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FLORAL RELATIOSHIPS OF BEES IN SELECTED AREAS OF SRI LANKA

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ABSTRACT

This study represents the very first attempt to record the floral relations of bees of Sri Lanka. Floral hosts of 117 bee species in 35 genera were recorded based on floral visits, pollen carriage and special behaviour at flowers. Floral hosts comprised 154 plant species in 112 genera and 44 families. Majority of the floral hosts were native plants of which most were weeds in their respective habitats. The exotic naturalized weed, *Hyptis suaveolense* was exceptional in attracting 60 bee species. All five species of social bees and majority of the solitary bees were polylectics foraging on pollen of a variety of unrelated flowers. Seven solitary bee species were recognized as oligolectics foraging on species of Convolvulaceae and Malvaceae having large spiny pollen. Sonication at tubular anthers of certain Solanaceae and Melastomataceae flowers having concealed pollen was observed in 12 species of solitary bees. Nectar robbing by males of five species of solitary bees was recorded from certain tubular–shaped flowers. Floral relationships suggest that most bees are generalists and a few have become specialized to forage on specific groups of flowers. The information gathered would be useful in pollination studies and in the management and conservation of bees.

INTRODUCTION

Studies on bees of Sri Lanka (Dalla Torre, 1896; Bingham, 1897; Strand, 1913; Wijesekara, 2001; Karunaratne, 2004; Karunaratne *et. al.*, 2005) have resulted in the identification and documentation of 152 species in 38 genera and four families. They include five species of social bees and the rest are solitary bees. However, published information on floral relationships of these bees is completely lacking. A recent field study documented 136 bee species from selected areas of Sri Lanka (Karunaratne, 2004). This paper reports the floral relationships of 117 species of bees collected during this recent field study.

Bees have varied relationships with flowers based on the type of floral resource they specialize on. Many solitary bees are resource specialists for pollen and rarely for nectar (Wcislo and Cane, 1996). Floral relationships of bees (food plant relationships) involve floral visitations that are followed by gathering of pollen and nectar. Floral relationships also cover behavioural specialization of bees such as sonication at flowers and nectar robbing.

The pollen relationships of solitary bees unlike those of social bees vary from being general (visiting a wide variety of unrelated flower types belonging to several families) to a highly specialized pollen relationship. Thus, based on the diversity of pollen gathering bees are termed polylectic, oligolectic and monolectic. Most bees are polylectic as they gather pollen from a wide variety of unrelated plant species. Oligolectic bees specialize on a particular type or class of pollen present in flowers of certain Convolvulaceae and Malvaceae. Monolectic bees are very specific in their pollen preference and confine themselves to a single species of floral hosts (Michener, 2000).

Although polylectic bees as generalists visit a wide variety of flowers a few species show a conspicuous widespread behavioural adaptation of floral sonication. These bees collect pollen from flowers that have specialized anthers which do not split along their length to release pollen. Such flowers release their pollen through terminal pores only when the anthers are vibrated. Bees that alight on these flowers vibrate their body while hanging on to the anthers. The sonication or buzzing noise produced by these bees when they vibrate their body enhances pollen release and

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collection. Several site studies from different parts of the world (Batra, 1967; Evans, 1986 and Deyrup and Edirisinghe, personal communication) have demonstrated such specialized behaviour in bee-flower relationships.

Bees are generally known to gather nectar by entering the flower through the corolla and reach the nectary directly. But certain bees reach the nectary by piercing the corolla at the base of the flower. Such bees do not encounter pollen and would not be part of the pollination process of the flower. Therefore, bees gathering nectar in this manner are termed nectar robbers (Roubik, 1992).

The objective of this paper is to record the floral associations of bees collected from selected areas of Sri Lanka. Floral associations are based on observations on floral visits of bees, pollen carriage as well as special behaviour patterns shown at flowers.

METHODOLOGY

Study area

Floral hosts of bees were determined by observing and collecting bees that alight on flowers to forage. Bees and the flowers they visit were studied in 29 sites (Table 1) in 26 locations (Figure 1). These sites came under 15 different agro-ecological regions and 13 administrative districts (Somasekaram, 1997) of the country. The study sites, identified by the location of the closest town were representative of the different elevations (sea level to montane region), rainfall zones (Dry, Wet and Intermediate) and habitat types (forests to cultivated areas) in the country.

Bees visiting flowers were recorded from a wide variety of habitats (Table 1) and vegetation types. The selection of bee collection sites included in the study was based on prior experience and the availability of flowering herbaceous annuals and perennials. However, selection of collection sites was limited by accessibility and availability of funds for long distance travel. In the proceeding section a description of the habitat types from which bees were collected is given.

Agricultural habitats ranged from well-managed research fields of large extent to small farmer fields managed at marginal level. Furthermore, depending on the location (Dry, Intermediate and Wet) the types of crops grown varied at the different collection sites. Tanks are rainwater collected natural or man-made depressions. Inclined banks of tanks are covered with natural secondary vegetation consisting largely of flowering herbaceous annual plants. Cemeteries are open sunny areas often located close to human settlements. In these habitats the degree of clearance or disturbance influences the types of plants that naturally grow. In coastal areas, the land immediately adjacent to the beach bears a specific vegetation type consisting largely of ground creepers.

Home gardens are of a variety of types ranging from Kandyan home gardens to upcountry and low country home gardens. The natural and cultivated vegetation differ accordingly. During the study the most frequently visited horticultural garden was the Royal Botanic Gardens at Peradeniya. The vegetation is entirely tropical and harbours a mixture of native and exotic plants including trees, climbers, palms, bamboos, epiphytes (orchids and ferns) and herbs. Three types of natural forests, montane, submontane and semi-evergreen forests were surveyed for bees. Rice fields are temporary and seasonal aquatic habitats managed with a variable degree of intensity. Vegetation in rice fields consists of a variety of grasses and herbaceous weeds in addition to the rice crop. Road side vegetation consists of a variety of herbaceous flowering plants that are subjected constant trampling and intermittent slashing. Weedy habitats are abandoned lands that harbour a rich vegetation of grasses and broad-leaf weeds.

Sampling procedures were not employed in the recording of floral relationships of bees, but were based on systematic collections of bees from flowers in a given habitat at a point of time when flowering was apparent.

Field visits

The study sites selected were visited at different frequencies and at different times of the year. Bees and their floral hosts from distant sites were collected only on a few occasions due to constraints in travel. Frequent collections were made from sites close to the university such as the Peradeniya University Park, Agriculture fields at Meewatura and Gannoruwa and the Royal Botanic Gardens.

Table 1. Details of collection sites from where bees and their floral hosts were recorded.

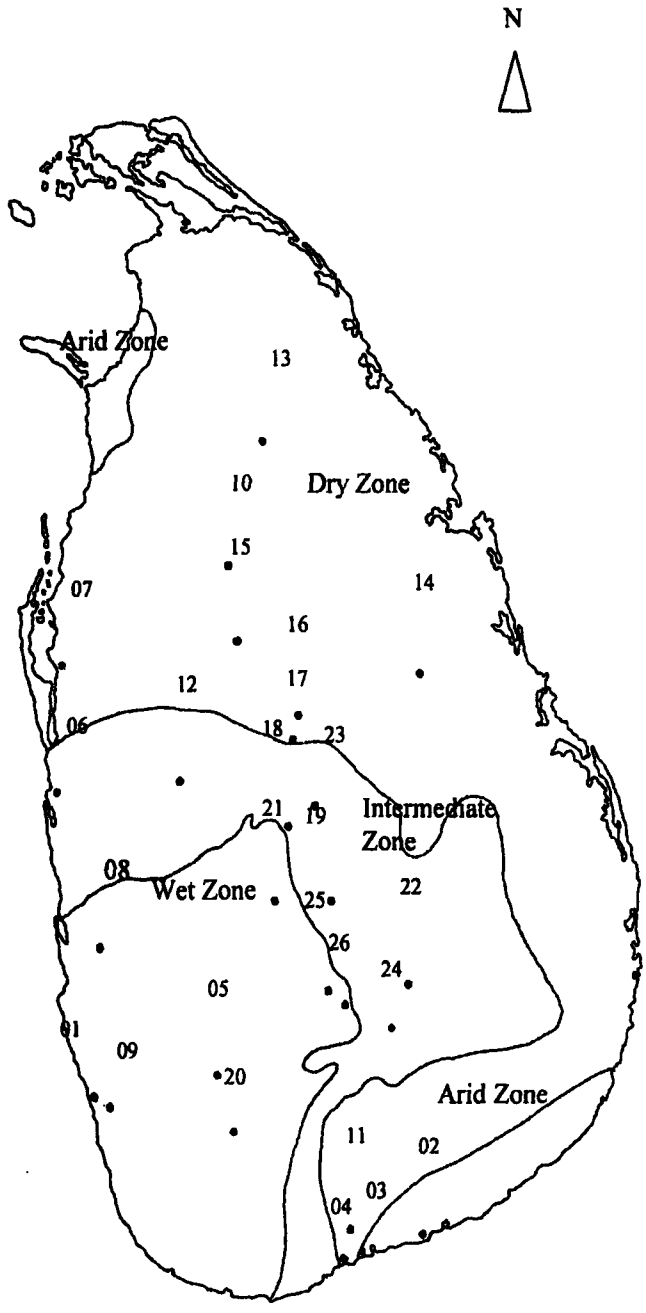
Collecting sites	Habitat types	Agro-ecological Region	District	Province
Anuradhapura	Ag, Rs, TS, Wh			
Maha Illuppallama	Ag	DL1	Anuradhapura	North-Central
Giritale**	Hg	DL1	Pollonnaruwa	North-Central
Badulla** 6.	Hg	IM1	Badulla	Uva
Bandarawela**	Ag	IU3		
Hambantota				
Rekawa	Ca	DL5	Hambanthota	Southern
Ussangoda				
Angunakolapelessa	Ag, Rs, TS, Wh			
Bombuwala	Rf, Rs, Wh			
Kalutara	Ca, Rs, Wh	WL4	Kalutara	Western
Gampaha**	Hg	WL3	Gampaha	Western
Meewatura	Ag			
Pera. Bot. Gardens	Ho	WM2	Kandy	Central
Pera. Uni. Park	Hg, Rf, Rs,Wh, Ag			
Gannoruwa				
Randenigala	Rs, Wh	IM3	Kandy	Central
Matale*	Hg	IM3		
Galewela*	Hg	DL1	Matale	Central
Dambulla*	Hg	DL1		
Knuckles	Nf, Rf, Hg, Wh	IU1 & IM1		
Nuwara Eliya*	Hg, Wh, Rs, Ce	WU3	Nuwara Eliya	Central
Sita Eliya	Rs, Wh			
Puttalam	Rs, Wh	DL3	Puttalam	North-Western
Chillaw	Ca, Rs, Wh	IL1		
Wariyapola	Ce, Hg, Ts	IL3	Kurunegala	North-Western
Ratnapura*	Hg, Rs	WL1	Ratnapura	Sabaragamuwa
Sinharaja	Nf	WM1		
Vavuniya**	Hg	DL1	Vavuniya	Northern

** - Locations where volunteer students gathered information

* - Areas from where both students and the first author collected information.

(Ag = Agricultural habitat, Ca = Coastal area, Ce = Cemeteris, Hg = Home garden, Ho = Horticultural garden, Nf = Natural forest, Rf = Rice fields, Rs = Roadsides, Ts = Banks of tanks and streams, Wh = Weedy habitat).

(DL = Low country Dry zone, IL = Low country Intermediate zone, IM = Mid country Intermediate zone, IU = Upcountry Intermediate zone, WL = Low country Wet zone, WM = Mid country Wet zone, WU = Upcountry Wet zone).



collection locations are numbered in order of increasing altitude (0-2100m): 1=Kalutara, 2=Hambanthota, 3=Rekawa, 4=Ussangoda, 5=Ratnapura, 6=Chillaw, 7=Puttalam, 8=Gampaha, 9=Bombuwala, 10=Anuradhapura, 11=Angunakolapelessa, 12=Wariyapola, 13=Vavuniya, 14=Giritale, 15=Maha Illuppallama, 16=Dambulla, 17=Galewela, 18=Matale, 19=Randenigala, 20=Sinharaja, 21=Peradeniya (includes 4 sites: Gannoruwa Ag. Field, Meewatura Ag. Field, R. Bot. Gardens & Univ. Park), 22=Badulla, 23=Knuckles, 24=Bandarawella, 25=Nuwara Eliya, 26=Sita Eliya.

Figure 1. Location of bee collection sites in relation to the rainfall zones of Sri Lanka.

The Knuckles forest reserve that shows a marked seasonal variation in its flora was visited monthly over a period of one year. Study of bees and their floral hosts in distant districts was facilitated by the services of volunteer undergraduate students, who were trained in the documentation and collection of representative samples of the bee species and their hosts. They were also provided with a bee-collecting kit and the necessary information for bee collection.

Collection and identification of bees and their floral hosts

Bees and their floral hosts were determined by visual observations when bees alight on flowers to forage. A standard insect net (30 cm diameter) was used for collecting bees on flowers and a net with an adjustable long handle for collecting bees from tall trees.

Bees collected were identified up to the highest possible taxon using keys and descriptions of Michener (2000), Pauly (1984, 1990), Pauly *et al.* (2001), Sakagami and Ebmer (1987), Schwarz (1990), Sakagami (1978 and 1991), Sakagami *et al.* (1996 and 1998) and Baker (1996). In addition, reference specimen collections of bees in the National Museum, Colombo and the Zoology Department Museum, University of Peradeniya were used for confirming the identity of species.

Specimens of floral hosts of bees were obtained at the time bees were collected. They were preserved in methylated spirit, dried and identified with help from the Department of Botany, University of Peradeniya and the National Herbarium, Peradeniya, Sri Lanka.

Study of pollen on bees and their floral hosts

Specimens of bees collected off flowers were examined for the presence of pollen on their body. Pollen on bees as well as pollen obtained from the respective floral hosts from which the bees were collected was slide-mounted using the method of Wodehouse (1935). Slide mounted pollen from both sources (bee specimens and floral hosts) was examined microscopically (2 X 40) and assigned to pollen classes, based on the method of Davis (1999).

Special behaviour patterns of bees at flowers

Bees foraging on flowers were closely observed for special behaviour patterns. Buzzing of bees near the anthers of flowers during pollen collection and nectar robbing are some of the special behaviour patterns that were looked for.

RESULTS

Floral hosts of bees

A total of 154 plant species in 112 genera and 44 families were recorded as floral hosts of 117 bee species in 35 genera and 3 families during this study. The list of floral and bee species documented is given in Appendices 1 and 2 respectively. The identified bee and herbaria specimens pertaining to the study are deposited in the Dept. of Zoology, University of Peradeniya. Appendix 1 gives the floral hosts under different plant taxa (arranged alphabetically according to plant family, genera and species). The ecological status of the floral host species, i.e. whether cultivated (C), endemic (En), naturalized exotic (nEx) or indigenous (I) is indicated after the species name. An asterisk placed after the name of a bees species indicates the presence of pollen on its body of the floral hosts on which the bee was collected in the field. Letters f (female) and m (male) that follow the species names of bees denote the sex of the specimen collected. Appendix 2 gives the species of bees whose floral hosts were recorded. Bees are listed under the three families and within each family the genera and species are arranged alphabetically.

Overall relationship between flowering plants and bees

The 154 floral hosts of bees recorded comprised 53% native or indigenous plants, 40% non-native or exotic plants and 7% endemic plants. Furthermore, among the floral hosts were 19 species of cultivated crops; native and exotic. These findings indicate that much of the bee foraging plants recorded are native/indigenous species.

The number of bee species that visited different flowering plant species was also found to be widely different (Appendix 1). Flowers of a few plant species were visited by a large number of bees. Of particular interest is *Hyptis suaveolens* on which 60 species of bees foraged on pollen and nectar. Family Asteraceae included the most

number of hosts (15 floral species) visited by bees followed by Convolvulaceae (13 floral species) and Rubiaceae (11 floral species). On the contrary, a large number of the floral host species were visited by a few bee species. Flowers of 21 plant species were visited by only a single bee species. Floral hosts in each of the remaining families were visited by 2-7 species of bees. Although all three families of bees included several species of generalists visiting a wide range of flora, *Apis cerana*, *Ceratina hieroglyphica* and *Trigona iridipennis* in particular visited over 40 species of floral hosts (Appendix 2).

Table 2 Pollen relationships of oligolectic bees based on pollen carriage*.

Bee species	Floral-pollen hosts
Lithurgus atratus	Convolvulaceae – *Argyreia populifolia, Ipomoea cairica, I. mauritiana, I. pes-caprae* Malvaceae – *Hibiscus furcatus, Hibiscus* sp., *H. tiliaceus*
Lithurgus sp. 1	Malvaceae – *Hibiscus tiliaceus*
Lasioglossum halictoides	Convolvulaceae – *Ipomoea pes-caprae*
Lasioglossum serenum	Convolvulaceae – *Ipomoea cairica, I. pes-caprae*
Systropha tropicalis	Convolvulaceae – *Ipomoea carnea, I. denticulata, I. littoralis, Merramia tridentata* Malvaceae – *Urena lobata*
Tetralonia sp. 1	Convolvulaceae – *Argyreia populifolia, Ipomoea mauritiana*
Tetralonia sp. 2	Malvaceae – *Hibiscus furcatus*

- Following examination of pollen on 5 specimens of bees per floral host for each bee species.

Pollen relationships of bees

Pollen on 585 specimens of bees representing 5 specimens from each of the 117 bee species was examined during the study. Microscopic examination of the pollen load of each bee indicated that only 15 bee species carried 'unmixed pollen' collected from a single plant species. The bees of the genera, *Lasioglossum* (subgenus *Nasohalictus)*, *Systropha*, *Tetralonia* and *Lithurgus*, in a given pollen load carried pollen from a single plant species that was easily identified by cross checking with the host. Pollen relationships of seven species of bees from these genera are noteworthy as they restricted their visits to a few closely related plant taxa belonging to the two families Convolvulaceae and Malvaceae (Table 2).

Thus, *Lithurgus atratus* carried pollen from one of four species of Convolvulaceae plants or three species of Malvaceae in a given pollen load. Similarly, *Systropha tropicalis* carried pollen from one of four other species of Convolvulaceae or one species of Malvaceae. *Lasioglossum serenum* collected pollen from two species of plants in the Family Convolvulaceae, and *Tetralonia* sp. 1 visited two other species of the same family. *Lasioglossum halictoides* gathered pollen only from a single species of plants in this family. *Lithurgus* sp. 1 and *Tetralonia* sp. 2, each visited two different floral species in the Family Malvaceae. Thus, the seven oligolectic bee species known for their pollen specificity carried pollen from flowers of eight species of Convolvulaceae and four species of Malvaceae (Table 2).

The pollen loads on the specimens of the remaining 102 bee species contained mixed pollen of several types that could not be identified to species level with the facilities available. Representative specimens of the honeybee (*Apis cerana*) examined for pollen indicated the presence of either mixed or unmixed pollen in a given pollen load. Honeybees that foraged specifically on crop flowers cultivated on a large extent of land carried pollen of that crop only. In contrast, honeybees collected from disturbed areas having a variety of flowering plants carried mixed pollen from several taxa. Of interest are bees of the genus *Lipotriches* that were common on grass flowers and were observed to collect pollen early in the morning between 7.00-8.30 am. Later in the day they foraged on flowers other than grass.

Specific behaviour of bees at flowers

Buzz pollination: Twelve species of bees belonging to the 2 families, Apidae (3- *Xylocopa* spp.) and Halictidae (9 spp.) sonicated at flowers of three plant families (Table 3). This behaviour pattern was seen at the anthers of *Osbeckia octandra, Solanum melongena, S. violaceum,* an unidentified *Solanum* species and *Dillenia triquetra.*

Nectar robbing: The present study recorded five nectar robbing bee species belonging to the two genera *Amegilla* and *Xylocopa.* They fed on nectar of three plant species belonging to two families (Table 3). All nectar-robbing bee species recorded were males of the family Apidae. The females of these bee species entered the corolla tube of the flower and gathered nectar therein in the usual manner.

Table 3 Observations on nectar robbing and buzzing at flowers by bees.

Flower species	Buzzing bee speceis
Dillenia triquetra (Dilleniaceae)	*Patellapis sp.* 2
Osbeckia octandra (Melastomataceae)	*Lasioglossum alphenum, Patellapis kaluterae, Xylocopa collaris, Xylocopa ruficornis, Xylocopa tenuiscapa,*
Solanum melongena (Solanaceae)	*Amegilla comberi, Pachynomia sp., Patellapis kaluterae, Leuconomia sp.*
Solanum violaceum (Solanaceae)	*Patellapis kaluterae, Pachynomia sp., Lasioglossum amblypygus*
Solanum sp. (Solanaceae)	*Pachynomia sp., Hoplonomia westwoodi, Xylocopa tenuiscapa, X. ruficornis*
	Nectar robbing bee species
Salvia tiliifolia (Lamiaceae)	*Amegilla comberi, A. puttalama, A. scintillans*
Sesamum indicum (Pedaliaceae)	*Amegilla violacea*
Sesamum radiatum (Pedaliaceae)	*Amegilla niveocincta, A. scintillans, Xylocopa fenestrata*

DISCUSSION

In the compilation of the floral relationships of bees several patterns can be recognized. It is noteworthy that majority of the floral hosts documented in this study are indigenous/native plant species. Furthermore, most of them are known weeds in their respective habitats. This study therefore highlights the importance of the native weed flora in sustaining the bee fauna in a plant community. The floral relationships further indicate the co-evolution of the native bee fauna with the native flora of the island.

Bees showed an unusually high attractiveness to certain naturalized exotic plant species, some of which are invasive in a given

habitat. Of particular importance is *Hyptis suaveolens,* which attracted 60 species of bees to its small purple flowers. Raju et *al.* (1997) of India consider this species as a prized-weed due to its importance in bee/pollinator conservation.

Different attributes of flowers such as nectar production, shape and colour have been assigned to attract different groups of bees (Dafni and Keven, 1995; Faegri and van der Pijl, 1979) and many other pollinators (Roubik, 1992). Flowers of *H. suaveolens* were observed to produce nectar over long periods (7.00 am-4.30 pm), attracting a large number of bee species and many types of other insects, such as beetles, wasps, moths and butterflies. Macmillan (1962) has listed 24 well-known bee-visiting floral species from Sri Lanka. Among them are five floral hosts of bees recorded during this study. It is important to note that no attempt was made during the present study to identify the attributes of floral hosts attractive to bees.

The analysis of pollen loads provides evidence of the degree of fidelity (floral constancy) to a particular floral resource by individual bees on a single foraging trip. Floral constancy is thought to proportionately increase effective pollination (Roubik, 1992). Because fidelity restricts an individual bee to a particular type of resource, such bees need not modify their behaviour on a given trip to handle more than one floral type (Roubik, 1992). This type of floral constancy would enhance pollination in cropping systems.

In the present survey, two of the Apidae bee species, *Apis cerana* and *Trigona iridipennis,* visiting cucumber flowers in an agricultural habitat, consistently carried only cucumber pollen. Thus it appears that when the floral patch is large, bees tended to keep their constancy even though they are polylectic bees. This behaviour is very important in agricultural systems for crops pollinated by Apidae bees that are very common in the wild. Hughes (1971) stresses the need to have honeybee colonies in cucumber fields for better yield. The floral associations of *Apis cerana* recorded from agricultural habitats suggest their ability to become successful pollinators of crops in agricultural systems.

In the entire compilation of the floral hosts of 117 species of bees to 154 floral hosts during the present study, there is no indication of an exclusive relationship between a bee and a plant species confirming the absence of monolectic bees. The floral relationships indicate that the majority of bees so far recorded from Sri Lanka are polylectic. Polylectic bees do not strictly adhere to one type of pollen source unlike the monolectic bee species which are well documented from xeric environments, where resource availability is more seasonal (Moldenke, 1979).

In the present study, the sonicating bees that vibrated the tubular anthers to release pollen are the generalist bees such as *Curvinomia iridescens, Lasioglossum alphenum, Patellapis kaluterae* and *Xylocopa collaris.* Thus, buzz-pollinated plants have evolved to use generalist bees to act as specialists, a common strategy for insect pollinated plants. The principle of training common and widespread insects as specialist pollinators is an example of how complex and flexible solutions to problems may be favoured in biological systems.

The study while highlighting the floral relationships of our bees addresses the need to incorporate the rich diversity of flowering plants in the country in bee-plant relationship studies. Comparison of floral relationships of different bee species in different countries of a given geographic region would indicate how bee communities respond to similar vegetation types. Of much significance would be the relationship of native bees to vegetable crops that are largely cosmopolitan in distribution. The knowledge gathered on the floral and pollen relationships of bees would undoubtedly contribute towards pollination biology of natural vegetation and of the cultivated agriculture of the country. Furthermore, this information would be invaluable in the conservation and management of specially the little known - solitary bees.

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Appendix 1. Floral hosts and the different bee species that visit them

1. ACANTHACEAE

1. Acanthus ilicifolius L. (l)

Bees: **Amegilla comberi* (f), **Lasioglossum amblypygus* (f), *Nomia crassipes* (f).

2. Asystasia chelonoides Nees (l)

Bees: *Amegilla comberi* (m), **Amegilla puttalama* (f), *Amegilla scintillans* (m,f), **Apis cerana* (f).

3. Jacobina tinctoria

Bees: *Amegilla scintillans* (m,f), *Ceratina binghami* (f), **Ceratina hieroglyphica* (f), **Hoplonomia westwoodi* (m,f), *Thyreus histrio* (m).

4. Justicia betonica L. (l)

Bees: **Ceratina binghami* (f), **Amegilla comberi* (f).

5. Justicia procumbens L. (l)

Bees: *Amegilla comberi* (m), **Apis cerana* (f), *Austronomia krombeini* (m), **Austronomia* sp. 1 (f), **Heriades binghami* (f), **Hoplonomia westwoodi* (f), *Lipotriches edirisinghei* (m), *Lipotriches pulchriventris* (m), **Maynenomia* sp.2 (f), *Megachile hera* (m), *Megachile umbripennis* (m), *Nomia crassipes* (m).

6. Strobilanthes sexennis Nees var. argata (Nees) C.B. Clarke. (En)

Bees: **Apis cerana* (f), **Apis dorsata* (f), *Hoplonomia westwoodi* (m).

2. AMARANTHACEAE

7. Alternanthera sessilis (L.) DC. (l)

Bees: *Apis cerana* (f), **Apis florea* (f), **Austronomia notiomorpha* (f), *Austronomia krombeini* (f), **Braunsapis* sp. (f), *Ceylalictus cereus* (m), *Halictus lucidipennis* (f,m), *Hoplonomia westwoodi* (f), *Leuconomia sp.* (m,f), *Lipotriches fulvinerva* (m), *Lipotriches edirisinghei* (m), *Nomia crassipes* (m), *Sphecodes biroi* (m), **Trigona iridipennis* (f).

8. Gomphrena sp.

Bees: *Braunsapis* sp. (m,f), **Ceratina hieroglyphica* (f), **Lasioglossum alphenum* (f).

9. Nothosaerva brachiata (L.) Wight. (I)
Bees: *Austronomia krombeini* (f).

3. ANACARDIACEAE

10. Mangifera indica L. (nEx, C)
Bees: *Apis cerana* (f), *Trigona iridipennis* (f).

11. Spondias dulcis Sol. Ex. Parkinson. (nEx, C)
Bees: **Trigona iridipennis* (f).

4. APONOGETONACEAE

12. Aponogeton natans (L.) Engl. & Krause, (I)
Bees: **Lasioglossum vagans* (f), **Trigona iridipennis* (f).

13. Aponogeton sp.
Bees: **Braunsapis mixta* (f), **Braunsapis* sp. (m,f), **Ceratina binghami* (f).

5. ARECACEAE

14. Cocos nucifera L. (I, C)
Bees: *Apis cerana* (f), *Trigona iridipennis* (f).

6. ASCLEPIADACEAE

15. Calotropis gigantea (L.) R.Br. (I)
Bees: **Amegilla comberi* (f), *Amegilla fallax* (f), *Amegilla violacea* (m,f), *Xylocopa fenestrata* (m), *Xylocopa tenuiscapa* (m,f).

7. ASTERACEAE

16. Acanthospermum hispidum DC. (nEx)
Bees: *Heriades binghami* (m).

17. Ageratum conyzoides L. (nEx)
Bees: **Apis cerana* (f), *Braunsapis* sp. (f), **Ceratina hieroglyphica* (f), **Ceratina* sp. (m, f), **Halictus lucidipennis* (f), **Heriades binghami* (f), **Lasioglossum carnifrons* (f), **Pachyhalictus* sp. (f).

18. Bidens pilosa L. var. minor Sherff (Blume) (nEx)
Bees: **Apis cerana* (f), *Ceratina binghami* (m,f), *Ceratina hieroglyphica* (m,f), *Halictus lucidipennis* (m), **Heriades binghami* (f), **Lasioglossum alphenum* (f), **Lasioglossum amblypygus* (f), **Lasioglossum bidentatum* (f), **Lasioglossum carnifrons* (f), *Lasioglossum* sp. (m), **Leuconomia* sp. (f), *Nomada priscilla* (f), *Gnathonomia nasicana* (m), *Pachyhalictus* sp. (f).

19. Chrysanthemum segetum L.
Bees: *Lasioglossum alphenum* (m,f), *Lasioglossum aulacophorum* (m,f), **Lasioglossum carnifrons* (f).

20. Eleutheranthera ruderalis (Swartz) Sch. Bip. (nEx)
Bees: **Apis florea* (f), **Austronomia notiomorpha* (f), *Braunsapis* sp. (f), *Ceratina binghami* (m,f), *Ceratina hieroglyphica* (m,f), *Halictus lucidipennis* (m,f), *Heriades binghami* (f), *Leuconomia* sp. (m,f), *Lipotriches exagens* (m), *Lipotriches fulvinerva* (m), *Pseudapis oxybeloides* (m,f).

21. Emilia alstonii Fosberg, (I)
Bees: *Braunsapis* sp. (m,f), *Lipotriches comperta* (m).

22. Erigeron karvinskianus D C. (nEx)
Bees: *Lasioglossum alphenum* (m,f), *Nomada priscilla* (f), *Nomada* sp. (m).

23. Hypochoeris radicata L. (nEx)
Bees: *Lasioglossum carnifrons* (m,f).

24. Lagascea mollis (Jacq.) Cav. (nEx)
Bees: **Megachile hera* (f).

25. Psiadia ceylanica (Arn.) Grierson (I)
Bees: **Lasioglossum alphenum* (f), **Lasioglossum carnifrons* (f).

26. Senecio ludens C. B. Clarke (I)
Bees: *Lasioglossum alphenum* (f), **Lasioglossum carnifrons* (f).

27. Tagetes sp. (L.) (nEx)
Bees: **Apis cerana* (f), **Apis dorsata* (f), **Apis florea* (f), **Ceratina hieroglyphica* (f,m), **Halictus lucidipennis* (f), **Trigona iridipennis* (f).

28. Tridax procumbens L. (nEx)
Bees: **Apis cerana* (f), *Apis florea* (f), **Braunsapis mixta* (f), **Ceratina binghami* (f), *Ceratina hieroglyphica* (f), **Halictus lucidipennis* (f), **Megachile hera* (f), *M. vigilans* (m,f), **M. nana* (f), *Thyreus histrio* (m), *Euaspis edentata* (f). *Thyreus takaonis* (m),

29. Vernonia cinerea L. Less. (I)
Bees: **Austronomia* sp. 1 (f), **Braunsapis mixta* (f), **Braunsapis* sp. (m,f), **Ceratina binghami* (f), **Ceratina hieroglyphica* (m,f), *Ceratina* sp. (m,f), *Coelioxys capitata* (m), *Coelioxys confusus* (m), *Coelioxys* sp. (f), **Gnathonomia nasicana* (f), **Halictus lucidipennis* (f), *Heriades binghami* (m,f), *Lasioglossum kandiense* (m,f),

Lasioglossum sp. (f), *Lasioglossum* sp. (m,f), **Leuconomia* sp. (f), *Lipotriches fulvinerva* (m), *Lipotriches edirisinghei* (m), *Megachile hera* (m,f), **Megachile nana* (f), *Megachile umbripennis* (f), *Megachile vigilans* (f), *Nomada wickwari* (m), *Nomia crassipes* (m,f), **Pachyanthidium* sp. (f), **Pachyhalictus* sp. (f), *Pseudapis oxybeloides* (m), *Sphecodes biroi* (f), *Thyreus insignis* (f).

30. Wedelia biflora (L.) DC. (I)

Bees: **Apis cerana* (f), **Apis cerana* (f), **Braunsapis mixta* (f), **Ceratina hieroglyphica* (f), **Trigona iridipennis* (f).

8. BALSAMINACEAE

31. Impatiens sp.

Bees: **Apis cerana* (f), **Lasioglossum vagans* (f), **Trigona iridipennis* (f).

9. BORAGINACEAE

32. Cordia aublettii A.D.C. (I)

Bees: *Gnathonomia nasicana* (f).

10. CACTACEAE

33. Opuntia dillenii (Ker-Gawl.) Haw. (nEx)

Bees: **Apis cerana* (f).

11. CAPPARIDACEAE

34. Cleome viscosa L. (I)

Bees: **Apis cerana* (f), **Apis florea* (f), *Braunsapis* sp. (m), **Ceratina hieroglyphica* (f), **Halictus lucidipennis* (f), *Hoplonomia westwoodi* (m), **Patellapis* sp. (f), *Pseudapis oxybeloides* (m), **Trigona iridipennis* (f).

12. CARICACEAE

35. Carica papaya L. (nEx, C)

Bees: *Trigona iridipennis* (f).

13. COMMELINACEAE

36. Commelina diffusa Burm. f. (I)

Bees: * *Lasioglossum carnifrons* (f).

37. Commelina kurzii Clarke

Bees: **Apis cerana* (f), *Austronomia krombeini* (f), **Austronomia notiomorpha* (f), *Austronomia* sp. (f), **Lasioglossum* sp. (f), **Leuconomia* sp. (m,f), *Lipotriches exagens* (m), **Lipotriches pulchriventris* (f), **Nomia crassipes* (f).

38. Cyanotis arachnoidea C.B. CL. (I)

Bees: **Braunsapis* sp. (f).

39. Cyanotis axillaris (L.) Sweet (I)

Bees: **Amegilla comberi* (f), *Apis cerana* (f), *Austronomia krombeini* (m), **Austronomia* sp. 2 (f), **Nomia crassipes* (f), * *Gnathonomia nasicana* (f).

14. CONVOLVULACEAE

40. Argyreia populifolia Choisy (En)

Bees: *Ceratina hieroglyphica* (f), *Lasioglossum serenum* (m,f), **Lithurgus atratus* (m,f), *Tetralonia* sp. (m,f).

41. Evolvulus alsinoides (L.) L. (I)

Bees: **Apis florea* (f), **Ceylalictus* sp. (m,f), **Halictus lucidipennis* (m,f), **Pseudapis oxybeloides* (f).

42. Evolvulus sp.

Bees: **Apis cerana* (f), **Braunsapis mixta* (f), *Ceratina hieroglyphica* (m), **Halictus lucidipennis* (f).

43. Cuscuta chinensis Lam. Swwet (I)

Bees: **Apis cerana* (f), *Austronomia* sp. (m,f), *Ceratina binghami* (m,f), **Ceratina hieroglyphica* (f), *Patellapis* sp. (f), *Sphecodes biroi* (f), **Trigona iridipennis* (f).

44. Ipomoea cairica L. Sweet (I)

Bees: *Apis cerana* (f), *Ceratina hieroglyphica* (m), *Halictus lucidipennis* (f), **Lasioglossum serenum* (f), *Lipotriches exagens* (m), **Lithurgus atratus* (f,m).

45. Ipomoea carnea Jacq. (nEx)

Bees: **Systropha tropicalis* (m)

46. Ipomoea denticulata (Desr.) Choisy (I)

Bees: *Ceratina* sp. (m), **Systropha tropicalis* (m)

47. Ipomoea mauritiana Jacq. (nEx)

Bees: *Amegilla comberi* (f), *Amegilla fallax* (m), *Amegilla puttalama* (m), *Amegilla* sp. (m,f), *Amegilla violacea* (m), **Apis cerana* (f), *Apis florea* (f), *Austronomia krombeini* (m), *Austronomia* sp. (m), *Ceratina binghami* (m,f), *Ceratina hieroglyphica* (m,f), *Curvinomia formosa* (m,f), *Lasioglossum serenum* (m), *Lipotriches comperta* (m), *Lipotriches exagens* (m,f), *Lithurgus atratus* (f), *Pseudapis oxybeloides* (f), **Tetralonia* sp. (m,f), *Thyreus ceylonicus* (f), *Thyreus takaonis* (f), *Trigona iridipennis* (f), *Xylocopa tenuiscapa* (f),

48. Ipomoea obscura Ker. Gawl. (I)
Bees: *Ceratina hieroglyphica* (f)
49. Ipomoea pes-caprae (L.) R. Br. (I)
Bees: *Apis cerana* (f), *Austronomia krombeini* (m), *Ceylalictus taprobanae* (m), **Lasioglossum halictoides* (m,f), **Lasioglossum serenum* (m,f), **Lithurgus atratus* (m,f)
50. Merremia tridentata (L.) Hall.F. (I)
Bees: **Systropha tropicalis* (f)
51. Merremia umbellata (L.) Hall. F.
Bees: **Systropha tropicalis* (f)
52. Xenostegia tridentata
Bees: *Austronomia krombeini* (f), *Braunsapis mixta* (f), *Ceratina hieroglyphica* (f), *Gnathonomia nasicana* (m,f), *Hoplonomia westwoodi* (m), **Lasioglossum amblypygus* (f), **Lasioglossum* sp. (f), *Lipotriches edirisinghei* (f), *Megachile umbripennis* (f)

15. CRUCIFERAE (=BRASSICACEAE)
53. Brassica juncea (L.) Czern (nEx, C)
Bees: **Amegilla niveocincta* (f), **Apis cerana* (f), **Apis florea* (f), **Braunsapis* sp. (f), **Ceratina binghami* (f), **Ceratina hieroglyphica* (f), **Ceratina* sp. (f), **Halictus lucidipennis* (f), **Lasioglossum amblypygus* (f), **Lasioglossum carnifrons* (f), **Leuconomia* sp. (f), **Lipotriches edirisinghei* (f), **Patellapis* sp. (f), **Lasioglossum alphenum* (f)
54. Raphanus sativus L. (nEx, C)
Bees: **Apis cerana* (f), **Megachile hera* (f), **Trigona iridipennis* (f)

16. CUCURBITACEAE
55. Cucumis melo L. (I, C)
Bees: **Apis cerana* (f), **Ceylalictus taprobanae* (m,f), **Trigona iridipennis* (f)
56. Cucumis sativus L. (I, C)
Bees: **Apis cerana* (f), **Apis dorsata* (f), **Apis florea* (f), **Ceratina hieroglyphica* (f), **Curvinomia formosa* (f),**Lasioglossum* sp. 1 (f), *Megachile conjuncta* (f), **Pseudapis oxybeloides* (f)
57. Momordica charantia L. (I, C)
Bees: **Apis dorsata* (f), **Apis cerana* (f), **Apis florea* (f), **Trigona iridipennis* (f), *Xylocopa tenuiscapa* (f)

17. CYPERACEAE
58. Fimbristylis eragrostis (Nees & Meyen) Hance (I)
Bees: **Lasioglossum serenum* (f), *Pseudapis oxybeloides* (m)

18. DILLENIACEAE
59. Dillenia triquetra (Rottb.) Gilg (I)
Bees: **Braunsapis* sp. (f), **Patellapis* sp. 2 (f), **Trigona iridipennis* (f)

19. ELAEOCARPACEAE
60. Elaeocarpus amoenus Thw (En)
Bees: **Apis florea* (f), **Trigona iridipennis* (f)

20. EUPHORBIACEAE
61. Croton hirtus L'Herit. (nEx)
Bees: *Megachile hera* (m), **Pseudapis oxybeloides* (f,m), **Trigona iridipennis* (f)
62. Croton officinalis (Klotzsch) Alston (I)
Bees: *Amegilla fallax* (m), *Amegilla* sp. (m), **Apis cerana* (f), **Apis florea* (f), **Ceratina binghami* (f), *Halictus lucidipennis* (m), *Hoplonomia westwoodi* (f), *Lasioglossum* sp. (f), **Nomia crassipes* (f), *Gnathonomia nasicana* (f), *Pseudapis oxybeloides* (m,f)
63. Euphorbia heterophylla L. (nEx)
Bees: **Apis florea* (f), **Austronomia krombeini* (f), **Halictus lucidipennis* (m), **Hoplonomia westwoodi* (f), *Lasioglossum* sp. (f), **Leuconomia* sp. (f), **Lipotriches comberi* (f), **Lipotriches n.sp* (f), *Megachile nana* (f), *Nomia crassipes* (m,f), *Gnathonomia nasicana* (f), *Pachynomia* sp. (f), *Pseudapis oxybeloides* (m,f), *Sphecodes crassicornis* (m,f),
64. Ostodes zeylanica (Thw.) Muell. Arg.
Bees: *Curvinomia iridescens* (f), *Patellapis kaluterae* (f)

21. FABACEAE
65. Aeschynomene sp.
Bees: *Anthidiellum* sp. (m,f), **Pseudoanthidium* sp. (f)

66. *Canavalia rosea* (Sw.) DC. (I)
Bees: *Pseudapis oxybeloides* (m)
67. *Cassia auriculata* L. (I)
Bees: **Xylocopa bryorum* (f), *Xylocopa ruficornis* (f), **Xylocopa tenuiscapa* (f)
68. *Cassia spectabilis* DC. (nEx)
Bees: *Xylocopa fenestrata* (m), *Xylocopa iridipennis* (f), **Xylocopa tenuiscapa* (f)
69. *Cassia tora* L. (I)
Bees: **Amegilla violacea* (f), *Curvinomia iridescens* (f), **Hoplonomia westwoodi* (f), *Nomia crassipes* (m)
70. *Crotalaria juncea* L. (I)
Bees: **Apis florea* (f), *Braunsapis* sp. 1 (f), **Ceratina binghami* (m,f), *Ceratina hieroglyphica* (f,m), *Megachile amputata* (f,m), **Megachile ardens* (f), *Megachile conjuncta* (f), **Megachile lanata* (f), **Megachile umbripennis* (f), *Trigona iridipennis* (f), **Xylocopa fenestrata* (f), *Xylocopa tenuiscapa* (f)
71. *Crotalaria pallida* Ait. (I)
Bees: **Apis cerana* (f), **Ceratina binghami* (f), *Ceratina hieroglyphica* (f), *Ceratina* sp. 4 (f), **Megachile conjuncta* (f), *Megachile disjuncta* (f), **Megachile lanata* (f), **Xylocopa fenestrata* (f)
72. *Crotalaria* sp.
Bees: **Megachile lanata* (m,f), **Nomia formosa* (f), *Xylocopa fenestrata* (m)
73. *Crotalaria micans* Link (nEx)
Bees: *Megachile lanata* (m,f)
74. *Desmanthus virgatus* (L.) Willd. (nEx)
Bees: **Apis cerana* (f), *Apis dorsata* (f), *Apis florea* (f), *Leuconomia* sp. (f)
75. *Desmodium heterophyllum* (Willd.) DC (I)
Bees: *Apis cerana* (f), *Austronomia krombeini* (m,f), *Austronomia notiomorpha* (f), *Austronomia* sp. 1 (f), **Braunsapis mixta* (f), *Braunsapis* sp. (f), *Ceratina hieroglyphica* (f), *Halictus lucidipennis* (f), ** Gnathonomia nasicana* (f), *Pseudapis oxybeloides* (f)
76. *Gliricidia sepium* (Jacq.) Walp. (I)
Bees: *Xylocopa ruficornis* (f), *Xylocopa tenuiscapa* (f)
77. *Indigofera tinctoria* L. (I)
Hoplonomia westwoodi (f)
78. *Lablab purpureus* (L.) Sweet (I, C)
Bees: *Ceratina hieroglyphica* (f),**Hoplonomia westwoodi* (f), *Trigona iridipennis* (f)
79. *Mimosa pudica* L. (nEx)
Bees: **Apis cerana* (f), **Apis dorsata* (f), **Braunsapis mixta* (f), **Ceratina hieroglyphica* (f), **Halictus lucidipennis* (f), **Trigona iridipennis* (f)
80. *Psophocarpus tetragonolobus* (L.) DC. (nEx, C)
Bees: *Ceratina binghami* (f), *Heriades binghami* (f), *Hoplonomia westwoodi* (f), *Megachile lanata* (m,f), **Trigona iridipennis* (f), *Xylocopa tenuiscapa* (m,f)
81. *Samanea saman* (Jacq.) Merr. (nEx)
Bees: *Xylocopa ruficornis* (m), *Xylocopa tranquibarica* (f)
82. *Tephrosia maxima* (L.) Pers. (I)
Bees: **Hoplonomia westwoodi* (f), **Megachile vigilans* (f), *Steganomus nodicornis* (f)
83. *Tephrosia* sp. 1 (nEx)
Bees: *Apis cerana* (f), *Apis dorsata* (f), **Apis florea* (f), *Austronomia krombeini* (m,f), **Austronomia notiomorpha* (f), *Austronomia* sp. 1 (m,f), *Braunsapis* sp. 3 (m), *Ceratina binghami* (m,f), *Ceratina hieroglyphica* (f), *Ceratina smaragdula* (f), *Ceratina* sp. 4 (f), *Coelioxys capitatus* (f), *Coelioxys minutus* (f), *Curvinomia iridescens* (f), *Halictus lucidipennis* (f), *Heriades binghami* (f), *Hoplonomia westwoodi* (m,f), *Megachile disjuncta* (f), *Megachile hera* (m,f), *Megachile* sp. 1 (m,f), *Megachile vigilans* (f), *Nomia crassipes* (m,f), ** Gnathonomia nasicana* (f), *Pseudapis oxybeloides* (m,f), *Steganomus nodicornis* (m,f), **Trigona iridipennis* (f)
84. *Tephrosia* sp. 2 (nEx)
Bees: *Megachile conjuncta* (f), **Megachile hera* (f), *Xylocopa amethystina* (f), *Xylocopa auripennis* (f), *Xylocopa ruficornis* (f), *Xylocopa tenuiscapa* (f)
85. *Vigna* sp.
Bees: *Amegilla comberi* (f), *Ceratina binghami* (f), **Ceratina hieroglyphica* (f), *Hoplonomia westwoodi* (m), *Megachile conjuncta* (f), *Pachynomia* sp. (m)

22. LAMIACEAE

86. *Coleus grandis* Cramer
Bees: *Nomada* sp. 1 (m,f), *Xylocopa fenestrata* (m)
87. *Hyptis suaveolens* (L.) Poit. (nEx)

Bees: *Amegilla comberi* (m,f), *Amegilla fallax* (m,f), *Amegilla niveocincta* (f), *Amegilla puttalama* (m), *Amegilla* sp. 1 (m,f), *Amegilla violacea* (m,f), *Anthidiellum* sp. (m,f), **Apis cerana* (f), *Apis dorsata* (f), **Austronomia krombeini* (f), *Austronomia notiomorpha* (f), *Austronomia* sp. 1 (m), *Austronomia* sp. 2 (m), **Braunsapis* sp. 1 (f), *Ceratina binghami* (m,f), *Ceratina hieroglyphica* (m,f), *Ceratina smaragdula* (m), **Ceratina* sp. (m,f), *Ceratina* sp. 4 (m,f), *Coelioxys capitata* (f), *Coelioxys* sp. (f), *Curvinomia formosa* (m), *Curvinomia iridescens* (f), *Euaspis carbonaria* (m,f), *Euaspis* sp. (f), **Halictus lucidipennis* (f), *Hoplonomia westwoodi* (m,f), *Lasioglossum amblypygus* (f), *Leuconomia* sp. (f), *Lipotriches comberi* (m), *Lipotriches exagens* (f), *Lipotriches pulchriventris* (m), *Lipotriches fulvinerva* (m,f), **Lipotriches edirisinghei* (f), *Megachile disjuncta* (m,f), *Megachile hera* (m,f), *Megachile lanata* (m), *Megachile nana* (m,f), *Megachile* sp. (m), *Megachile umbripennis* (m,f), *Megachile vigilans* (m,f), *Nomia crassipes* (m,f), *Nomia westwoodi* (m,f), *Nomia formosa* (f), *Gnathonomia nasicana* (m,f), *Pachyanthidium* sp. (m,f), *Pachynomia* sp. (f), **Patellapis* sp. (f), *Pseudapis oxybeloides* (m,f), *Pseudoanthidium* sp. (m,f), *Sphecodes crassicornis* (m,f), *Thyreus ceylonicus* (m), *Thyreus histrio* (m,f), *Thyreus ramosellus* (m,f), *Thyreus takaonis* (m,f), *Trigona iridipennis* (f), *Trigona* sp. 1 (f), *Xylocopa amethystina* (f), *Xylocopa collaris* (m,f), *Xylocopa fenestrata* (f)

88. Leucas zeylanica (L.) R.Br. (I)

Bees: *Amegilla fallax* (m), *Amegilla puttalama* (m), **Amegilla* sp. 1(f), **Apis cerana* (f), *Thyreus ceylonicus* (m), *Thyreus histrio* (m), *Thyreus takaonis* (m,f), *Trigona iridipennis* (f)

89. Ocimum gratissimum L. (I)

Bees: *Gnathonomia nasicana* (m,f), *Steganomus nodicornis* (m,f), *Pseudapis oxybeloides* (m,f), *Austronomia krombeini* (m,f), **Apis cerana* (f), *Coelioxys confusus* (m), *Megachile vigilans* (f), *Megachile hera* (f), *Leuconomia* sp. (m,f), **Ceylalictus* sp. (f), *Curvinomia iridescens* (m)

90. Ocimum tenuiflorum L. (I)

Bees: *Anthidiellum* sp. (m), **Apis florea* (f), *Austronomia notiomorpha* (m), *Braunsapis mixta* (m), *Ceratina binghami* (m,f), *Ceratina* sp. (f), *Halictus lucidipennis* (f), *Heriades binghami* (m), **Hoplonomia westwoodi* (f), *Leuconomia* sp. (m), **Maynenomia* sp. 2 (f), *Megachile nana* (f), *Nomada wickwari* (f), *Gnathonomia nasicana* (m,f), *Pseudapis oxybeloides* (m,f)

91. Salvia tiliifolia Vahl. (nEx)

Bees: *Amegilla comberi* (m,f), *Amegilla puttalama* (m,f), **Amegilla scintillans* (m,f), *Apis cerana* (f), **Braunsapis* sp. (f), **Lasioglossum vagans* (f), **Trigona iridipennis* (f)

23. MALVACEAE

92. Hibiscua tiliaceus L. (I)

Bees: **Lithurgus atratus* (m,f), **Lithurgus* sp. (f)

93. Hibiscus esculentus L. (nEx, C)

Bees: *Apis cerana* (f), *Apis dorsata* (f), *Ceratina hieroglyphica* (f), *Lasioglossum* sp. (f), **Lithurgus atratus* (f), *Trigona iridipennis* (f)

94. Hibiscus furcatus Roxb. (I)

Bees: **Lithurgus atratus* (m,f), **Tetralonia* sp. (m,f)

95. Sida acuta Burm. F. (I)

Bees: **Austronomia notiomorpha* (f), *Braunsapis* sp. (f), **Ceratina hieroglyphica* (f), *Lasioglossum carnifrons* (f), **Lasioglossum* sp. (f)

96. Urena lobata L. (I)

Bees: **Systropha tropicalis* (m,f)

24. MELASTOMATACEAE

97. Clidemia hirta (L.) D. Don (nEx)

Bees: **Apis cerana* (f), **Braunsapis* sp. (f)

98. Melastoma malabathricum L. (I)

Bees: **Ceratina hieroglyphica* (f), **Curvinomia formosa* (f), **Curvinomia iridescens* (f), **Lasioglossum alphenum* (f), **Lipotriches fulvinerva* (m,f), *Patellapis* sp. (f), *Trigona iridipennis* (f), *Xylocopa collaris* (m), **Xylocopa tenuiscapa* (f)

99. Osbeckia octandra (L.) DC. ((En)

Bees: **Ceratina hieroglyphica* (m,f), **Curvinomia iridescens* (f), **Lasioglossum alphenum* (f), **Lasioglossum carnifrons* (f), *Lasioglossum* sp. (f), **Patellapis kaluterae* (f), *Xylocopa collaris* (f), *Xylocopa ruficornis* (f), **Xylocopa tenuiscapa* (f)

100. Osbeckia parvifolia Arn. (I)

Bees: **Lasioglossum alphenum* (f), **Lasioglossum carnifrons* (f)

25. MENYANTHACEAE

101. Nymphoides hydrophylla (Lour.) Kuntze (I)

Bees: ** Lasioglossum vagans* (m), **Trigona iridipennis* (f)

26. MYRTACEAE

102. Psidium guajava L. (nEx, C)

Bees: **Apis dorsata* (f), **Apis cerana* (f), **Trigona iridipennis* (f)

103. Syzygium samarangense (Blume) Merr. & Perry (nEx, C)

Bees: **Apis cerana* (f), **Apis dorsata* (f), **Trigona iridipennis* (f)

104. Syzygium sp.

Bees: **Trigona iridipennis* (f), *Xylocopa ruficornis* (f)

27. OXALIDACEAE

105. Averrhoa bilimbi L. (nEx, C)

Bees: **Trigona iridipennis* (f)

106. Biophytum nervifolium Thw. (I)

Bees: *Amegilla* sp. (f), **Apis cerana* (f), *Austronomia notiomorpha* (f), *Braunsapis* sp. (f), *Ceratina* sp. (f), **Halictus lucidipennis* (f), *Leuconomia* sp. (f), *Lipotriches exagens* (m)

107. Oxalis barrelieri L. (nEx)

Bees: *Amegilla* sp. (f), *Apis florea* (f), *Lipotriches comberi* (f), *Megachile nana* (m)

108. Oxalis latifolia HBK (nEx)

Bees: **Braunsapis* sp. (f)

28. PEDALIACEAE

109. Sesamum indicum L. (nEx)

Bees: *Amegilla comberi* (m,f), *Amegilla violacea* (m), **Apis cerana* (f), **Apis florea* (f), *Braunsapis mixta* (f), *Leuconomia* sp. (f), *Megachile disjuncta* (f), *Megachile hera* (f), *Megachile lanata* (f), *Gnathonomia nasicana* (f), *Thyreus histrio* (f,m), *Thyreus surniculus* (f), *Thyreus takaonis* (m,f)

110. Sesamum radiatum Schum. (nEx)

Bees: *Amegilla niveocincta* (m), *Amegilla puttalama* (m,f), *Amegilla scintillans* (m), *Amegilla* sp. (f), **Apis cerana* (f), **Apis dorsata* (f), *Braunsapis* sp. (m,f), **Ceratina binghami* (m,f), **Ceratina hieroglyphica* (m), *Curvinomia formosa* (f), *Halictus lucidipennis* (f), *Lasioglossum serenum* (m), *Leuconomia* sp. (f), **Lipotriches pulchriventris* (f), *Megachile buddhae* (m), *Megachile hera* (f), *Megachile lanata* (m), *Megachile umbripennis* (m,f), *Megachile vestita* (m), *Thyreus takaonis* (f), *Xylocopa fenestrata* (m)

29. POACEAE

111. Brachiaria brizantha (Hochst ex A.Rich. Stapt.) (I)

Bees: **Ceratina binghami* (f), *Lipotriches exagens* (f), **Lipotriches edirisinghei* (f)

112. Ischaemum indicum (Houtt.) Merr. (I)

Bees: **Lipotriches exagens* (f), **Lipotriches sp.n* (f)

113. Ischaemum rugosum Salisb. (I)

Bees: **Lipotriches fulvinerva* (f), **Lipotriches sp.n* (f)

***114. Panicum maximum* Jacq.**

Bees: **Apis cerana* (f), **Austronomia notiomorpha* (f), **Lipotriches sp.n* (f), **Lipotriches pulchriventris* (f)

115. *Panicum* sp.

Bees: **Hoplonomia westwoodi* (m), **Leuconomia* sp. (m), **Lipotriches fulvinerva* (f)

30. POLYGONACEAE

116. Antigonon leptopus Hook. & Arn. (nEx)

Bees: **Apis cerana* (f), **Apis florea* (f), *Hoplonomia westwoodi* (m), **Lasioglossum cire* (m,f), **Trigona iridipennis* (f)

117. Persicaria nepalensis (Meissner) H. Gross (I)

Bees: **Apis cerana* (f), **Braunsapis* sp. (f), *Lasioglossum alphenum* (m,f)

31. RANUNCULACEAE

118. Ranunculus sagittifolius Hook. (En)

Bees: *Braunsapis mixta* (f)

32. RHAMNACEAE

119. Ziziphus mauritiana Lam. (I)
Bees: **Apis florea* (f), *Braunsapis* sp. (f), **Lasioglossum amblypygus* (f), **Leuconomia* sp. (f), **Patellapis* sp. (f)

33. ROSACEAE

120. Rubus ellipticus Smith (I)
Bees: **Lasioglossum alphenum* (f)

34. RUBIACEAE

121. Coffea arabica L. (nEx, C)
Bees: **Apis cerana* (f), **Trigona iridipennis* (f)

122. Hedyotis corymbosa (L.) Lamk. (En)
Bees: *Apis cerana* (f), *Austronomia krombeini* (m,f), *Braunsapis* sp. (f), *Ceratina* sp. (m,f), **Halictus lucidipennis* (f), *Heriades binghami* (m), *Pachynomia* sp. (f), **Pseudapis oxybeloides* (m,f)

123. Hedyotis fruticosa L. (I)
Bees: *Ceratina* sp. (m,f)

124. Hedyotis trimenii Deb & Dutta (En)
Bees: *Apis cerana* (f), **Apis dorsata* (f), **Lasioglossum alphenum* (f), *Lasioglossum carnifrons* (f)

125. Hydrophylax inorilimea L.f. (I)
Bees: *Ceylalictus* sp. (m,f)

126. Knoxia platycarpa Arn. (En)
Bees: **Apis cerana* (f)

127. Metabolus sp.
Bees: **Leuconomia* sp. (f), *Pseudapis oxybeloides* (m)

128. Mitracarpus hirtus (L.) DC. (nEx)
Bees: **Apis cerana* (f), *Apis florea* (f), *Austronomia* sp. 1 (f), **Braunsapis* sp. (f), **Curvinomia iridescens* (f), *Halictus lucidipennia* (f), *Lipotriches comperta* (m), **Megachile umbripennis* (f)

129. Oldenlandia corymbosa L. (I)
Bees: *Apis florea* (f), **Austronomia notiomorpha* (f), **Trigona iridipennis* (f)

130. Spermacoce sp. (nEx)
Bees: **Apis cerana* (f), **Apis cerana* (f), **Apis dorsata* (f), **Apis florea* (f), *Austronomia notiomorpha* (m), **Austronomia* sp. 1 (m,f), **Braunsapis* sp. (f), **Braunsapis* sp. (f), **Ceratina binghami* (f), *Ceratina hieroglyphica* (f), **Ceylalictus cereus* (f), *Hoplonomia westwoodi* (f), *Lipotriches exagens* (m), **Patellapis kaluterae* (f), **Patellapis* sp. (f), **Trigona iridipennis* (f)

131. Spermacoce suffrutescens L. (nEx)
Bees: *Braunsapis mixta* (f), **Ceratina hieroglyphica* (f), *Megachile nana* (f), *Sphecodes biroi* (m)

35. RUTACEAE

132. Citrus aurantifolia (Christm. & Panzer) Swingle (nEx, C)
Bees: **Lasioglossum vagans* (f)

36. SAPINDACEAE

133. Cardiospermum halicacabum L. (I)
Bees: **Apis florea* (f), **Ceratina binghami* (m,f), **Ceratina hieroglyphica* (m,f), **Leuconomia* sp. (f), *Lipotriches comperta* (f), *Lipotriches fulvinerva* (m), *Gnathonomia* sp. (m,f)

37. SCROPHULARIACEAE

134. Scoparia dulsis L. (nEx)
Bees: * *Megachile nana* (f)

38. SOLANACEAE

135. Solanum americanum Miller (nEx)
Bees: *Braunsapis* sp. (m), **Pseudapis oxybeloides* (f)

136. Solanum jasminoides Paxton (nEx)
Bees: **Hoplonomia westwoodi* (f), * *Trigona iridipennis* (f)

137. Solanum melongena L. (nEx, C)
Bees: **Amegilla comberi* (f), **Apis cerana* (f), **Apis florea* (f), *Braunsapis* sp. (f,m), **Ceratina hieroglyphica* (f), *Curvinomia formosa* (m), **Lasioglossum serenum* (f), **Lasioglossum* sp. (m), *Leuconomia* sp. (f), *Nomia westwoodi* (f), *Gnathonomia nasicana* (m), **Pachynomia* sp. (f), **Patellapis kalutarae* (f), *Patellapis* sp. (f), *Xylocopa tenuiscapa* (f)

138. Solanum mauritianum Scop. (I)
Bees: **Homalictus singhalensis* (f), **Lasioglossum alphenum* (f), **Lasioglossum carnifrons* (f)

139. Solanum macrocarpum L. (nEx, C)
Bees: **Gnathonomia nasicana* (f), **Leuconomia* sp. (f)

140. Solanum sp.
Bees: **Hoplonomia westwoodi* (f), **Pachynomia* sp. (f), *Patellapis kaluterae* (f), **Trigona iridipennis* (f), **Xylocopa fenestrata*, **Xylocopa ruficornis* (f), **Xylocopa tenuiscapa* (f)

141. Solanum violaceum Ortega (I, C)
Bees: **Lasioglossum amblypygus* (f), **Patellapis kaluterae* (f), **Pachynomia* sp. (f)

39. SYMPLOCACEAE
142. Symplocos sp.
Bees: *Braunsapis* sp. (f,m)

40. THEACEAE
143. Camellia sinensis (L.) Kuntze, (nEx, C)
Bees: **Apis cerana* (f)

41. TILIACEAE
144. Muntingia calabura L. (nEx)
Bees: **Apis cerana* (f), **Apis dorsata* (f), **Apis florea* (f), *Braunsapis* sp. (m,f), *Ceratina binghami* (f), **Ceratina hieroglyphica* (m,f), *Hoplonomia westwoodi* (m), **Lasioglossum amblypygus* (f), **Lasioglossum serenum* (m,f), **Lasioglossum* sp. (m,f), **Trigona iridipennis* (f)
145. Triumfetta sp.
Bees: *Gnathonomia nasicana* (f,m), *Hoplonomia westwoodi* (3 (m), *Gnathonomia* sp. (f), **Pseudapis oxybeloides* (f)

42. VERBENACEAE
146. Lantana camara L. (nEx)
Bees: **Amegilla scintillans* (f), *Xylocopa ruficornis* (f)
147. Petrea volubilis L. (nEx)
Bees: *Braunsapis* sp. (f)
148. Premna obtusifolia R. Br. (I)
Bees: **Ceratina hieroglyphica* (f), *Ceylalictus* sp. (m,f), **Lasioglossum* sp. (m,f)
149. Stachytarpheta dichotoma (Ruiz & Pav.) Vahl (nEx)
Bees: *Amegilla* sp. (m,f), *Apis cerana* (f), **Ceratina binghami* (f)
150. Stachytarpheta sp.
Bees: *Amegilla violacea* (m), *Amegilla scintillans* (m,f), *Amegilla* sp. (m,f), *Amegilla comberi* (m), *Amegilla puttalama* (m), *Braunsapis mixta* (f), *Anthidiellum* sp. (m,f)
151. Stachytarpheta urticaefolia (Salisb.) Sims (I)
Bees: **Apis cerana* (f), **Apis dorsata* (f), **Ceratina hieroglyphica* (f), *Xylocopa tenuiscapa* (f), *Amegilla comberi* (m,f), *Amegilla scintillans* (m,f), *Thyreus histrio* (m,f), *Thyreus ceylonicus* (f,m), *Amegilla violacea* (m), *Amegilla* sp. (m,f), *Thyreus takaonis* (m), *Megachile vestita* (m), *Hoplonomia westwoodi* (f), *Braunsapis* sp. (f), *Ceylalictus cereus*(m), **Amegilla subinsularis* (m,f), *Thyreus insignis* (m,f), *Xylocopa nigrocaerula* (f), *Xylocopa amethystina* (f)
152. Tectona grandis L.f. (nEx)
Bees: *Heriades binghami* (m), **Lasioglossum* sp. (f), *Gnathonomia* sp. (m)

43. ZINGIBERACEAE
153. Ellettaria cardamomum (L.) Maton (I)
Bees: **Apis cerana* (f), *Amegilla subinsularis* (f), *Lasioglossum aulacophorum* (f)

44. ZYGOPHYLACEAE
154. Tribulus terrestris L. (I)
Bees: *Ceylalictus* sp. (f), *Braunsapis* sp. (m,f), *Ceylalictus taprobanae* (f), *Ceratina binghami* (m,f), **Apis florea* (f), **Trigona iridipennis* (f), *Lasioglossum* sp. (f), *Patellapis* sp. (f), **Halictus lucidipennis* (m,f)

Appendix 2. The species of bees recorded and the number of floral host species visited by them.

HALICTIDAE - *Austronomia krombeini* (17), *Austronomia notiomorpha* (12), *Austronomia* sp. 1 (10), *Austronomia* sp. 2 (2), *Ceylalictus* sp. (6), *Ceylalictus cereus* (3), *Ceylalictus taprobanae* (3), *Coelioxya confusus* (2), *Coelioxys capitata* (3), *Coelioxys minutus* (1), *Coelioxys* sp. 1 (2), *Coelioxys* sp. 2 (1), *Curvinomia formosa* (7), *Curvinomia iridiscens* (8), *Gnathonomia nasicana* (14), *Gnathonomia* sp. (5), *Halictus lucidipennis* (25), *Homalictus singhalensis* (1), *Hoplonomia westwoodi* (27), *Lasioglossum cire* (1), *Lasioglossum* sp. (12), *Lasioglossum carnifrons* (13), *Lasioglossum halictoides* (1), *Lasioglossum serenum* (9), *Lasioglossum alphenum* (14), *Lasioglossum aulacophorum* (2), *Lasioglossum bidendatum* (1), *Lasioglossum kandiense* (1), *Lasioglossum amblypygus* (8), *Lasioglossum vagans* (6), *Leuconomia sp.* (24), *Lipotriches sp*

nr. comperta (1), *Lipotriches edirisinghei* (12), *Lipotriches exagens* (9), *Lipotriches fulvinerva* (10), *Lipotriches pulchriventris* (4), *Lipotriches comberi* (4), *Maynenomia* sp. 1, *Maynenomia* sp. 2 (2), *Nomia crassipes* (12), *Pachyanthidium* sp. (2), *Pachynomia* sp. (7), *Patellapis* sp. 1 (7), *Patellapis* sp. 2 (6), *Patellapis* sp. 3 (3), *Patellapis kalutarae* (6), *Pseudapis oxybeloides* (21), *Sphecodes biroi* (4), *Sphecodes crassicornis* (3), *Sphecodes* sp. (5), *Systropha tropicalis* (2), *Steganomus nodicornis* (3).

MEGACHILIDAE - *Anthidiellum* sp. 1 (4), *Anthidiellum* sp. 2 (1), *Euaspis edentata* (2), *Euaspis* sp. (1), *Heriades binghami* (10), *Lithurgus atratus* (8), *Lithurgus* sp. (1), *Megachile amputata* (1), *Megachile ardens* (1), *Megachile conjuncta* (5), *Megachile disjuncta* (4), *Megachile hera* (12), *Megachile lanata* (8), *Megachile nana* (8), *Megachile* sp. 1 (1), *Megachile* sp. 2 (1), *Megachile umbripennis* (7), *Megachile vestita* (3), *Megachile vigilans* (5), *Nomada priscilla* (2), *Nomada* sp. (2), *Nomada wickwari* (2), *Pseudoanthidium* sp. 1 (2).

APIDAE - *Amegilla comberi* (13), *Amegilla fallax* (5), *Amegilla niveocincta* (3), *Amegilla puttalama* (7), *Amegilla scintillans* (9), *Amegilla* sp. 1 (8), *Amegilla* sp. 2 (6), *Amegilla* sp. 3 (1), *Amegilla subinsularis* (3), *Amegilla violacea* (6), *Apis cerana* (58), *Apis dorsata* (16), *Apis florea* (29), *Braunsapis cupulifera* (1), *Braunsapis mixta* (15), *Braunsapis sp.* 1 (30), *Braunsapis* sp. 2 (12), *Braunsapis* sp. 3 (2), *Ceratina binghami* (30), *Ceratina hieroglyphica* (43), *Ceratina smaragdula* (2), *Ceratina. tanganyicensis* (6), *Ceratina* sp. (3), *Tetralonia* sp. 1 (3), *Tetralonia* sp. 2 (1), *Thyreus ceylonicus* (4), *Thyreus histrio* (6), *Thyreus insignis* (2), *Thyreus ramosellus* (1), *Thyreus surniculus* (1), *Thyreus takaonis* (5), *Trigona iridepennis* (41), *Trigona* sp. (1), *Xylocopa amethystina* (3), *Xylocopa auripennis* (1), *Xylocopa bryorum* (1), *Xylocopa collaris* (4), *Xylocopa fenestrata* (9), *Xylocopa ruficornis* (8), *Xylocopa tenuiscapa* (15), *Xylocopa tranquibarica* (1).