

BEEFLORA AT PESHAWAR

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Abstract

One hundred and thirty plant species were recorded as bee flora at the Pakistan Forest Institute, Peshawar and adjoining areas. The data on flora, comprising 39 species of forest trees, 12 of fruit trees, 28 of ornamentals, 13 of agricultural crops and vegetables and 38 of annual herbs, are given in a table with major and minor sources of nectar and pollen and the blooming period of each plant species.

The major sources of nectar and pollen are *Acacia modesta*, *Eucalyptus camaldulensis*, *E. citriodora*, *E. alba*, *Flacourtia indica*, *Olea cuspidata*, *Prosopis chilensis*, *Swietenia mahagoni*, *Xylosma longifolium* and *Zizyphus mauritiana* out of forest trees, *Eriobotrya japonica* among fruit trees, *Amorpha fruticosa*, *Citrus acida* and *Spiraea cantoniensis* out of ornamentals and *Brassica campestris* out of agricultural crops.

Six tree species, viz; *Acacia modesta*, *Eucalyptus camaldulensis*, *E. citriodora*, *Eriobotrya japonica*, *Xylosma longifolium* and *Zizyphus mauritiana*, being the major sources of nectar and pollen with longer blooming period of 2-4 months, are recommended for mass planting to develop apiculture in the country.

Introduction

Beekeeping is dependent upon bee flora round the year. A beekeeper must have available data on the nectar and pollen bearing plants in the vicinity of his apiary for successful honey production. Such information enable him to determine when to install package bees, divide colonies, put on supers, use swarm control measures, harvest honey, requeen and locate profitable apiary sites.

Bee flora includes natural and cultivated forest trees, fruit orchards, ornamentals, agricultural crops, garden flowering plants, wild plants and weeds.

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Among the bee flora trees are the most prolific source of nectar than other flora. Holmes and Henniker (1978) conclude that a nectar yielding tree is as much effective as a hundred or thousand small nectar plants. For example, a single *Salix fragilis* or *S. alba* will provide as much nectar as a small field of herbaceous plants.

Some 565 plant species are known as bee flora in Pakistan. Major portion of honey (70%) is produced from *Acacia modesta* and *Robinia pseudoacacia* in April, *Trifolium* and *Prosopis* spp. during April to June, *Plectranthus rugosus* from September to October and *Brassica* spp. during October-February (Muzaffar and Ahmad, 1991).

Rahman and Chaudhry (1985) recorded 90 bee foraging plants at the Pakistan Forest Institute, Peshawar and presented in a calendar with 45 major sources and 45 minor sources, of nectar, pollen or both.

The present study is in continuation of the previous work where 106 new plant species have been investigated as bee flora.

Material and Method

Twenty colonies of European bees, *Apis mellifera* were maintained at the Pakistan Forest Institute, Peshawar. Weekly observations were recorded on the honeybees, foraging on the blooming plants, to record;

1. Major sources
2. Minor sources
3. Nectar sources
4. Pollen sources
5. Both nectar and pollen sources
6. Blooming periods of plants

When hundreds of bees were observed working on the blossoms of a plant throughout of the day the plant was considered as major source. If flowers of a plant were casually visited by a few bees in a day the plant was taken as minor source.

When a visiting bee on landing on a flower inserted its proboscis of mouth parts into the nectaries of the flower the plant was recorded as nectar source. If

a honey bee dragged its thorax on the stamens of the flower, flew off and collected pollen from the thorax by means of front and middle legs and then stored in the pollen basket of the hind legs, the plant was recorded as pollen source. If both nectar and pollen collecting bees foraged on the blossoms of the same plant it indicated both sources.

Results and Discussion

The bee flora comprises 39 species of forest trees, 12 of fruit trees, 28 of ornamental trees and shrubs, 13 of agricultural crops and vegetables and 38 of annual garden and wild herbs. All these plants are given in the following table showing their botanical names, major and minor sources of nectar and pollen and the blossoming periods.

Table 1. Bee flora Providing Nectar (N) and Pollen (P) to Honeybees

S. No.	Plant Name	Source	Status	Flowering period
FOREST TREES				
1.	<i>Acacia ampliceps</i> B.R. Maslin	N	Minor	Jan.- March
2.	<i>A. artemizoides</i>	N	Minor	Feb.-March
3.	<i>A. modesta</i> Wall.	N	Major	April - May
4.	<i>A. nilotica</i> L.	N	Minor	March-April & July/August
5.	<i>Aleurites fordii</i> Hemsl.	N/P	Minor	March-April
6.	<i>Bauhinia racemosa</i> Lam.	N	Minor	March-April
7.	<i>Adhatoda vasica</i> Nees.	N	Minor	March-April
8.	<i>Ceratonia siliqua</i> L.	N	Minor	Nov/Dec/Jan.
9.	<i>Cedrela toona</i> Roxb.	N	Minor	April-May
10.	<i>Dalbergia sissoo</i> Roxb.	N	Minor	April
11.	<i>Eucalyptus camaldulensis</i> Dehn.	N/P	Major	January-April
12.	<i>E. citriodora</i> Hook.	N/P	Major	January-April
13.	<i>E. alba</i> Reinw.	N/P	Major	May
14.	<i>Gmelina arborea</i> Roxb.	N	Minor	May
15.	<i>Ehretia serrata</i> Roxb.	N	Minor	Apr-May
16.	<i>Flacourtia indica</i> Roxb.	N	Major	April
17.	<i>Jacaranda mimosifolia</i> D. don.	N	Minor	May
18.	<i>Koelreuteria paniculata</i> Laxm.	N	Minor	May-June
19.	<i>Morus alba</i> L.	N	Minor	March-April
20.	<i>Nyctanthes arborescens</i> L.	N	Minor	Sept.-Nov.
21.	<i>Olea cuspidata</i> Wall.	N/P	Major	May
22.	<i>Paulownia australis</i>	N	Minor	March-April
23.	<i>P. catalpifolia</i>	N	Minor	March-april
24.	<i>P. elongata</i>	N	Minor	March-April
25.	<i>P. forgesii</i>	N	Minor	March-April
26.	<i>P. fortunei</i>	N	Minor	March-April
27.	<i>P. tomentosa</i> Thunb	N	Minor	March-April
28.	<i>Prosopis juliflora</i> Cockerell.	N	Minor	July
29.	<i>P. chilensis</i> Stuntz	N	Major	April

S. No.	Plant Name	Source	Status	Flowering period
30.	<i>Rhus typhina</i> L.	N	Minor	April-May
31.	<i>Ricinus communis</i> L.	N	Minor	March-April
32.	<i>Robinia pseudoacacia</i> L.	N	Minor	March-April
33.	<i>Sapindus mukorossi</i> Garin.	N	Minor	May
34.	<i>Sapium sebiferum</i> L.	N	Minor	June
35.	<i>Sterculia diversifolia</i> D.Don.	N	Minor	May
36.	<i>Swietenia mahagoni</i> L.	N	Major	May
37.	<i>Woodfordia fruticosa</i> L.	P	Minor	April
38.	<i>Xylocarpus longifolium</i> Clos.	N/P	Major	Nov./Dec./Jan.
39.	<i>Zizyphus mauritiana</i> Lam.	N	Major	Jul./Aug./Sep.
FRUIT TREES				
40.	<i>Eriobotrya japonica</i> Thunb.	N/P	Major	Nov.-Feb.
41.	<i>Diospyros kaki</i> L.	N	Minor	Apr.-May
42.	<i>Phoenix dactylifera</i> L.	N	Minor	Feb.-April
43.	<i>Prunus amygdalus</i> L.	N	Minor	March-April
44.	<i>P. avium</i> L.	N	Minor	March-April
45.	<i>P. cerasus</i> L.	N	Minor	March-April
46.	<i>P. persica</i> Seib.	N	Minor	Feb.-March
47.	<i>Psidium guajava</i> L.	N	Minor	May-June
48.	<i>Punica granatum</i> L.	N	Minor	May
49.	<i>Pyrus communis</i> L.	N	Minor	March-April
50.	<i>P. malus</i> L.	N	Minor	Feb.-March
51.	<i>Prunus domestica</i> L.	N	Minor	Feb.-Apr.
ORNAMENTAL TREES AND SHRUBS				
52.	<i>Abutilon indicum</i> G.Don	N	Minor	March
53.	<i>Acacia glauca</i> D.C.	N	Minor	Nov.-Dec.
54.	<i>Amorpha fruticosa</i> L.	P	Major	April-May
55.	<i>Buddleia asiatica</i> Lour.	N	Minor	April
56.	<i>Buxus wallichiana</i> Beill.	N	Minor	March-April
57.	<i>Callistemon citrinus</i> Curt.	N	Minor	April
58.	<i>Cestrum diurnum</i> L.	N	Minor	Feb.-April
59.	<i>Citrus acida</i> L.	N/P	Major	March-April
60.	<i>Deutzia staminea</i> R.Br.	N	Minor	April
61.	<i>Duranta plumieri</i> Jacq.	N	Minor	April-May
62.	<i>Dodonaea viscosa</i> L.	N	Minor	Jan.-April
63.	<i>Erythrina blakii</i> Hort.	N	Minor	May
64.	<i>Euonymus japonicus</i> L.	N	Minor	May-June
65.	<i>Gymnosporia royleana</i> Wall.	N	Minor	March-April
66.	<i>Hibiscus rosa-sinensis</i> L.	N	Minor	June-Nov.
67.	<i>Jasminum grandiflorum</i> L.	N	Minor	Jan.-April
68.	<i>Lagerstroemia indica</i> L.	N	Minor	July-August
69.	<i>Lawsonia inermis</i> L.	N	Minor	March-April
70.	<i>Ligustrum lucidum</i> Ait.	N	Minor	May
71.	<i>Nerium oleander</i> L.	N	Minor	June-Oct.
72.	<i>Reinwardtia indica</i> Dumort.	N	Minor	Feb.-April
73.	<i>Rhododendron nudiflorum</i> Torr.	N	Minor	Dec.-Jan.
74.	<i>Rosa indica</i> Lindl.	N	Minor	April-June
75.	<i>Spiraea cantoniensis</i> Lour	N	Major	April
76.	<i>Syringa emodi</i> Wall.	N	Minor	April-May
77.	<i>Tecoma stans</i> Juss.	N	Minor	June-Nov.
78.	<i>Thevetia nerifolia</i> Juss.	N	Minor	July-Nov.
79.	<i>Vitex negundo</i> L.	N	Minor	June-Aug.

S. No.	Plant Name	Source	Status	Flowering period
AGRICULTURAL CROPS AND VEGETABLES				
80.	<i>Brassica campestris</i> L.	N/P	Major	Dec.-March
81.	<i>Helianthus annuus</i> L.	N	Minor	May-Oct.
82.	<i>Lagenaria vulgaris</i> Seringe.	N	Minor	Aug-Sep.
83.	<i>Luffa acutangula</i> Roxb.	N/P	Minor	Aug.-Sep.
84.	<i>Momordia charantia</i>	N	Minor	Aug.-Sep.
85.	<i>Papaver somniferum</i> L.	N	Minor	April
86.	<i>Pisum sativum</i> L.	N	Minor	Feb.-April
87.	<i>Cucurbita pepo</i> L.	N	Minor	June-Aug.
88.	<i>Cucurbita maxima</i> Duchesne.	N	Minor	June-July
89.	<i>Citrullus vulgaris</i> Schrod.	N	Minor	June-July
90.	<i>Hibiscus esculentus</i> L.	N	Minor	June-Aug.
91.	<i>Lycopersicum esculentum</i> Mill.	N	Minor	June-July
92.	<i>Solanum melongena</i> L.	N	Minor	June-Aug.
ANNUAL GARDEN HERBS				
93.	<i>Amaranthus viridis</i> L.	N	Minor	Nov.-Dec.
94.	<i>Chrysanthemum</i> Sp.	N	Minor	Nov.-Jan.
95.	<i>Chrysopsis mariana</i> Nutt.	N	Minor	Feb.-March
96.	<i>Capsella bursa</i> Maench.	N	Minor	Feb.-April
97.	<i>Cineraria stellata</i> Hort.	N	Minor	March-May
98.	<i>Dahlia variabilis</i> Desf.	N	Minor	Feb.-April
99.	<i>Tagetes erecta</i> L.	N	Minor	Nov.-April
100.	<i>Dianthus caryophyllus</i> L.	N	Minor	Dec.-April
101.	<i>Gaillardia pulchella</i> Foug.	N	Minor	Throughout the year
102.	<i>Gamolepsis tagetes</i> D.C.	N	Minor	Feb.-April
103.	<i>Geranium wallichianum</i> D.Don.	N	Minor	Aug.-Oct.
104.	<i>Gerbera</i> Sp.	N	Minor	Nov.-Dec.
105.	<i>Gazania hybrida</i> D.C.	N	Minor	Throughout the year
106.	<i>Hillia longiflora</i> Swartz.	N	Minor	July-August
107.	<i>Narcissus poeticus</i> L.	N	Minor	Dec.-Feb.
108.	<i>Phlox pilosa</i> L.	N	Minor	Feb.-April
109.	<i>Plumeria pulcherima</i> L.	N	Minor	Sep.-Nov.
110.	<i>Portulaca grandiflora</i> HK.	N	Minor	Aug.-Sept.
111.	<i>Ruellia tuberosa</i> L.	N	Minor	Aug.-Sept.
112.	<i>Senecio vulgaris</i> L.	N	Minor	Feb.-April
113.	<i>Vinca rosea</i> L.	N	Minor	Aug.-Oct.
114.	<i>Viola tricolor</i> L.	N	Minor	Feb.-April
115.	<i>Zinnia elegans</i> Jacq.	N	Minor	June-Sept.
ANNUAL WILD HERBS				
116.	<i>Allium stellatum</i> L.	N	Minor	April
117.	<i>Corydalis clavicalata</i> L.	N	Minor	Feb.-April
118.	<i>Grindelia robusta</i> Nutt.	N	Minor	Feb.-March
119.	<i>Hieracium aurantiacum</i> L.	N	Minor	March-April
120.	<i>Iris germanica</i> L.	N	Minor	March-April
121.	<i>Krigia biflora</i> Walt.	N	Minor	Jan.-March
122.	<i>Lathyrus aphaca</i> L.	N	Minor	Feb.-March
123.	<i>Leontodon autumnale</i> L.	N	Minor	May
124.	<i>Oxalis corniculata</i> L.	N	Minor	Feb.-April
125.	<i>Oxalis violacea</i> L.	N	Minor	May
126.	<i>Plantago ovata</i> Forssk.	N	Minor	March-April
127.	<i>Ruellia prostata</i> Lamk.	N	Minor	May
128.	<i>Stellaria media</i> L.	N	Minor	May
129.	<i>Taraxacum officinale</i> Wigg.	N	Minor	Feb.-April
130.	<i>Ammi majus</i> L.	N	Minor	May-June

Out of 130 plant species 15 act as major sources of nectar and pollen yielding surplus honey while 115 serve as minor sources contributing in day-to-day requirements of the honeybees. The major ^{tree} sources are *Acacia modesta*, *Eucalyptus camaldulensis*, *E. citriodora*, *E. alba*, *Flacourtia indica*, *Olea cuspidata*, *Prosopis chilensis*, *Swietenia mahagoni*, *Xylosma longifolium* and *Zizyphus mauritiana* ^{Amorpha fruticosa} ~~out of forest trees~~, *Eriobotrya japonica* ^{are among ornamentals} ~~out of fruit trees~~, *Amorpha fruticosa*, *Citrus acida* and *Spiraea contoniensis* ~~out of ornamentals~~ and *Brassica campestris* ^{one worthy to mention} ~~out of agricultural crops~~.

Table of the bee flora reveals that five forest tree species of major sources bloom for longer period providing nectar and pollen to honeybees. Blooming period of *Eucalyptus camaldulensis* and *E. citriodora* is 4 months each followed by *Xylosma longifolium* and *Zizyphus mauritiana* 3 months each and *Acacia modesta* 2 months. A major source of fruit tree, *Eriobotrya japonica* also blooms for 4 months hence very important for honeybees. Mass planting of these tree species on the sites of roads and canals, around the agriculture fields and gardens is recommended to develop apiculture industry in the country.

Among the minor sources *Gaillardia pulchella* and *Gazania hybrida* bloom for 12 months each followed by *Hibiscus rosa-sinensis*, *Tecoma stans*, *Helianthus annuus*, *Tagetes erecta*, *Duranta plumieri*, *Jasminum grandiflorum*, *Nerium oleander*, *Thevetia nerrifolia* and *Dianthus caryophyllus* which bloom for 5-6 months. These plant species together with other minor sources fill the flowering gaps between the major sources in various parts of the year and help in continuous supply of food to honeybees.

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