

BEE FLORA OF THE N.W.F.P.

by

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Abstract. In the N.W.F.P. (Pakistan), a detailed survey was carried out to explore different nectar and pollen yielding plants for honey-bees. A detailed list of 122 such plants both wild and cultivated, their scientific names, time of blossom and their distribution in the Province has been prepared. Of the 122 bee-foraging plants, the shisham (*Dalbergia sissoo*), phulai (*Acacia modesta*), bhaikar (*Adhatoda vasica*), apple (*Malus sylvestris*), loquat (*Eriobotrya japonica*), clovers (*Trifolium spp.*), serson (*Brassica campestris*), maize (*Zea mays*), dates (*Phoenix spp.*), citrus fruit (all spp.), ber (*Zizyphus jujuba*), guava (*Psidium guajava*) and shain (*Plectranthus rugosus*) were recorded as major sources for the production of surplus honey with five major honey-flows in a year at different localities in the Province. Shifting of the bee colonies at appropriate times to different places as determined in this work is recommended for maximum honey production.

Introduction. Although ideal climatic conditions exist for apiculture in the N.W.F.P. yet bee keeping is limited to governmental research institutions. Only a few private enterprisers have, during the past 8 or 10 years, started keeping bees for commercial purposes. There are many wild and cultivated plants in the province which yield nectar and pollen for honey bees. As nectar and pollen are the essential components on which apiculture is solely based, a thorough knowledge of the nectar and pollen yielding plants is of paramount importance for successful bee keeping in the area.

In some countries the local nectar and pollen producing plants are well known and their time of blossom recorded. In the light of such knowledge the bee keepers shift their colonies to more appropriate localities in order to make full use of the honey-flow occurring in those areas.

In the Punjab out of 144 recorded species of plants baberry (*Berberis lycium* Royle), shain (*Plectranthus rugosus*) and soapnut (*Sapindus detergens*) were described by Rehman and Singh (1941) as important sources of nectar and pollen for bees. Rehman (1941 a) stated that the bee flora of Lyallpur comprised of cotton, maize, bajra, berseem, toria, sarson, all species of citrus, plum, guava, peach, loquat, mango, jaman, eucalyptus, arjun, turnip and roses etc. The major nectar yielding plants according to Rehman (1941 b) were toria and sarson during winter, citrus species in March, shisham in April and clovers and jaman in April and May.

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The clovers which are grown in the irrigated areas of the N.W.F.P. provide nectar and pollen to the bees. The flowers appear in the second week of May and are in full bloom 2 weeks after (Roy 1941). Dasgupta (1945) also stated that berseem having white flowers and shaftal having pink flowers are the major sources of nectar and pollen for the bees in N.W.F.P. In the Punjab out of sixty species of ornamental plants as reported by Rehman and Sharma (1947) only 23 were visited by the bees for nectar or pollen or both during the period of dearth when other plants were not available. These were regarded as minor sources.

Fotidar (1944) observed that after the middle of August *Plectranthus rugosus* became the major source of nectar and pollen in Kashmir Valley and other higher elevations. In a detailed list of the bee flora of North India prepared by Kohli *et al* (1958) mustard, loquat, and *Plectranthus* sp. etc., were regarded as important sources of nectar and pollen.

In this paper a similar effort has been made to compile a detailed list of the major nectar and pollen yielding plants to create interest in apiculture.

Material and Method. In order to record bee flora 40-65 bee colonies were placed at 20 different localities of the Province at different times during 1972 to 1975. As soon as the honey-flow stopped at one place, the colonies were shifted to another locality with different climate and vegetation, where honey-flow was just to start.

At each locality where the bee hives were placed, thorough observation of each plant species in flowering condition and being visited by the bees was taken.

Nectar yielding plants. If a plant was yielding nectar, the bees were found to walk over its flowers with their heads downward and beaks extended to search and collect the nectar present in the flowers. On some occasions the bees were also observed to collect nectar from the extra floral nectaries present on various parts of the plants. To confirm that the bee had collected nectar, the method of Singh (1962) was followed. A foraging bee was held by the wings and the anterior region of her abdomen and thorax was pressed between the fingers so that a drop of glistening white liquid appeared at the tip of her tongue which was transferred to a piece of paper. This drop was tasted. If it was sweet, the bee had collected nectar and if it was tasteless, the bee had collected water only.

Pollen yielding plants. If a plant was yielding pollen, the bees were observed to walk over its flowers by dragging their bodies over the stamens and with their beaks in folded condition. The pollen grains adhered to the branched hairs on the body of the bee which she collected with brushes of her metathoracic legs after every few minutes, and stored in the pollen basket.

Collection of all the plants yielding nectar and pollen for honey bees and those having extra floral nectaries was made for their identification. Also data regarding the blooming period of each plant species were recorded. All the plants were identified with the help of available keys and confirmed through the Botany Department, University of Peshawar.

Results and Discussion. All the plants yielding nectar and/or pollen recorded during this study have been divided in to two groups. The plant species from which the bees collected surplus honey were classed as major sources of nectar and pollen and those which provided nectar and pollen only during the dearth period in quantity hardly enough for existence and maintenance of the bees were classed as minor sources.

A. Major sources of Nectar and Pollen:

1. Shisham (*Dalbergia sissoo* Roxb.)

Shisham is a deciduous tree grown in the plains all over the province especially in Peshawar, Haripur, Kohat, and Bannu etc. The trees bloom in April and produce small greenish-yellow flowers which secrete nectar for the bees for about 2 weeks. The honey from shisham is amber to dark-amber in colour and of strong flavour.

2. Phulai (*Acacia modesta* Wall.)

Phulai is a medium size gregarious deciduous tree of eroded low hilly areas of Khairabad, Nowshera and Chirat etc. The trees bloom in April. The flowers are creamy white in colour and produce ample quantity of nectar. Its honey is white or very lightly tinged.

3. Bhaikar. (*Adhatoda vasica* Nees)

It is a shrub found in Haripur, Rustam and Mardan etc. It blooms in April along with phulai and produces creamy white flowers which are a good source of nectar.

4. Apple. (*Malus sylvestris* Mill.)

This is a deciduous fruit tree of the higher elevations e.g. Swat, Dir and Parachinar. It blooms in February and March and is an important source of nectar and pollen. Its honey is of amber colour.

5. Citrus trees. (*All species.*)

These are evergreen trees and include lemon, sour orange, sweet orange, grape fruit, kinno and mandarin etc., which are abundantly grown in Peshawar, Mardan, Haripur and Dargai. The citrus trees bloom in March and provide nectar as well as pollen for bees. Their pollen are specially very useful for early brood rearing after swarming. The honey from citrus is of light amber colour.

6. Guava. (*Psidium guyava* Linn.)

Guava is a popular fruit tree of Kohat, Haripur and Dargai and is also sparsely distributed throughout the province. It blooms from middle of May to middle of June and is a good source of nectar and pollen.

7. Ber (i) *Zizyphus jujuba* Mill & Lamk.
(ii) *Zizyphus hysudrica* Hole.

These trees grow wild in the plains and hills up to 1065 metres elevation and are abundantly found in Khairabad, Peshawar, Kohat and Bannu. Ber produces flowers in August which provide plenty of nectar and pollen for bees. Its honey is of dark amber colour.

8. Loquat (*Eriobotrya japonica* (Thumb. Lindley)

Loquat is a common fruit tree of Peshawar, Kohat, Haripur and Dargai and is also lightly distributed throughout the province. Loquat blooms from the first week of November and continues to provide nectar and pollens for bees upto the last week of January a time when the other bee flora are not available. Its honey is white and becomes granulated.

9. Dates (*Phoenix* spp.)

Dates grow in D.I. Khan and Bannu districts. The date trees bloom in August and are a major source of nectar and pollen. Its honey is of dark amber colour and strongly flavoured.

10. Clovers. Shaftal (*Trifolium resupinatum* L.)

Berseem (*Trifolium alexandrianum* L.)

Berseem and shaftal are grown on large scale for fodder in the irrigated plains of Haripur, Mardan, Peshawar, and Bannu. These bloom in the first week of May and continue to provide nectar and pollen till the end of June and are the best source of nectar and pollen. The bulk of honey in the irrigated plains comes from this source.

11. Sarson (*Brassica campestris* L.)

Sarson grown chiefly as an oilseed crop in the irrigated and rainfed plains of Peshawar, Haripur, Mardan, Dargai, Kohat and D.I. Khan. The early sown crop blooms in February and the late varieties in March. The honey flow, from sarson lasts for about a month. Sarson is a good source of nectar and pollen. Its honey is yellow in colour and becomes granulated in a few days after extraction.

12. Maize (*Zea mays* L.)

Maize is grown in the plains and mountains all over the province. It is a very useful source of pollen during July and August when the other bee flora are not available. This crop supplies larger quantities of pollen than other plants.

13. Shain (*Plectranthus rugosus*)

This is a wild shrub of medium elevations. The shrub produces small white flowers which provide nectar and pollen to bees from middle of September to middle

of October, a time when no source of nectar is available in the plains. The bulk of honey in the mountains comes from this plant.

Extensive survey and shifting of bee colonies to different localities revealed that, five honey flows occur from various bee flora in a year at different localities as follows:

1. Clovers from the 1st week of May till end of June at Peshawar, Mardan, Charsadda, Haripur, Kohat, and Bannu etc.
2. Shain from middle of September to middle of October 3500-4500 feet above sea level in the hilly tract of Swat and Dir Districts.
3. Loquat from the first week of November to the end of January at Peshawar Kohat, Haripur, Mardan and Dargai.
4. Sarsoon in February and March at Peshawar, Rashankai (Nowshera), Rustam, Dargai, Swabi, Haripur, Bannu and D.I. Khan.
5. Phulai and shisham throughout April at Khairabad, Haripur, Rustam, Dargai and other similar places where phulai and shisham trees are available.

B. Minor sources of Nectar and Pollen

Details of the minor sources of nectar and pollen, their scientific names, families, distribution, whether yielding nectar or pollen or both and their blooming periods are given in the following table.

Minor sources of nectar and pollen

S.No.	Local or English name	Scientific name	Family name	Distribution	Yield Nectar or pollen	Blooming period.
<i>(a) Forest trees</i>						
1.	Neem	<i>Azadirachta indica</i> (Linn.) A. Juss	Meliaceae	Hazara, Haripur	Nectar	April-May
2.	Amaltas	<i>Cassia fistula</i> Linn.	Leguminosae	Throughout the Province	Nectar	May-June
3.	Keekar	<i>Acacia arabica</i> (Lam.) Willd.	—do—	Throughout the unirrigated tracts	Nectar	April-May
4.	Imli	<i>Tamarindus indica</i> Linn.	—do—	Hazara	Nectar	April and October
5.	Sharin, Siris	<i>Albizia lebeck</i> (Linn) Benth	—do—	Hazara	Nectar	April
6.	Lassoora	<i>Cordia myxa</i> Linn.	—do—	Throughout the plains	Nectar	April
7.	Polygonum	<i>Polygonum glabrum</i> Willd.	Polygonaceae	Hazara	Nectar	Aug-Sept.
8.	Toon	<i>Cedrela toona</i> Toxb.ex. Rottl. and Willd.	Meliaceae	Hazara, Kohat	Nectar and pollen	April to June
9.	Kachnar	<i>Bauhinia variegata</i> Linn.	Caesalpinoideae	Throughout the province	—do—	Feb-March
10.	Dela, Karir	<i>Capparis decidua</i> (Forssk) Edgew.	Capparidaceae	Throughout the dry places of the province	Pollen	March-April
11.	Rakhs, Frash	<i>Tamarix aphylla</i> (L.) Karst.	Tamaricaceae	Throughout the province	Nectar	May-Sept.
12.	Dhaman	<i>Grewia elastica</i> Royle	Tiliaceae	Hazara	Nectar	April-June
13.	Eucalyptus	<i>Eucalyptus</i> spp.	Myrtaceae	Throughout the province	Nectar and pollen	Different species at different time
14.	Bottle brush	<i>Callistemon viminalis</i> (Solander) Cheel	—do—	—do—	Nectar	of the year
15.	Singi	<i>Euonymus hamiltonianus</i> Wall.	Celastraceae	Hazara	Nectar	April-May
16.	Unab	<i>Zizyphus sativa</i> Gaertn.	Rhamnaceae	Throughout the province	Nectar	April-May
17.	Kancheli	<i>Acer pictum</i> Thumb.	Sapindaceae	Hazara	Nectar	June-July
18.	Duswila	<i>Rhus chinensis</i> Miller	Anacardiaceae	Dir, Swat and Hazara	Nectar	April-May
19.	Locust tree	<i>Robinia pseudoacacia</i> Linn.	Leguminosae	—do—	Nectar and pollen	April-May
20.	Safed Siris	<i>Albizia procera</i> (Roxb.)	Mimosoidea	Hazara	Nectar	April-May
21.	Bakain	<i>Melia azedarach</i> Linn.	Meliaceae	Throughout the province	Nectar and pollen	March-April
<i>(b) Fruit Trees</i>						
22.	Apricot	<i>Prunus armeniaca</i> Linn.	Rosaceae	District Peshawar	Nectar and pollen	Feb-March
23.	Plum	<i>Prunus bokhariensis</i> Royle ex. C.K. Schn.	—do—	—do—	—do—	—do—
24.	Peach	<i>Prunus persica</i> (Linn.) Batsch.	—do—	—do—	—do—	—do—
25.	Pears (Nashpati) (Nakhi)	<i>Pyrus communis</i> Linn. } <i>Pyrus lindleyi</i> Rehder. }	—do—	—do—	—do—	—do—

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26.	Batong	<i>Pyrus pashia</i> Ham. ex D. Don	Rosaceae	District Peshawar	Nectar and pollen	Feb-March
27.	Wild berry	<i>Prunus cerasoides</i>	—do—	—do—	—do—	—do—
28.	Almond	<i>Prunus amygdalus</i> Baill	—do—	Throughout the hilly tracts Hazara, Kohat, Bannu	—do—	—do—
29.	Jaman	<i>Syzygium cumini</i> (L.) Skeels	Myrtaceae	Through out the province	Nectar	May
30.	Pomegranate	<i>Punica granatum</i> Linn.	Lythraceae	Through out the province	Nectar and pollen	Mid April-Mid May
(c) Field crops and Vegetables.						
31.	Cotton	<i>Gossypium</i> spp.	Malvaceae	Plains of the province	Nectar	July-Sept.
32.	Sorghum	<i>Andropogon sorghum</i> (Linn.) Brot	Gramineae	Dry region of the province	Pollen	July-Aug.
33.	Gram	<i>Cicer arietinum</i> Linn.	Leguminosae	—do—	Nectar	July
34.	Turnip	<i>Brassica rapa</i> Linn.	Cruciferae	Through out the province	Nectar and pollen	Feb-March
35.	Raddish	<i>Raphanus sativus</i> Linn.	—do—	—do—	—do—	Jan-March
36.	Cauliflower	<i>Brassica oleracea</i> Linn. Var. <i>Botrytis</i> L.	—do—	—do—	—do—	—do—
37.	Coriandar	<i>Coriandrum sativum</i> Linn.	Umbelliferae	—do—	—do—	Feb-March
38.	Carrot	<i>Daucus carota</i> Linn.	—do—	—do—	—do—	April
39.	Brinjal	<i>Solanum melongena</i> Linn.	Solanaceae	—do—	Pollen	May-June
40.	Tomato	<i>Lycopersicon esculentum</i> Mill.	Solanaceae	—do—	—do—	Jan.-April
41.	Long Melon	<i>Cucumis melo</i> Var. <i>utilissima</i>	Cucurbitaceae	—do—	—do—	April-May
42.	Bottle Gouard	<i>Lagenaria siceraria</i> (Molina.) Standley.	—do—	—do—	—do—	May-June
43.	Lady's finger	<i>Abelmoschus esculentus</i> (L.) Moench	Malvaceae	—do—	—do—	—do—
44.	Bitter Gouard	<i>Momordica charantia</i> Linn.	Cucurbitaceae	—do—	—do—	—do—
45.	Cucumber	<i>Cucumis sativus</i> Linn.	—do—	—do—	—do—	—do—
46.	Fennel	<i>Foeniculum vulgare</i> Mill.	Umbelliferae	—do—	Nectar and pollen	March-April
47.	Onion	<i>Allium cepa</i> Linn.	Liliaceae	—do—	—do—	—do—
(d) Weeds and Shrubs.						
48.	Oxalis spp.	<i>Oxalis pescaprae</i> Linn.	Oxalidaceae	—do—	Pollen	September
49.	Mako	<i>Solanum nigrum</i> Linn.	Solanaceae	Peshawar, Mardan Kohat and Bannu	Nectar and pollen	February
50.	Euphorbia	<i>Euphorbia heterophylla</i> Linn.	Euphorbiaceae	Throughout the province	Pollen	April
51.	Salvia spp.	<i>Salvia plebeia</i> R.Br.	Labiatae	—do—	Nectar and pollen	September
52.	Ruellia	<i>Ruellia prostrata</i> Lamk.	Acanthaceae	Dir, Swat	Pollen	—do—
53.	Piazi	<i>Asphodelus tenuifolius</i> Cav.	Liliaceae	Peshawar, Haripur Mardan and Kohat	—do—	March-April
54.	Lagerstroemia Crepemyrtle	<i>Lagerstroemia indica</i> Linn.	Lythraceae	Dir, Swat	—do—	September

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55.	Ranunculus spp.	Ranunculus spp.	Ranunculaceae	Swat and Agencies	Nectar and pollen.	September
56.	Berberis	<i>Berberis lycium</i> Royle	Berberidaceae	Hazara, Swat, Dir	Nectar	April-May
57.	Geranium spp.	<i>Geranium nepalense</i> Sweet	Geraniaceae	Dir, Swat etc.	Pollen	September
58.	Impatiens	<i>Impatiens edgeworthii</i> Hk. f.	Balsaminaceae	Dir, Swat	Nectar	—do—
59.	Cynoglossum	<i>Cynoglossum wallichii</i> G. Don.	Boraginaceae	Dir, Swat	Pollen	—do—
60.	Nepeta spp.	<i>Nepeta spicata</i> Bth.	Labiatae	Dir, Swat	—do—	—do—
61.	Polygonum spp.	<i>Polygonum amplexicaule</i> D. Don.	Polygonaceae	—do—	—do—	Aug.-Sept.
62.	Calamintha spp.	<i>Calamintha umbrosa</i> (M. Bieb) Fisch. & Mey.	Labiatae	—do—	—do—	Sept.-Oct.
63.	Aster spp.	<i>Aster nova-angliae</i> Linn	Compositae	—do—	—do—	—do—
64.	Begonia spp.	<i>Begonia picta</i> Sm.	—	—	—do—	—do—
65.	Cenchrus spp.	<i>Cenchrus ciliaris</i> Linn.	Gramineae	Dir, Swat	—do—	September
66.	Cichorium spp.	<i>Cichorium intybus</i> Linn.	Compositae	Throughout the province	—do—	—do—
67.	Origanum spp.	<i>Origanum vulgare</i> Linn.	Labiatae	Dir, Swat	Nectar and pollen.	Sept-Oct.
(e) Ornamental flowers						
68.	Roses	<i>Rosa</i> spp.	Rosaceae	Throughout the province	Pollen	March-June
69.	Sun flower	<i>Helianthus annuus</i> Linn.	Compositae	—do—	—do—	July-Sept.
70.	Corn flower	<i>Zea mays</i> Linn.	Compositae	—do—	—do—	March-April
71.	Panipatia	<i>Euphorbia pulcherrima</i> Willd. ex Kl.	Euphorbiaceae	—do—	—do—	Nov.-June
72.	Portulaca	<i>Portulaca grandiflora</i> Hk.	Portulacaceae	—do—	—do—	April to June
73.	Golden rod	<i>Solidago canadensis</i> Linn.	Compositae	—do—	—do—	Sept.-Oct.
74.	Duranta	<i>Duranta repens</i> Linn.	Verbenaceae	—do—	—do—	April-June
75.	Cosmos spp.	<i>Cosmos bipinnatus</i> Can.	Compositae	—do—	—do—	Sept.-Oct.
76.	Jatropha spp.	<i>Jatropha hastata</i> Jacq.	Euphorbiaceae	—do—	—do—	—do—
77.	Rangoon creeper	<i>Quisqualis indica</i> Linn.	Compretaeaceae	—do—	Nectar	April-May
78.	Honey suckle	<i>Lonicera sempervirens</i> Linn.	Caprifoliaceae	—do—	Nectar and pollen	April
79.	Railway creeper	<i>Ipomoea carnea</i> Jacq.	Convolvuleaceae	—do—	Pollen	April
80.	Golden wave	<i>Corchoris drummondii</i> Torr and Gran.	Compositae	—do—	—do—	Feb-March.
81.	Gaillardia	<i>Gaillardia</i> spp.	—do—	—do—	Nectar and pollen	July-Aug. and April-May
82.	Nasturtium	<i>Tropaeolum</i> sp.	Tropaeolaceae	—do—	—do—	March-April
83.	Marigold	<i>Calendula officinalis</i> Linn.	Compositae	—do—	—do—	Feb-May
84.	Commelina spp.	<i>Commelina benghalensis</i> Linn.	Commelinaceae	Dir, Swat etc.	Pollen	September
85.	Rubus spp.	<i>Rubus</i> spp.	Rosaceae	Hazara, Dir, Swat	—do—	—do—
86.	Dicliptera sp.	<i>Dicliptera roxburghiana</i> Nees.	Acanthaceae	Dir, Swat	Nectar and pollen	Sept.-Oct.
87.	Rumex spp.	<i>Rumex dentatus</i> Linn.	Polygonaceae	Dir, Swat.	—do—	Winter
88.	Podina	<i>Mentha longifolia</i> (Linn.) Huds.	Labiatae	Dir, Swat	Pollen	Sept.-Oct.
89.	Harmal	<i>Peganum harmala</i> Linn.,	Zygophyllaceae	Throughout the province.	—do—	April

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90.	AK	<i>Calotropis gigantea</i> R.Br.	Asclepiadaceae	Throughout the province	Pollen	—
91.	Wild berris	<i>Rubus biflorus</i> Ham.ex sm.	Rosaceae	—do—	—do—	April
92.	Dandelion	<i>Taraxacum officinale</i> Wigg.	Compositae	Hazara, Peshawar Mardan	Nectar and pollen	Spring
93.	Berberis spp.	<i>Berberis kunawurensis</i> Royle.	Berberidaceae	Hazara	—do—	June
94.	Berberis spp.	<i>B. jateshkeana</i> C.K. Schn.	—do—	Dir, Swat	—do—	May-June
95.	Zanthoxylum spp.	<i>Zanthoxylum alatum</i> Roxb.	Rutaceae	Hazara	—do—	March-April
96.	Sensulat	<i>Indigofera cassioides</i> Rottler ex De	Leguminosae	Hazara, Swat	—do—	July-Aug
97.	Lespedeza sp.	<i>Lespedeza elegans</i> Camb.	—do—	—do—	Pollen	April-May
98.	Sorbaria sp.	<i>Sorbaria tomentosa</i> (Lindl.) Rehder.)	Rosaceae	Hazara, Swat	Nectar and pollen	—do—
99.	Wild currant	<i>Ribes orientale</i> Poir.	Saxifragaceae	—do—	Pollen	—
100.	Dahlia	<i>Dahlia variabilis</i> (Willd.) Desf.	Compositae	Throughout the province	—do—	April-May
101.	Michaelmes daisy	<i>Aster novi-belgii</i> Linn.	—do—	—do—	Nectar and Pollen	Sept.-Nov.
102.	Gul-i-Khaira	<i>Althaea rosea</i> (Linn.) Can.	Malvaceae	—do—	—do—	March-April
103.	Poppy	<i>Papaver rhoeas</i> Linn.	Papaveraceae	—do—	Pollen	March-April
104.	Ageratum	<i>Ageratum conyzoides</i> Linn.	Compositae	—do—	—do—	—
105.	Gul-i-dauidi	<i>Chrysanthemum</i> spp.	—do—	—do—	—do—	Feb.-March
106.	Salvia	<i>Salvia splendens</i> Ker.-Gawl.	Labiataeae	—do—	Nectar and pollen	—do—
107.	Geranium	<i>Pelargonium zonale</i> Linn.	Geraniaceae	—do—	—do—	September
108.	Ishq paicha	<i>Ipomoea caririca</i> (Linn.) Sweet.	Convolvulaceae	—do—	Pollen	—do—
109.	Antigonon	<i>Antigonon leptopus</i> Hook.	Polygonaceae	—do—	—do—	—

These minor sources provided plenty of nectar and pollen for the maintenance of be colonies at times when the major sources were not available.

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