Extraordinary Place for Wild Orchids in Nepal

Abishkar Subedi[1], Nabin Subedi[2] and Ram P. Chaudhary[3]

[1]Himalaya Research and Development Center (HRDC), Block no 11, Ganesh Tole-4, Pokhara, Nepal.
E-mail: abishkar@hotmail.com

[2]Prithivi Narayan College, Department of Science and Technology, Tribhuvan University, Pokhara, Nepal.
E-mail: nabin19_pkr@hotmail.com

[3]Central Department of Botany, Tribhuvan University, Kirtipur, Kathmandu, Nepal.
E-mail: ram@cdbtu.wlink.com.np

Abstract

Survey for orchids in Panchase Forest since 1998 recorded 112 species covering 44 genera. This include two endemics and three threatened species. Quite a few species are also potential ornamentals while others are sources of medicine and fodder. Fodder and fire wood collection and grazing domestic cattle are the main threats. Strategies to conserve this rich flora also has been discussed.

Key words: Panchase Forest, Nepal, Orchids, conservation.

OVERVIEW

Panchase Forest (PF) with an area of about 500 sq km is located in Central Nepal between 83º 15' and 83º 57' E longitudes and 28º 12' and 28º 18' N latitudes (Fig 1). Altitude ranges from 1000 to 2517 m amsl. The area receives annual precipitation of over 4300 mm which is heaviest in Nepal. This forest lies about 27 km by road from Pokhara City, the second largest city of Nepal. Marsyangdi river basin in Annapurna Conservation Area Project (ACAP) comprises 86 species of orchids belonging to 42 genera (Chaudhary *et al*. 2002) and the southern buffer zone of ACAP ends in PF. With reference of altitude gradient and dominant species, PF can be classified into five different types *viz*. (1) Hill Sal (*Shorea robusta* Gaertnner f.) Forest (±1000 m); (2) *Castanopsis indica* (Roxb.) Miq. and *Schima wallichhi* (DC.) Korth. mixed forest between (1000 – 1700 m); (3) *Daphniphyllum himalense* (Benth.) Mull. forest (1700 – 2100 m); (4) *Quercus semicarpifolia* Smith and *Rhododendron arboreum* Smith mixed forest (1800 – 2300 m); (5) *Q. semicarpifolia* Smith, *C. hystrix* Miq. and *R. arboreum* Smith mixed forest (2300 – 2517 m) – at the highest peak.

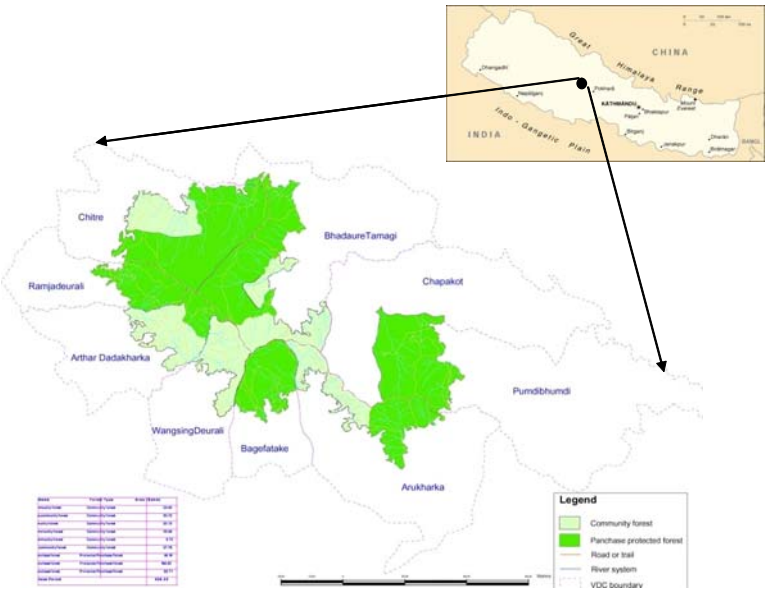

Fig. 1. Enlarged map (in green) showing location of Panchase Forest in Central Nepal

Due to its wide altitudinal variation within a small area and high precipitation, the PF provides varied and unique habitat for orchids. The open grassy slopes, mature tree trunks, humus rich forest floor, *Rhododendron* thickets, Bamboo thickets and rocks covered with mosses are the major micro-habitats where number orchids are found growing. On the other hand, the cultural importance of PF is also noteworthy. This forest is considered as sacred and worshiped by the Hindus. On the occasion of different festivals thousands of pilgrims visit the temples in forest contributing to conservation of orchids of PF as a Sacred Grove.

Orchid Flora of Panchase

We started the orchid exploration in PF during 1998 and have already covered about 60% of forest area (Subedi 2002; Subedi *et al*. 2003). The present record includes altogether 113 species, one subspecies and one natural hybrid belonging to 44 genera in PF, which represent about 32 % of total orchid species recorded from Nepal (Subedi *et al.* 2003). This included an endemic orchid of Panchase *viz. Eria pokharenensis* Bajracharya *et al*. A few new species belonging to genera *Panisea* and *Malaxis* are yet to be published. PF shows that within the altitude 1600 – 2300 m about 90 % of total species could be seen. Similarly, about 70 % of orchids are flowering during July – August and September – November. The Oak and *Rhododendron* forest provided a good habitat for a number of orchids in PF. A summary of genera and number of species of orchids found in PF given in Table 1 and concisely discussed as following:

Acampe Lindley

This is an Indo-Malaysian genus of about 10 species of tropical and sub-tropical regions. Two species *viz. A. rigida* (Buchanan-Hamilton ex Smith) P.F. Hunt and *A. pachyglossa* Rchb.f.. (= *A. papillosa,* (Lindley) Lindley, *nom. illeg*.) reported from Nepal which are found in PF. *A. rigida,* a common epiphytic in open areas on tree trunks or as lithophytes within 1000-1700 m and flowers during July to September. The second species is found on tree trunks near the river, lakes or streams (±1000 m) and flowers during August to October.

Aerides Loureiro

It is an Indo-Malaysian genus of about 26 epiphytic species with beautiful flowers of which three species are reported from Nepal. two species occur in PF, *A. multiflora* Roxburgh is commonly distributed in tropical Sal forest and flowers during June-July and *A. odorata* Loureiro is a common species in subtropical forest within within 1000 – 1500 m (Flower: June – July).

Agrostophyllum Blume

A tropical Asiatic genus of about 98 species of which *A. callosum* Rchb. f., an epiphyte is reported from Nepal. The plant looks like a tuft of grass with numerous clustered, erect stems borne on creeping rhizome covered by persistent basal sheaths, flowers in compact clusters from the upper leaf axil during June-July. Here is commonly found in Oak forest (1800 – 2300 m) and often widely used as fodder for cattle by local communities.

Anthogonium Wallich ex Lindley

A monotypic Indo-Malayan terrestrial genus is having ovoid pseudobulb with 1-2 grassy elliptic leaves. *A. gracile* Wallich ex Lindley is common in Nepal including PF (1300 – 1800 m). This species grows in open grassy slopes along the road sides or in open grass lands. Flowers few, rose-purple, non-resupinate in branched racemes and is blooming during August to September. It is extensively used as fodder.

Bulbophyllum Thouars

It is a pantropical genus of about 1100 species of epiphytic or lithophytic orchids. Thirty species are reported from Nepal and of which 17 species occur in PF. The most common *B. affine* Lindley, is often found in large patches; *B. bisetum* Lindley is rare and found in very few places; *B. careyanum* (Hooker) Sprengel is common and its leaves are used as tonic by local communities; *B. caudatum* Lindley is a very rare species often found as lithophyte; *B. cylindraceum* Wallich ex Lindley is also very rare. Other recorded species

Calanthe R. Brown

from PF are *B. hirtum* (Smith) Lindley, rare; *B. leopardinum* (Wallich) Lindley ex Wallich, *B. moniliforme* Par. & Rchb. f., the smallest orchid of Nepal with a solitary single orange-yellowish flower, *B. odoratissimum* (Smith) Lindley; *B. polyrhizum* Lindley; *B. reptans* (Lindley) Lindley ex Wallich, the commonest orchid; *B. retusiusculum* Rchb.f., found above 2400 m in PF; *B. secundum* Hooker f.; *B. striatum* (Griffith) Rchb. f.. is common with reddish doted leaves; *B. umbellatum* Lindley; *B. viridiflorum* (Hook. f.) Schltr.; and *B. wallichii* (Lindley) Rchb. f. is another very rare species. Local people of PF use paste of pseudobulbs of these species over burned or cut skin.

Calanthe R. Brown
A pantropical genus of about 200 terrestrial and highly ornamental species. These plants bear large plicate leaves and a lateral raceme of many large, showy and sweet scented flowers. Twelve species reported from Nepal and of these two, *C. plantaginea* Lindley and *C. puberula* Lindley occur in PF, bear rose-pink fragrant flowers; often growing in scattered colonies in humus rich Oak and *Rhododendron* forest floor (1900 – 2500 m).

Cheirostylis Blume
An old World genus of about 25 terrestrial delicate species with slender, semi erect spike bearing thin weathering leaves and terminal few flowers. Only *C. griffithii* Lindley reported from Nepal is rarely found in PF in the floor of south a facing slope of Rhododendron forest (1700 – 2000 m) and flowers in April.

Chiloschista Lindley
An Indo-Malaysian genus of about 19 species with medium to long clustered roots, 1-2 small leaves appears during fruit ripening period, flowers in clusters of 1-3 in racemes with white or dotted-yellowish perianth. Three species are reported from Nepal and of which *C. usneoides* (D. Don) Lindley occurs in PF (endemic to Himalayas) bears beautiful sweet scented white flowers and is common between 1200 – 1900 m. It is common on Fig tree-trunks around agriculture-land but very rarely found in the forest. It flowers during March to May.

Cleisostoma Blume
An Indo-Malaysian genus comprises about 100 species. Two species are reported from Nepal, of which *C. filiforme* (Lindley) Garay occurs in tropical belt of PF. This species has many terete leaves, lateral raceme with many reddish small flowers and is found hanging from tree branches within 1000 – 1200 m. It flowers during August to September.

Coelogyne Lindley
An Indo-Malaysian genus of about 240 species of epiphytic or lithophytic orchids, *Coelogyne* is of high ornamental value. Fourteen species reported from Nepal and six from PF. *C. corymbosa* Lindley often grows with *C. nitida*; *C. cristata* Lindley, is very beautiful epiphytic or lithophytic orchid, gregarious in north facing *Rhododendron* forest (1600 – 2300 m) (Flower: March-April); *C. flaccida* Lindley grows in large patches on tree trunks near streams and water bodies but is rare (Flower: March to April); *C. prolifera* Lindley is most common in open areas (1000 – 1900 m) covering the whole tree trunks and with yellow flowers (May to June); *C. fuscescens* Lindley, a shade loving epiphyte or lithophyte, is common in north facing slope (1600 – 2100 m) (Flower: October to November); *C. nitida* (Wallich ex D. Don) Lindley is the most noteworthy orchid of PF, emits sweet scent during June to July and is remarkable owing to its beautiful white-yellow flowers in between 1800 – 2500 m and gregarious growth.

Cryptochilus Wallich
This genus is distributed from North India to Indo-China, comprised of four species, out of which two species are reported from Nepal. One species *C. lutea* Lindley is found in PF that has densely packed oval pseudobulbs borne in clusters, flower bracts persistent, and shape looks like fishbones with golden yellow flowers and commonly found in Oak forests (1900 – 2500 m) (Flower: June-July).

Cymbidium Swartz

An Indo-Malesio-Australian genus of about 78 species of both epiphytic or terrestrials while very few are saprophytic. Plants are sympodial with thick and fleshy pseudobulbs, loriform leaves, drooping or erect racemes with beautiful flowers. Eleven species, one subspecies and one natural hybrid are reported from Nepal of which four are commonly found in PF. *C. aloifolium* (L.) Swartz is a common tropical (to 1100 m) orchid and flowers during June-July; *C. bicolor* subsp. *obtusum* Du Puy & Cribb, has oblong much fleshy leaves, comparatively shorter than leaves of *C. aloifolium* (L.) Swartz and flower during March-April; *C. erythraeum* Lindley, a beautiful orchid in Oak and *Rhododendron* forest with whitish flower spotted with reddish lip (Flower: October to November); *C. lancifolium* Hooker, common in humus rich Oak and Rhododendron forest floor (Flower: September-October); *C. longifolium* D. Don, a beautiful orchid with bell shaped reddish flushed flowers in compact dropping racemes during October – November. The *C.* x *gammieanum* King & Pantling is a natural hybrid with large yellowish flushed with reddish flowers are found in Oak forests.

Dendrobium Swartz

An Indo-Malesio-Australian genus with about 1400 species, mostly epiphytic or lithophytic, with small, few nodes to stout, long and plurinodal pseudobulbs. Flowers borne on axillary fascicles and lip has remarkable variation in colour with characteristics coloured spots in many species. Twenty six species are reported from Nepal, of which 11 are found in PF. Of these five species are found in Sal or *Castanopsis* forest up to 1400 m: *D. aphyllum* (Roxburgh) C.E.C. Fischer (Flower: May-June); *D. crepidatum* Lindley & Paxton (Flower: April); *D. moschatum* (Buchanan-Hamilton) Swartz (Flower: June-July); *D. primulinum* Lindley (Flower: April); *D. transparens* Wallich ex Lindley (Flower: May-June). Some species often found in subtropical *Castanopsis* forest and in open areas: *D. densiflorum* Lindley (Flower: April-May); *D. eriiflorum* Griffith (Flower: August-September); *D. heterocarpum* Wallich ex Lindley (Flower: March-April); *D. amoenum* Wallich ex Lindley (Flower: May-July. Again, two species found in temperate Oak and *Rhododendron* forest are: *D. porphyrochilum* Lindley (Flower: March-April) and *D. candidum* Wallich ex Lindley (Flower: May-June).

Epigeneium Gagnepain

An Indo-Malaysian genus of about 43 species, mostly epiphytic or lithophytic with creeping or pedant rhizome, bearing ovoid pseudobulbs and solitary 1-2 flowers. Three species are reported from Nepal. *E. amplum* (Lindley) Summerhayes found in temperate Oak forest of PF, has solitary large dark-reddish flushed flower (Flower: August to October).

Eria Lindley

An Indo-Malaysian genus of about 500 species of epiphytic or lithophytic orchids with uninodal pseudobulbs or plurinodal thickened stems. Leaves 2 – á; racemes axillary or terminal with one to many flowers. Thirteen species are reported from Nepal of which ten are found in PF. In tropical Sal forest *Eria amica* Rchb. f., a beautiful orchid (Flower: March-April), is found with luxuriant growth. Many species of *Eria* are widely distributed in subtropical to lower temperate region (1400 – 1800 m) of PF. *E. apertiflora* Summerhayes, *E. bipunctata* Lindley, *E. bractescens* Lindley, *E. muscicola* (Lindley) Lindley, *E. spicata* (D. Don) Handel-Mazzetti and *E. graminifolia* Lindley flower during July-August. Few species are distributed up to temperate Oak and *Rhododendron* forest reaching to the altitude of 2500 m. *E. coronaria* (Lindley) Rchb. f., *E. excavata* Lindley, *E. graminifolia* Lindley, *E. pokharenensis* Bajracharya *et al*, an endemic orchid of PF, flowers during July-August.

Gastrochilus D. Don

An Indo-Malaysian genus of about 54 species of epiphytes with short or long stems, linear-oblong leaves and short umbellate inflorescence with small to showy flowers. Six species are reported from Nepal of which three species occur in PF. *G. bigibbus* (Rchb. f. ex Hook. f.) Kuntze is rather distributed in humid region between 1000 – 1200 m and flowers during February-March. Other two species are temperate orchids (1800 – 2500 m) found in Oak trees or *Berberis* bushes*: G. distichus* (Lindley) Kuntze (Flower: April-May) and *G. pseudodistichus* (King & Pantling) Kuntze (Flower: September – October).

Goodyera R. Brown
A widely distributed genus with about 97 terrestrial species and very few are epiphytes in temperate forests. Eight species are recorded from Nepal, of which three are found in the floor of temperate part of PF. *G. cordata* (Lindley) Nicholson is found in Bamboo thickets (Flower: September). *G. foliosa* (Lindley) Bentham ex Clarke is found as epiphyte in moss covered trunks of Oak (Flower: October-November). *G. procera* (Ker Gawler) Hooker Is found in grassy slopes (Flower: May-June).

Habenaria Willdenow
A pantropic genus of about 800 terrestrial species. Nepal is known to have seventeen species of which one species occur in PF. *H. arietina* Hook. f.. is found in open floor of temperate forests (2300 – 2500 m) and flowers during July.

Hemipilia Lindley
A genus of 17 terrestrial species with root-tuber, two elliptic leaves, erect raceme with many colourful flowers, and distributed in the Himalayas, China and Indo-China. In Nepal one species *H. cordifolia* Lindley is occur which is also found in PF. It is a very rare plant and the authors recorded only one open temperate grassy slope with 6 mature individuals (Flower: July).

Herminium R. Brown
An Indo-Malaysian genus of 50 terrestrial species with root-tubers, with liner or elliptic leaves, flowers grassy green, many on terminal raceme. Seven species recorded from Nepal and two of which are found in PF. *H. lanceum* (Thunberg ex Swartz) Vuijk is common in open grass slopes (Flower: July-August). *H. mackinnonii* Duthie is rarely found in open grassy slopes between 2300 – 2500 m (Flower: August – September).

Liparis L.C. Richard
A pantropical genus of about 250 terrestrial, epiphytic or lithophytic species, with pseudobulbs variously shaped, leaves plicate, fleshy and a terminal raceme with grass-green or reddish pink to creamy flowers. Nepal is known to have 14 species and five species occur in PF. *L. bootanensis* Griffith has a solitary leaf with greenish flowers and distributed between 1600 – 2200 m; *L. nervosa* (Thunberg) Lindley is occasionally found in open grassy slopes with dark reddish flowers during June – July; *L. resupinata* Ridley is common in north facing slopes within 1700 – 2100 m (Flower: October – January); *L. petiolata* (D. Don) P.F. Hunt & Summerhayes is rare and found in moist humus rich Oak forest floor (Flower: June – July); *L. viridiflora* (Blume.) Lindley is also rare in PF with a small population in Oak forest (Flower: November – December).

Luisia Gaudichaud
An Indo-Malaysian genus of about 40 epiphytic species with short stem, terete leaves and fascicle bearing small dark reddish or yellowish flowers. Three species is known from Nepal of which *L. trichorhiza* (Hooker) Blume is common within 1000 – 1700 m (Flower: April-June).

Malaxis Solander ex Swartz
It is a cosmopolitan genus of about 300 terrestrial species. Many species have bulbous fleshy stem, elliptic leaves and a terminal inflorescence with small greenish, light reddish or yellowish flowers. Seven species are reported from Nepal of which two are common in PF. *M. acuminata* D. Don is common throughout the moist forest floor in between 1000 – 2100 m with much variation in size and colour of flower (May – June); *M. latifolia* Smith is rare in distribution and often grows in open grassy slopes, flowers (July – August) small and dark red.

Nervilia Commerson ex Gaudichaud
An Old World genus of about 100 terrestrial species is with small tubers, solitary leaf and one to many flowered inflorescence. Five species are known to occur in Nepal. *Nervilia falcata* (King & Pantling) Schltr. is a new record for Nepal collected from PF. This species has a single rosy flower and growing in leaf litters of north facing *Rhododendron* forest (Flower: May-June).

Oberonia Lindley
An old World genus of about 300 – 350 epiphytic (on tree trunks) species is with laterally compressed fleshy leaves and a terminal inflorescence of numerous minute flowers. Twelve species are recorded from Nepal of which five are common in PF. *O. ensiformis* (Smith) Lindley is its largest species found in Nepal with reddish-yellow flowers, common in open subtropical areas (Flower: September – October); *O. falcata* King & Pantling is common in moist forests between 1700 – 2100 m; *O. myriantha* Lindley is very common in open areas throughout the PF within 1400 – 1800 m (Flower: September – October); *O. pachyrachis* Rchb. f. ex Hook. f. is its most common species in PF and is also found in open areas and rather rare inside forests (Flower: October – January); *O. nepalensis* Shakya & R.P. Chaudhary is endemic to West Nepal which is also common in subtropical forest of PF (Flower: January – March).

Ornithochilus (Lindley) Bentham
An Indo-Malaysian genus of 3 species is with short stem, two elliptic leaves and 1-3 many flowered racemes. *O. difformis* (Wallich ex Lindley) Schltr. grows on tree trunks in moist forests of Panchase between 1500 – 1700 m (Flower: June – July).

Otochilus Lindley
An Indo-Malaysian genus of about 5 epiphytic species is with jointed pseudobulbs and pleated deciduous leaves. Flowers whitish to light yellowish borne in chain like racemes. Four species reported from Nepal of which three occur in PF. *O. albus* Lindley is found between 1400 – 1900 m (Flower: June-July); *O. fuscus* Lindley is growing between 1000 – 1700 m (Flower: October – November); and *O. lancilabious* Seidenfaden forms a large patch on Oak tree trunks is distributed within 1700 – 2300 m (Flower: October – November).

Panisea **(**Lindley) Steudel
An Indo-Malaysian genus of about 7 epiphytic species is with conic pseudobulbs, two elliptic leaves, inflorescence arise from new growths and flowers white or yellowish. Two species are reported from Nepal of which *P. demissa* (D. Don) Pfitzer is common in temperate areas (Flower: September – October).

Papillionanthe Schltr.
An Indo-Malaysian genus of 12 epiphytic species is with erect or pendent stems and terete leaves. Two species are found in Nepal of which *P. uniflora* (Lindley) Garay occur in PF in Oak and *Rhododendron* forests (Flower: September – October).

Peristylus Blume
An Indo-Malaysian genus of about 60-70 terrestrial species is with root-tuber, erect stem bearing few leaves and many flowered terminal raceme. Nine species are found in Nepal and *P. aristatus* Lindley is found in open grassy slope in PF within 1600 – 2100 m (Flower: September – October).

Phalaenopsis Blume
An Indo-Malaysian genus of 61 epiphytic species, 7 subspecies, 2 varieties and 7 natural hybrids is with clustered long root, short stem, few elliptic leaves, and flowers beautiful in semi-erect scapes. Three species are reported from Nepal of which *Phalaenopsis taenialis* (Lindley) Christenson & Pradhan is commonly found on Fig tree trunks of open areas between 1400 – 1800 m in PF. Its flowers (May – July) are rose-pink.

Pholidota Lindley ex Hooker
An Indo-Malaysian genus of 29 epiphytic or lithophytic species and seven varieties is with clustered pseudobulbs and closely arranged bifarious many flowered racemes. Five species are found in Nepal of which four species occur in PF. *P. articulata* Lindley is commonly growing between 1000 – 1800 m (Flower: July – August); *P. imbricata* Hook. f. is common between 1000 – 1800 m (Flower: July – August); *P. protracta* Hook. f. is common in Oak forests (1900 – 2500 m) (Flower: October – November; *P. pallida* Lindley is common in tropical belt of PF (Flower: June – July).

Platanthera L.C. Richard
About 150 terrestrial species with tuberous root, erect stem, few leaves and terminal raceme are distributed in temperate regions of both hemispheres. Ten species are found in Nepal; one species *P. latilabris* Lindley occur in grassy slopes of PF between 1700 – 2100 m and flowers during July.

Pleione D. Don
An Indo-Malaysian genus of 21 epiphytic or lithophytic species and 6 natural hybrids is with ovoid or cone-shaped pseudobulbs and short raceme bearing few colourful flowers. Five species are found in Nepal and of which two species occur in PF. *P. humilis* (Smith) D. Don flowers during January – February, and *P. praecox* (Smith) D. Don flowers during September – November. Both the species are commonly distributed between 1900 – 2500 m in Oak and *Rhododendron* forests.

Propax Lindley
An Indo-Malaysian genus of 12 lithophytic or epiphytic species is with discoid pseudobulb and a lateral inflorescence of one or few small not fully opening flowers. One species is found in Nepal viz. *P. meirax* (Parish & Rchb.f.) King & Pantling which is also growing in PF in areas between 1000 – 1700 m (Flower: November – December).

Rhynchostylis Blume
An Indo-Malaysian genus of 2 epiphytic species and 2 subspecies is with stout, semi-erect, monopodial stem, leathery leaves and pendulous many flowered racemes. One species found in Nepal *viz. R. retusa* (L.) Blume is also very common in PF in areas between 1000 – 1800 m (Flower: June – August).

Satyrium Swartz
An genus of about 100 terrestrial species is with tuberous roots, erect stem, succulent leaves, terminal racemes with spurred flowers are distributed in S. Africa, Madagascar, and the Himalayas. One species and two varieties are found in Nepal of which *S. neplaense* D. Don var. *nepalense* rarely occur in Oak forest floor of PF (Flower: July – August).

Spiranthes L.C. Richard
A world wide genus of about 50 terrestrial species is with tuberous erect stem, spike with spirally arranged flowers. One species found in Nepal *viz. S. sinensis* (Persoon) Ames is also occur in PF in temperate grassy slopes around water bodies. Flowers pink appear during August – September.

Sunipia Lindley
An Indo-Malaysian genus of three epiphytic species is borne in clusters with ovoid 1-leafed pseudobulbs, and few flowered racemes. Three species are found in Nepal of which two occur in PF. *S. bicolor* Lindley is commonly found in Oak forest and flowers during September-October. *S. paleacea* (Lindley) P.F. Hunt is rare and flower during October – November.

Tainia Blume
An Indian-Malaysian genus of about 25 terrestrial species is characterized by fleshy, variously shaped pseudobulbs, bearing a long-petioled leaf and lateral raceme with fairly large flowers. Only one species is reported from Nepal *viz. T. minor* Hook. f. which is rare and found in Oak forest floor of PF (Flower: January – February).

Thunia Rchb. f.
An Indo-Malaysian genus of about 5 epiphytic or lithophytic species is characterized by tufted stems, bearing several sessile leaves and terminal compact inflorescence. One species is found in Nepal and is also in PF. *T. alba* (Lindley) Rchb. f. is common on tree trunks in open areas in between 1000 – 1700 m (Flower: June – July).

Vanda Jones ex R. Brown
An Indo-Malaysian genus of about 53 epiphytic species is bearing short tuft stems, loriform leaves and an axillary raceme of large beautiful flowers. Four species are found in Nepal of which one species occur in PF. *V. cristata* Lindley is very common on tree trunks in open areas in between 1000 – 1800 m (Flower: April – August).

Vandopsis Pfitzer
An Indo-Malaysian genus of 70 epiphytic species is characterized by erect creeping stem, bearing long stalked flowering raceme. One species is found in Nepal. *V. undulata* (Lindley) J. J. Smith is rarely found in sunny areas on tree trunks in PF in between 1800 – 2200 m (Flower: April – June).

Zeuxine Lindley
An Indo-Malaysian genus of about 70 terrestrial species is characterized by nodose stem with thin leaves and a terminal inflorescence bearing few to several whitish or yellow flowers. Five species are found in Nepal of which two species occur in PF. *Z. flava* (Wallich ex Lindley) Trimen grows in *Rhododendron* thickets (Flower: March – April); *Z. strateumatica* (L.) Schltr. is distributed in open grassy land near the streams or water bodies and flowers during December – January.

DISCUSSION

During the present survey for orchidaceous plants in Panchase Forest as much as 112 species of orchids has been recorded covering 44 genera and a much diverse habit groups. Both types, epiphytic and terrestrial orchids are equally dominating in the flora and a good number of later types are also saprophytic.

Endemic species of Nepal: Two endemic species occur in PF are *Oberonia nepalensis* Shakya & R.P. Chaudhary and *Eria pokharenensis* Bajracharya *et al*. This forest is the Type locality for the second species.

Endangered orchids of Panchase: Strictly following IUCN Red List Categories 2001, only three species of orchids of PF belongs to threatened and endangered category. The orchids having low population (less than 100 mature individuals) in a very small area include *Bulbophyllum. viridiflorum, Eria pokharenensis* and *Hemipilia cordifolia*

Threats to the Flora: The diversity of its orchid flora asks for its proper conservation but that appears to be quite difficult due to the following threats:
1. Extensive uncontrolled grazing of domestic cattle: Tens of thousands of domestic cattle like buffaloes, cows and oxen grazing freely in the forest. This uncontrolled grazing is a major threat specially to the terrestrial orchids. Plants like *Calanthe puberula*, *C. plantagine* and *Liparis petiolata* become threatened due to over grazing.
2. Logging in Oak and *Rhododendron* forests: The oak and *Rhododendron* trees are the major hosts for many epiphytic orchids and are also providing humus to soil. Villagers are cutting down these trees for fuel wood. Populations of many beautiful epiphytic orchids such as *Coelogyne nitida, Dendrobium longicornu, Cymbidium erythreum, Pleione praecox* etc. are thus highly affected.
3. Orchids used as fodder: Local villagers collect orchid leaves, or even whole plant as fodder for their cattle during December to March. This affects the population of many epiphytic orchids like *Agristophyllum callosum, Eria spicata, Cymbidium erythreum, C. longifolium* and *C.* x *gammieanum.*

Strategies for Conservation of Orchids of Panchase Forest:

1. Conservation awareness to local community: It seems that illegal orchid trade is not operating in these forests. However, sooner or later this activity will start operating there as many parts of eastern Nepal like Ilam valley and Central Nepal like Kathmandu valley, Makwanpur valleys, orchids are extensively exploited in illegal trade. So, the most important strategy is generating awareness among the villagers. The first step

should be conducting awareness programs for forest users group (FUG) members and Panchase religious and cultural development committee members.

2. Sustainable use of potential orchids for local income: Imparting proper training in orchid culture and marketing will help the dependent villagers to find out alternate sources of income. There are many commercially viable of potential orchis in PF flora *viz* species of *Aerides*, *Coelogyne*, *Cymbidium*, *Dendrobium*, *Pleione* and *Vanda.* Proper authority needs to take immediate necessary steps in this matter.
3. **Linking with orchid tourism:** Panchase area is considered as one of the important trekking routes, therefore, information of rich diversity of orchids could be linked with promoting orchid tourism. For this July – August and September – November are the suggested months to organize orchid tourism in Panchase.

Literature Cited

Chaudhary, R.P., Subedi, A., Shakya, L.R., Karki, D., Vetaas, O.R. & Gupta, V.N.P. 2002. Orchid Diversity in Arun River and Marsyangdi River Valley of Nepal: Distribution and Conservation Priorities. In: *Vegetation and Society – Their Interaction in the Himalayas*, (Eds.: Chaudhary, R.P., Subedi, B.P., Vetaas, O.R., Aase, T.H.), pp. 108-118. Tribhuvan University, Nepal and University of Bergen, Norway.

Satish Kumar, C. 1999. Orchids of Silent Valley. In: *Silent Valley-Whisper of Reason*. Kerala Forest Department, India.

Subedi, A. 2002. Orchids around Pokhara Valley of Nepal. *LI-BIRD Occasional Paer No 1. Local Initiatives for Biodiversity*, Research and Development (LI-BIRD), Pokhara, Nepal.

Subedi, A., L.R. Shakya & R.P. Chaudhary 2003. Wild Orchids of Nepal, Paper presented during the *17th World Orchid Conference*, April 26-May 2, 2003, Malaysia