Honeybee Flora at Kabre, Dolakha District

Sanjaya Bista[1]* and Gopal P Shivakoti[1]

[1] Entomology Division, NARC, Khumaltar, Lalitpur

Abstract

Adequate knowledge about bee flora is the prerequisite to initiate bee keeping. A study was conducted at Kabre area of Dolakha district during 1997-1999 to identify existing bee flora and develop a floral calendar. Based on the interview with bee farmers and visual observations, 119 important plant species were recorded, out of which 47 species were found major sources for honeybees. Spring season (mid-March to mid-June) and autumn season (mid-Sept to Oct) were identified as honey flow periods having a number of floral plants such as *Guizotia abyssinica*, *Fraxinus floribunda*, *Prunus cerasoides*, *Pyrus communis*, *Castanopsis indica*, *Brassica* spp., *Citrus* spp., *Berberis* spp., *Rubus* spp., *Rhododendron* spp. and *Trifolium* spp. Winter season (mid-Nov to Feb) is the critical dearth period with a few flowering plants like *Reinwardtia indica*, *Pogestemon glaber*, *Caesalpinia* spp. and *Eupatorium* spp. Depending upon the climatic conditions, possibility of planting multipurpose plants has been discussed. Based on available flora, major characteristics of these plant species, utility status and flowering duration a bee floral calendar was developed for Kabre. To conserve these floras, attention must be made to maintain and multiply the existing flora.

Key words: *Apis cerana*, bee flora, bee keeping, dearth period, honey flow

Introduction

Bee keeping is one of the important farming activities in Nepal since ancient times. Being a non-land based enterprise with multipurpose output, the demand of bee keeping has been increased tremendously in Nepal. Success in bee keeping depends upon many factors, among them availability of bee flora is the fundamental one. Bees obtain nectar, pollen, or both from flowers, which are the mainstay of honeybee's life. The value of flora in bee keeping has been observed in many parts of the world. For instance, the directory of world honey sources (Crane et al., 1984), honey plant resources of Hindu Kush-Himalayan region (Verma, 1990; Partap, 1997) and bee flora of India (Kaur and Sihag, 1994) are some existing examples of such efforts. In the context of Nepal, Kafle (1984), Thapa and Dangol (1990) reported one hundred fifty six and over one hundred bee floras available respectively in Kathmandu valley and Rampur, Chitawan.

However, plant types and their flowering duration differ from one place to other due to variation in topography, climate and other cultural and farming practices. The extensive knowledge on type, density and quality of bee flora in a region are prerequisites for successful bee keeping. Such information enable beekeepers to utilize them at the maximum level, so that, they can harvest a good yield of honey and other bee products in addition to effective pollination which enhances crop yields. Every region has its own honey flow and floral dearth period(s) of short or long duration. Such knowledge on bee flora help in the effective management of bee colonies during such periods. Considering these facts, the present study was made to prepare an inventory of existing bee flora and develop floral calendar for Kabre region of Dolakha district.

Materials and Methods

This study was undertaken during 1996/97 to 98/99 around Kabre Village Development Committee in Dolakha district. Geographically, Kabre is located at 27.8º N latitude and 86.3º E longitude. The average altitude of this area is 1740 meter above sea level (m asl). However, the foraging area of honeybee ranges approximately

from 1250 to 2200 masl. The mean minimum temperature during 1993-1997 was 10.8 ± 0.99ºC but it dropped down to 0ºC during winter. Dec and Jan are the coldest months with average minimum and maximum temperature of 4.51 ± 0.09ºC and 16.22 ± 0.54ºC respectively. The hottest days of the year are during mid-April to mid-Sept, when the mean maximum temperature during 1993-1997 reached up to 22.4 ± 0.18ºC. The average annual rainfall was 2192.5 ± 87.5 mm. Over 90% of total rainfall was received during the months of June-Sept (HCRP, 1999).

A survey questionnaire was prepared comprising mainly of common and local names of different flowering plants of that area, their flowering season and duration, habit, nectar or pollen yielding ability and their abundance in the area. A total of 28 questionnaires were prepared, out of which 24 were interviewed with farmers, two with agriculture and two with forestry personnel to gather information on honey plant resources, available honeybee species and bee keeping practices around Kabre area.

The information was focused mainly on the farmers' statement in the questionnaires. However, the major bee foraging plants were further verified by visual observation. The foraging plants were marked and two observations were made in each flowering season. Such observations were made for three seasons (three years). The observation on nectar and pollen source was based on activities performed by honeybees on different flowers. Honeybees with their activity of extending their proboscis into the flowers are considered as nectar source and bees carrying pollen on their hind legs were determined as pollen source. The status of flowering plants, whether they are major or minor, was determined by the frequency and the number of honeybees' visits. The density of those plants found around the region determined the abundance of bee plants. Finally, the plants visited by honeybees were later on collected, identified and then compared with the published reports (Partap, 1997, Polunin and Stainton, 1997, Shrestha, 1998) for their uses by honeybees.

Results and Discussion

Honeybee species and bee keeping practices

Three different honeybee species were found at Kabre. They were little honeybee *(Apis florea* F.), the common hive bee *(Apis cerana* F.) and the giant bee (*Apis dorsata* F.). According to farmers' experience, the predominant species is *A. cerana* (78.6%), followed by *A. dorsata* (17.9%) and *A. florea* (3.6%).

A. cerana was the predominantly cultivated species and almost all the farmers maintained it on traditional fixed hives as wall hive (*Khopa Ghar*) or log hive (*Mude Ghar*). A few farmers (21.4%) kept modern hives but the production of honey was not satisfactory due to lack of appropriate management practices. Swarming and absconding were the major problems. Cutting off of the drone brood and cleaning up of the hive during autumn season to minimize swarming were the main management practices followed by farmers. These activities were not enough. April-May is the annual honey-extracting period with average 5-6 kg of honey per colony. However, some experienced farmers (32.1%) also extract during Oct getting a total extract of 10-15 kg honey per colony per year.

Honeybee flora

Various plants were blossoming in different seasons and honeybees visited these plants for nectar and pollen. Based on the source status and abundance, altogether 119 plant species were identified as important bee flora at Kabre area. Based on frequency, number of bee visits and abundance, they were further classified into three groups. Forty-seven plant species were recognized as major source, forty-five species as medium source and the remaining twenty-seven species as minor source for honeybees (Annex 1). Among major plant species, *Guizotia abyssinica*, *Pyrus communis*, and *Brassica* spp. as cultivated plants and *Prunus cerasoides*, *Fraxinus floribunda*, *Berberis* spp., *Rubus* spp. and *Rhododendron* spp. among wild plants were identified as extremely important bee floras of Kabre area. Some of the medium and minor

source plant species blossomed for long periods about 5-6 months or more were *Ageratum conyzoides, Colebrookea oppositifolia, Inula cappa, Nicandra physaloides, Osbeckia stellata, Oxalis corniculata, Persicaria capitata, Sapium insigne, Vitex negundo, Cynoglossum* spp., *Polygonum* spp., *Plectranthus* spp. and considered them as important floral species. Some ornamental plants *Euphorbia pulcherrima, Malvaviscus arboreus, Salvia splendens* and *Tagetes erecta* though in less area, blossomed also for longer period. The honeybees utilized these plant species during colony development and dearth periods. Likewise, plant species *Aesandra butyracea, Callistemon citrinus* and *Grevillea robusta* were found in a few number but these plants were referred to as good nectar and pollen source for honeybees (Partap, 1997).

Number of honey plant species found at different altitudes around Kabre area are presented in Fig. 1. 81 and 104 species were found in *Lekh* high hill (above 1500 masl), *Besi* foot hill (below (1500 masl) respectively. Among them 66 were common in both sides. Some plants like *Zea mays* and *Juglans regia* were found in abundance at both areas and the bees utilized these plants as the source of pollen. Apart from these two above species, honeybees utilized almost all identified bee floras as the source of both pollen and nectar. The source status of different identified plant species are presented in Annex 1. Some traditional bee farmers informed that the honey from *Lyonia ovalifolia, Prinsepia utilis* and some species of *Rhododendron* as well as *Cannabis sativa* yielded toxic nectar, which are non-poisonous to honeybees but poisonous to human health. This was also reported earlier by Kafle (1992).

Likewise various vegetables as *Abelmoschus esculentus, Coriandrum sativum* and different gourds have been grown at every homestead garden for kitchen purposes and some vegetables such as *Allium cepa* and *Brassica* spp. are grown for seed purposes. All these plants were regularly visited by honeybees. Some farmers (10.71%) were found using pesticides such as dichlorovos (Nuvan) and methyl parathion (Metacid) in some vegetables in foot hill areas, but other were using wood ashes to control pests causing no harm to bees. It was observed that some bee floras like *Melastoma melabathricum, Grevillea robusta, Grewia optiva* and *Bauhinia* spp. were used as fodder and the farmers cut them before or at the time of flowering. So these plant species were of less value to honey production in that area.

Honeybee foraging activity, honey flow and dearth periods

At Kabre area, the peak periods of honeybee foraging activity were recorded during mid-Feb and May (spring season) and mid-Aug and Oct (autumn season) (Fig. 2). During the seasons, abundant bee floral plants were found blossoming with mild temperature and little or no rainfall. Eight plant species (*Brassica* spp., *Citrus* spp., *Pyrus communis, Berberis* spp., *Fraxinus floriblunda, Rubus* spp., *Rhododendron* spp. and *Trifolium* spp.) during the spring season and five plant species (*Guizotia abyssinica, Prunus cerasoides, Brassica* spp., *Castanopsis indica* and *Mirre jhar*) during the autumn season were recorded as the major source of honey production around Kabre area. Honeybees visited these plants extensively for honey production and colony multiplication. Other medium and minor floras during these periods also supported the honey production.

Fig. 1. Number of available major, medium and minor bee floras at different altitudes in Kabre area of Dolakha district.

Figure 2. Number of major, medium and minor bee floras flowering in different months and colony growth (G), honey flow (H) and dearth period (D) at Kabre area of Dolakha district

Early spring (from mid-Feb to mid-March) and autumn season (from mid-Aug to mid-Sept) were observed to be the colony development period for honeybees at Kabre. The climate gradually become favourable for bees and the plant species *Caryopteris odorata*, *Leucosceptrum canum*, *Buddleia* spp., *Prunus domestica*, *Prunus persica* and *Eupatorium* spp. during early spring season and *Rhus* spp., *Porana grandiflora*, *Glycine max*, *Osbeckia stellata* and *Rubus* spp. during early autumn season help in the colony development.

Mid-Nov - Feb (winter season) and June - Aug (rainy season) were identified as the dearth periods for honeybee at Kabre area. Winter season is the critical dearth period with low temperature (minimum temperature often goes below 0°C), short sunshine period and very few flowering plants like, *Reinwardtia indica*, *Pogestemon glaber*, *Caesalpinia* spp., *Eupatorium* spp. Although some honey floras, *Zea mays*, *Phaseolus* spp., *Ranunculus* spp., *Vitex negundo*, *Crinum amoenum*, *Mussaenda roxburghii*, *Lagerstromia* spp., *Curcuma aromatica* and some vegetables blossomed during the rainy season, they were not found sufficient to sustain for the honeybee colonies in that area. Because of continuous rain and thereby fluctuation in temperature, this period was also found unfavorable for honeybee foraging. However, the pollen requirement during the rainy season was found to be fulfilled by *Zea mays*, *Phaseolus* spp. and *Glycine max*. Major and minor plants, dearth period, colony growth and honey flow period at different months are shown in Fig. 2.

Bee floral calendar

Based on the availability of different plants along with their flowering time, a bee floral calendar was developed for Kabre area (Table 1).

Suggestions for plantation of bee floral plants

Due to high variation in altitude and climatic condition, this region is suitable for growing various multipurpose plants such as *Aesandra butyracea*, *Cedrela toona*, *Azadirachta indica*, *Melia azedarach*, *Grevillea robusta*, *Grewia optiva*, *Morus alba*, *Albizzia* spp., *Bauhinia* spp., *Eucalyptus* spp., *Eurya* spp. and different *Trifolium* spp., which have been growing in the region but in limited number. Horticultural trees such as *Citrus* spp., *Prunus domestica*, *Prunus persica*, *Pyrus communis*, *Phyllanthus emblica*, *Choerospondias axillaris*, *Musa paradisiaca*, *Diospyros virginiana*, *Syzygium* spp. and *Psidium guajava* could be replanted to increase the number. This view was expressed also by Partap (1992).

The success of bee keeping depends not only on honeybee strains, its management and hive structures, but also on the abundance and availability of bee floral plants around bee farming area. Based on the study and available bee floras, Kabre is a suitable area to initiate bee farming. However, attention must be given to maintain the existing bee flora and multiplication of multipurpose plant species in order to make it sustainable. To initiate bee keeping, one must give attention to provide artificial feeding during winter and rainy months and other management practices when necessary. Such studies need to be carried out in other ecological regions of the country as well.

Table 1. Different available honeybee plants and floral calendar in different months of the year in Kabre area of Dolakha district

Plant name	Jan	Feb	Mar	April	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Musa paradisiaca												
Prunus persica												
Pyrus communis												
Prunus domestica												
Brassica spp.												
Buddleia spp.												
Rhododendron spp.												
Rubus spp.												
Trifolium spp.												
Melia azedarach												
Pinus spp.												
Citrus spp.												
Woodfordia fruticosa												
Erythrina stricta												
Coriaria nepalensis												
Maesa macrophylla												
Shorea robusta												
Pyrus pashia												
Engelhardtia spicata												
Berberis spp.												
Fagopyrum spp.												
Holboellia latifolia.												
Trichilia connaroides												
Juglans regia												
Cordia obliqua												
Fraxinus floribunda												
Pyracantha crenulata												
Grewia optiva												
Psidium guajava												
Choerospondias axillaris												
Phyllanthus emblica												
Ampelocissus rugosa												
Zizyphus spp.												
Schima wallichii												
Zea mays												
Phaseolus spp.												
Sechium edule												
Elsholtzia spp.												
Mirrre jhar												
Guizotia abyssinica												
Castanopsis indica												
Prunus cerasoides												
Myrica esculenta												
Pogestemon glaber												
Caesalpinia spp.												
Eupatorium spp.												
Reinwardtia indica												

Acknowledgements

Authors are highly grateful to Mr DN Manandhar and Dr SL Joshi, Chief Entomologist and Senior Scientists, Mr BK Gyawali, former Senior Scientist, Entomology Division, Nepal Agricultural Research Council for providing continuous support and encouragement to conduct this study. Sincere thanks go to the personnel of HCRP, Kabre, local forestry and

agriculture office and other concerned persons around Kabre VDC for their support. Also the suggestions and deep interest provided by other senior scientists and technical officers of Entomology Division are highly appreciated. Our sincere appreciation and thanks go to Mr T Pokherel, Mr SP Nepal and Mr JB Tamang for their sincere help to collect information during the course of study.

References

Crane, E, P Walker and R Day. 1984. *Directory of important world honey sources*. IBRA Publication, London.

HCRP. 1999. *Annual report 1997-98*. Hill Crops Research Program (HCRP), Kabre, Dolakha.

Kafle, GP. 1984. A general survey of bee forage in and around Kathmandu valley. *Nep. J. Agric.*15: 89-99.

Kafle, GP. 1992. Salient features of bee keeping in Nepal. Pp.155-162. In: *Honeybees in Mountain Agriculture* (LR Verma, ed.). ICIMOD, Kathmandu, Nepal.

Kaur, G and RC Sihag. 1994. Bee flora of India: A review. *Indian Bee J*. 56:105-126.

Polunin, O and A Stainton. 1997. *Flowers of the Himalayas*. Oxford University Press, New Delhi.

Partap, T. 1992. Honey plant sources in mountain areas: Some perspectives. Pp.155-162. In: *Honeybees in Mountain Agriculture* (LR Verma, ed.) ICIMOD, Kathmandu, Nepal.

Partap, U. 1997. *Bee flora of the Hindu Kush-Himalayas: Inventory and management*. ICIMOD, Kathmandu, Nepal.

Shrestha, K. 1998. *Dictionary of Nepalese plant names*. Mandala Book Point, Kathmandu, Nepal.

Thapa, RB and DR Dangol. 1990. A preliminary survey of bee flora at IAAS and its vicinity. Pp.59-65. In: *IAAS Research Reports 1985-1991* (FP Neupane, ed.). Institute of Agriculture and Animal Science, Chitwan, Nepal.

Verma, LR. 1990. *Beekeeping in integrated mountain development: Economic and scientific perspective*. Oxford and IBH Publishing, New Delhi.

Annex 1. Different plant species of honeybee flora identified in Kabre area of Dolakha district

SN	Scientific name	Common name	Local name	Family	Habit	Flowering period	Status†
a. Major bee flora							
1	Ampelocissus rugosa	Ampelocissus	Pureni	Vitaceae	Climber	May-June	N–P
2	Berberis spp.	Barbery	Chutro	Berberidaceae	Shrub	Mar-May	N–P
3	Brassica spp.	Mustard	Tori	Cruciferae	Herb	Feb-Mar, Sep-Nov	N–P
4	Buddleia spp.	Butterfly bush	Bhimsenpathi	Loganiaceae	Tree	Feb-Apr	N–P
5	Caesalpinia spp.	Molucca bean	Bhaisen kanda	Leguminosae	Shrub	Nov-May	N–P
6	Castanopsis indica	Chestnut	Dhale katus	Fagaceae	Tree	Sept-Nov	N–P
7	Choerospondias axillaris	Hog plum	Lapsi	Anacardiaceae	Tree	Apr-May	N–P
8	Citrus spp.	Citrus	Kagati	Rutaceae	Tree	Mar-Apr	N–P
9	Cordia obliqua.	Cordia	Bohari	Cordiaceae	Tree	Apr-May	N–P
10	Coriaria nepalensis	Coriaria	Machino	Coriariaceae	Tree	Mar-Apr	N–P
11	Elsholtzia spp.	Elsholtzia	Ban silam	Labiateae	Herb	Sep-Oct	N–P
12	Engelhardia spicata	Engelhardtia	Mauwa	Juglandaceae	Tree	Mar-May	N–P
13	Erythrina stricta	Coral bean	Phaledo	Leguminosae	Tree	Mar-Apr	N–P
14	Eupatorium spp.	Throughwort	Banmara	Compositae	Herb	Nov-May	N–P
15	Fagopyrum spp.	Buckwheat	Fapar	Polygonaceae	Herb	Mar-Apr, Oct-Nov	N–P
16	Fraxinus floribunda	Ash tree	Lakunri	Oleaceae	Tree	Apr-May	N–P
17	Grewia optiva	Grewia	Syal phusro	Tiliaceae	Tree	Apr-May	N–P
18	Guizotia abyssinica	Niger	Jhuse til	Compositae	Herb	Sep-Nov	N–P
19	Holboellia latifolia	Holboellia	Gulfo	Lardizabalaceae	Climber	Apr-May	N–P
20	Juglans regia	Walnut	Ookhar	Juglandaceae	Tree	Apr-May	P
21	Maesa macrophylla	Maesa	Bhagate	Myrsinaceae	Shrub	Mar-Apr	N–P
22	Melia azedarach	China berry	Bakaino	Meliaceae	Tree	Mar-Apr	N
23	-	-	Mirre jhar	-	Herb	Sep-Nov	N-P
24	Musa paradisiaca	Banana	Kera	Musaceae	Tree	All year	N–P
25	Myrica esculenta	Bayberry	Kafla	Myricaceae	Tree	Oct-Nov	N–P
26	Phaseolus spp.	Beans	Simi	Leguminosae	Herb	July-Aug	N–P
27	Phyllanthus emblica	Goose berry	Aamala	Euphorbiaceae	Tree	Apr-Jun	N–P
28	Pinus spp.	Chir pine	Khote salla	Pinaceae	Tree	Mar-Apr	N–P
29	Pogostemon glaber	Pogostemon	Rudilo	Lamiaceae	Shrub	Nov-Feb	N–P
30	Prunus cerasoides	Wild cherry	Painyu	Rosaceae	Tree	Oct-Nov	N–P
31	Prunus domestica	Plum	Arubakhada	Rosaceae	Tree	Feb-Mar	N–P
32	Prunus persica	Peach	Aru	Rosaceae	Tree	Feb-Mar	N–P
33	Psidium guajava	Guava	Aamba	Myrtaceae	Tree	Apr-May	N–P
34	Pyracantha crenulata	Fire thorn	Ghangharu	Rosaceae	Shrub	Apr-May	N–P
35	Pyrus communis	Pear	Naspati	Rosaceae	Tree	Feb-Mar	N–P
36	Pyrus pashia	Wild pear	Mayal	Rosaceae	Tree	Mar-Apr	N–P
37	Reinwardtia indica	Winter flax	Pyawuli	Linaceae	Shrub	Nov-May	N–P
38	Rhododendron spp.	Rhododendron	Lali gurans	Ericaceae	Tree	Feb-Apr	N–P
39	Rubus spp.	Raspberry	Ainselu	Rosaceae	Shrub	Feb-May, Oct-Nov	N–P
40	Schima wallichii	Needle wood	Chilaune	Theaceae	Tree	May-Jun	N–P
41	Sechium edule	Chayote	Iskush	Cucurbitaceae	Climber	July-Nov	N–P
42	Shorea robusta	Sal	Sal	Dipterocarpaceae	Tree	Mar-Apr	N–P
43	Trichilia connaroides	Trichilia	Aankha taruwa	Meliaceae	Tree	Apr-May	N–P
44	Trifolium spp.	Clover	Pyawali	Leguminosae	Herb	Feb-Jun	N–P
45	Woodfordia fruticosa	Fire flame bush	Dhaiyaro	Lythraceae	Shrub	Mar-Apr	N–P
46	Zea mays	Maize	Maikai	Gramineae	Herb	July-Aug	P
47	Zizyphus spp.	Bead plum	Hade bayar	Rhamnaceae	Tree	May-Jun	N–P
b. Medium bee flora							
1	Ageratum conyzoides	Goat weed	Gandhe jhar	Compositae	Herb	Feb-Nov	N–P
2	Albizia spp.	Albizia	Shiris	Leguminosae	Tree	Apr-May	N–P
3	Alnus nepalensis	Alder	Utttis	Betulaceae	Tree	Oct-Nov	N–P
4	Amaranthus spp.	Pigweed	Lunde	Amaranthaceae	Herb	Jun-Aug	N–P
5	Arisaema spp.	Cobra lily	Sarpa makai	Araceae	Herb	May-Jun	N–P
6	Artemisia spp.	Mugwort	Titepati	Compositae	Herb	Aug-Oct	N–P
7	Bauhinia spp.	Bauhinia	Koiralo/tanki	Leguminosae	Tree	Mar-May, Sep-Oct	N–P
8	Butea minor	Forest flame	Bhuletro	Leguminosae	Shrub	Apr-May	N–P
9	Cannabis sativa	Hemp	Bhang	Cannabaceae	Herb	Feb-Apr	N–P
10	Caryopteris odorata	Caryopteris	Ghusere	Verbenaceae	Shrub	Feb-Apr	N–P
11	Cedrela toona	Cedrela	Tooni	Meliaceae	Tree	Apr-May	N–P
12	Chenopodium album	Lamb's quarter	Bethe	Chenopodiaceae	Herb	Mar-May	N–P
13	Colebrookea oppositifolia	Colebrookea	Ghursul	Labiateae	Shrub	Dec-Apr	N–P
14	Crinum amoenum	Crinum	Hade lasun	Amaryllidaceae	Herb	May-Jul	N–P
15	Curcuma aromatica	Zedoary	Ban haledo	Zingiberaceae	Herb	June-Jul	N–P
16	Cynoglossum spp.	Hounds tongue	Kanike kuro	Boraginaceae	Herb	May-Aug	N–P

Annex 1. Continued…

SN	Scientific name	Common name	Local name	Family	Habit	Flowering period	Status†
17	Diospyros virginiana	Persimmon	Haluwabed	Ebenaceae	Tree	Mar-Apr	N–P
18	Eurya acumiata	Osmanthus	Jhigani	Theaceae	Tree	Sep-Nov	N–P
19	Glycine max	Soyabean	Bhatmas	Leguminosae	Herb	July-Sep	N–P
20	Ilex excelsa	Holy tree	Puwanle	Aquifoliaceae	Tree	Apr-May	N–P
21	Inula cappa	Samphire	Kan pake	Compositae	Shrub	Sept-Feb	N–P
22	Ipomoea batatas	Sweet potato	Sakharkhand	Convolvulaceae	Climber	Aug-Nov	N–P
23	Justicia adhatoda	Malabar nut	Aasuro	Acanthaceae	Herb	Sept–Oct	N–P
24	Lagerstroemia spp.	Crape myrtle	Aasare	Lythraceae	Tree	Jun-July	N–P
25	Leucosceptrum canum	Leucopscepturm	Bhusure	Labiateae	Tree	Feb-Apr	N–P
26	Lyonia ovalifolia	Lyonia	Angeri	Ericaceae	Tree	Mar-May	N
27	Mahonia napaulensis	Mahonia	Jaman mandro	Berberidaceae	Shrub	Nov-Feb	N–P
28	Mussaenda roxburghii	Paper chase	Dhobini	Rubiaceae	Shrub	May-Aug	N–P
29	Nicandra physalodes	Peru apple	Poke chinek	Solanaceae	Herb	Mar-Nov	N–P
30	Osbeckia stellata	Osbeckia	Chuleshi	Melastomataceae	Shrub	July-Nov	N–P
31	Oxalis corniculata.	Crepping sorrel	Chari aamilo	Oxalidaceae	Herb	Feb-July	N–P
32	Persicaria capitata	Smart weed	Pire	Polygonaceae	Herb	Mar-Nov	N–P
33	Phaseolus calcaralus	Red bean	Masyang	Leguminosae	Herb	Oct-Nov	N–P
34	Phlogacanthus thyrsiflorus	Phologacanthus	Choyua	Acanthaceae	Shrub	Sep-Nov	N–P
35	Porana grandiflora	Porana	Aakash beli	Convolvulaceae	Climber	Aug-Oct	N–P
36	Ranunculus spp.	Butter cup	Nak kure	Ranunculaceae	Herb	Apr-Jul	N–P
37	Rhus spp.	Nepal sumac	Bhalayo	Anacardiaceae	Tree	May-Jun, Aug-Sep	N–P
38	Rosa spp.	Wild rose	Jangali gulaf	Rosaceae	Shrub	Apr-Jun	N–P
39	Sapium insigne	Tallow	Khirro	Euphorbiaceae	Tree	Nov-May	N–P
40	Saurauia nepaulensis	Saurauia	Gogan	Saurauiaceae	Tree	Sept-Oct	N–P
41	Smilax spp.	Green briers	Kukur daino	Liliaceae	Climber	Apr-May	N–P
42	Swertia spp.	Chiretia	Chiraito	Gentianaceae	Shrub	Aug-Oct	N–P
43	Symplocos spp.	Symplocos	Kholme	Symplocaceae	Tree	Apr-May	N–P
44	Vegetables					All year	
45	Vitex negundo	Privet	Simali	Verbenaceae	Shrub	Apr-Oct	N–P
46	Zanthoxylum armatum	Nepal pepper	Timbur	Rutaceae	Shrub	Apr-May	N–P
c. Minor bee flora							
1	Aesandra butyracea	Butter tree	Chiuri	Sapotaceae	Tree	Sep-Feb	N–P
2	Cajanus cajan	Piegon pea	Rahar	Leguminosae	Herb	Oct-Nov	N–P
3	Callistemon citrinus	Bottle brush	Kalki phul	Myrtaceae	Tree	Mar-Apr, Sep-Oct	N–P
4	Chrysanthemum segetum	Chrysanthemum	Godavari	Asteraceae	Herb	Aug-Sept	N–P
5	Cirsium spp.	Field thistle	Dhade kande	Compositae	Herb	Feb-Jun	N–P
6	Cosmos sulphureus	Cosmos	Cosmos	Asteraceae	Herb	Oct-Nov	N–P
7	Eriobotrya dubia	Medlar	Jure kaphal	Rosaceae	Tree	Feb-Mar, Sep-Oct	N–P
8	Euphorbia pulcherrima	Poinsettia	Lalupate	Euphorbiaceae	Shrub	Oct-Feb	N–P
9	Ficus spp.	Fig	Ber	Moraceae	Tree	Feb-Apr, Oct-Nov	N–P
10	Fragaria nubicola	Alpine strawberry	Bhun ainselu	Rosaceae	Herb	Apr-Jun	N–P
11	Grevillea robusta	Silky oak	Kangiyo	Proteaceae	Tree	Apr-May	N–P
12	Impatiens spp.	Balsam	Tiwuri	Balsaminaceae	Herb	Jul-Sep	N–P
13	Malvaviscus arboreus	Chinese lantern	Ghante phul	Malvaceae	Shrub	All year	N–P
14	Melastoma melabathricum	Indian rhododendron	Angeri	Melastomataceae	Shrub	Mar-Jun	N–P
15	Mimosa spp.	Sensitive plant	Lazzavati	Leguminosae	Herb	Oct-Dec	N–P
16	Perilla frutescens	Perilla	Silam	Labiateae	Herb	Sep-Oct	N–P
17	Pisum sativum	Pea	Kerau	Leguminosae	Herb	Mar-Apr	N–P
18	Plectranthus spp.	Shain		Labiateae	Shrub	Aug-Nov	N–P
19	Polygonum spp.	Polygonum	Thotne	Polygonaceae	Herb	May-Sep	N–P
20	Prinsepia utilis	Prinsepia	Dhatelo	Rosaceae	Herb	Oct-Nov, Apr-May	N–P
21	Punica granatum	Pomogranate	Aanar	Punicaceae	Tree	Apr-May	N–P
22	Punica nana	Wild Pomegranate	Darim	Punicaceae	Tree	Apr-May	N–P
23	Salvia splendens	Scarlet sage	Lwang phul	Labiateae	Herb	All year	N–P
24	Sesamum indicum	Sesame	Kalo til	Pedaliaceae	Herb	Sep-Oct	N–P
25	Syzygium jambos	Rose apple	Ban jamum	Myrtaceae	Tree	Apr-May	N–P
26	Tagetes erecta	Marigold	Sayapatri	Compositae	Herb	Feb-May, Aug-Nov	N–P
27	Tamarindus indica	Tamarind	Imili	Leguminosae	Tree	Apr-May	N–P

† N, Nectar source; P, Pollen source.