The Pakistan Journal of Forestry April, 1985

BEE-FORAGING PLANTS AT PESHAWAR

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Abstract:

Ninety bee-foraging plants from among the forest and fruit trees, ornamentals and agricultural crops serving as major and minor sources of nectar and pollen have been recorded at the campus of the Pakistan Forest Institute, Peshawar. Bee-foraging calendar has been prepared showing both major and minor sources of nectar and pollen and their blooming periods. *Eucalyptus camaldulensis, E. ochrophloia, E. tereticornis, E. pilularis, E. fruticetorum, E. microtheca, E. rudis, Eriobotrya japonica, Acacia modesta, Dombeya acutangula* out of major sources and *Callistemon citrinus, Tecoma stans, Holmskioldia* sp. out of minor sources have longer blossoming period and are suitable for planting to increase bee pasturage.

Introduction:

Sound knowledge of bee-foraging plants and their flowering time is the most important factor for successful beekeeping. There is a wide range of natural and cultivated plants which blossom in different parts of the year to provide nectar and pollen to honey bees. Many of them are major sources of nectar and act as mainstay of honey production. Plants of minor sources of nectar and pollen contribute to the day-to-day upkeep of the colonies, but may be important in some localities where they grow in abundance or blossom during honey slack period.

As many as 478 species of plants, yielding nectar, pollen or both occur in Pakistan but none of the areas provides flora to honey-bees throughout the year (Ahmad et al 1978).

Acacia modesta, Adhatoda vasica, Brassica campestris, Citrus spp., *Dalbergia sissoo, Eriobotrya japonica, Malva sylvestris, Phoenix* spp., *Plectranthus rugosus, Psidium guajava, Trifolium* spp., *Zea mays* and Ziziphus jujuba are major sources of nectar and pollen in the NWFP (Shahid and Qayyum 1977). *Berberis lycium, Plectranthus rugosus* and *Sapindus detergens* are important sources of nectar and pollen in the Punjab. (Rehman and Singh 1941).

"Planting a suitable nectar yielding tree may be as effective as a hundred or thousand small nectar plants. For example a single willow tree (*Salix fragilis* or *Salix alba*) will provide almost as much bee pasturage as a small field of herbaceous plants" (Holmes and Henniker 1978).

Similarly some small plants though major source of nectar and pollen do not support larger bees because they bear flowers on tiny tender tips which cannot bear weight of larger

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bees just as *Apis mellifera* failed to work on Shain (*Plectranthus rugosus*) in Swat and adjoining hills.

In the present study similar efforts have been made and bigger plants of major and minor sources of nectar and pollen besides some agricultural crops and annual ornamentals have been recorded at the campus of the Pakistan Forest Institute, Peshawar.

Material and Method:

To record bee-flora colonies of *Apis cerana* and *Apis mellifera* were maintained at the Pakistan Forest Institute, Peshawar throughout the year. During weekly visits each and every plant was examined in its blossom period to record foraging honey-bees on the flowers. If the bees on landing extended their proboscis to thrust deep into the nectaries of the flowers and fly away to visit and repeat the process on adjoining flower the plant was recorded as nectar source. In case the bee on landing dragged its body over the stamens and flew off brushing pollen grain with the legs and depositing them in the pollen baskets on the hind legs the plant was taken as pollen source. If the bees collected pollen and nectar from the same plant the plant was recorded yielding both.

Plants on which very large number of bees were found collecting nectar, pollen or both regularly throughout the day were graded as major sources while plants visited by bees casually were graded as minor sources. Pollen and nectar yielding plants were got identified from the Botany Branch of the Pakistan Forest Institute, Peshawar.

Results and Discussion

Bee-foraging calendar of both major and minor sources was prepared indicating blooming period and type of source out of various plants available at the campus.

The plants yielding pollen, nectar or both are given with their botanical and common or vernacular names under various groups split into major and minor sources as follows:

Forest Plants

Major sources: *Acacia modesta* Wall. (phulai), *Acer oblongum* Wall., *Acer pictum* Thunb. (Maple), *Eucalyptus alba, E. camaldulensis* Dehn., *E. citriodora* Hook., *E. crebra* F. Muell., *E. fruticetorum* F. Muell., *E. globulus* Labill., *E. kitsonia, E. maculata* Hook., *E. melanophloia* F. Muell., *E. microtheca* F. Muell., *E. ochrophloia, E. pilularis* Sm., *E. pollidifolia, E. populnia* F. Muell., *E. robusta* Sm., *E. rudis* Endl., *E. tereticornis* Sm., *E. torelliana* F. Muell., *Gleditsia* sp. (Dozakh), *Olea cuspidata* Wall. (Olive), *Syzygium cuminii* (L.) Skeels (Jaman).

Minor sources: *Albizia* sp., *Bauhinia variegata* Linn. (Kachnar), *Berberis* sp., *Bombax cieba* Linn. (Semul), *Cassia* sp., *Dalbergia sissoo* Roxb. (Shisham), *Heterophragma* sp., *Salix* spp., *Schinus molle* L. (California pepper tree). *Schinus terebinthifolius* Raddi (Brazilian pepper tree), *Tamarix aphylla* (L.) Karst. (Ghaz, Frash), *Woodfordia floribunda* Salisb.

Fruit Plants

Major sources: *Citrus* spp. (Lemon, Oranges), *Eriobotrya japonica* Thunb. Lindley (Loquat), *Psidium guajava* Linn. (Guava).

Minor sources: *Prunus amygdalus* Batsch (Almond), *P. armeniaca* Linn. (Apricot, Khobani, Khurmani), *P. domestica* L. Plum, Aloocha), *P. persica* (Linn.) Batsch (Peach, Aru), *Pyrus communis* Linn. (Pear, Nashpati).

Ornamental Plants

Major sources: *Amorpha fruticosa* L. (Bastard indigo), *Brassica oleracea* L. Var. *Italica* Plenck (Potted ghobi gul), *Buddleja asiatica* Lour. (Butter fly bush), *Butea monosperma* Lam. (Dhak), *Dombeya acutangula* Cav., *Erythrina blakei* Hort. (Gule-nashtar), *Grewia asiatica* (Falsa), *G. villosa* Willd., *Indigofera* sp., *Lonicera* sp., *Parkinsonia aculeata* L. (Wilayati kikar), *Rhus typhina* Linn. *Swietenia macrophylla* King. (Mahagni), *Terminalia arjuna* Wight. & Arn. (Arjun)

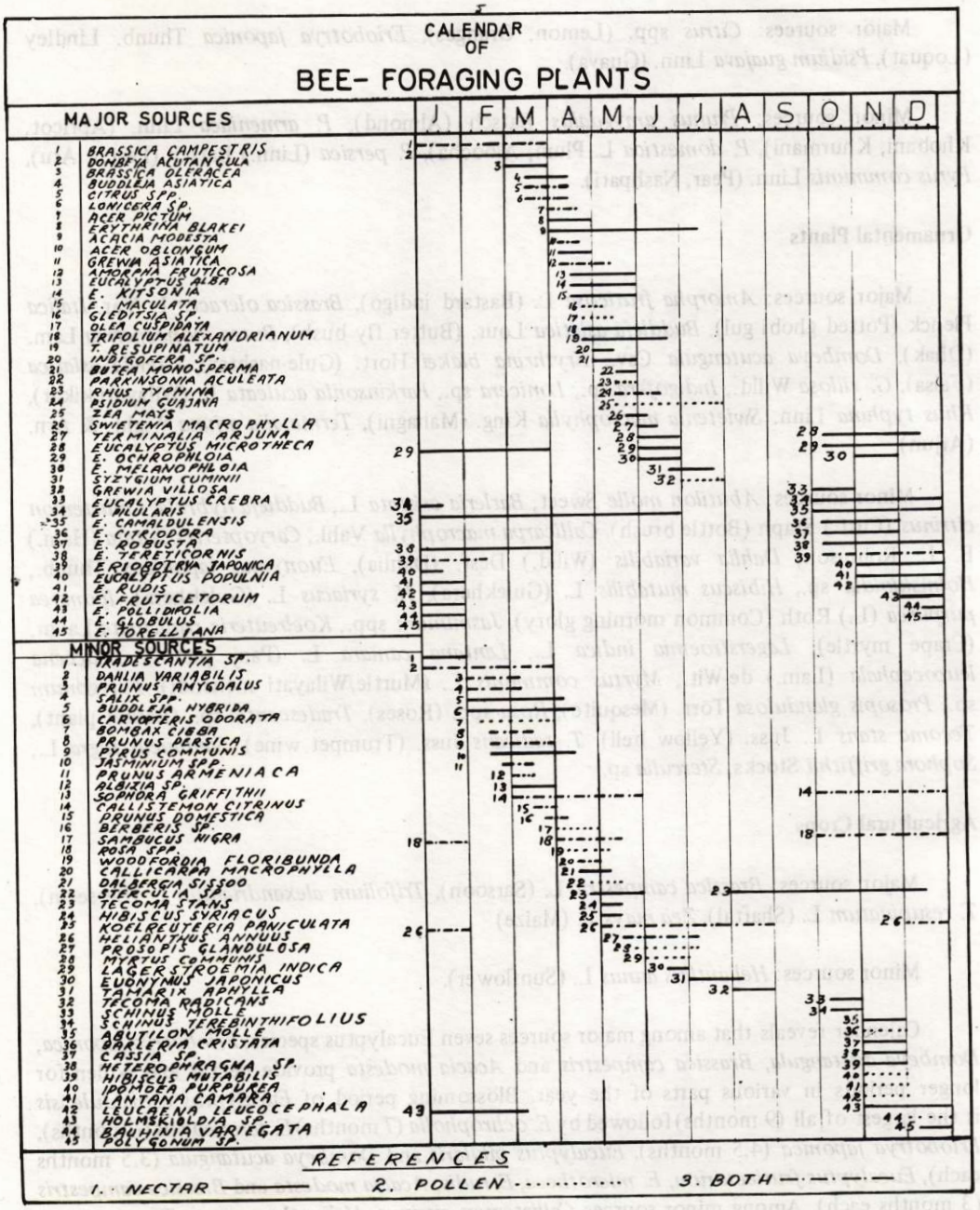
Minor sources: *Abutilon molle* Sweet, *Barleria cristata* L., *Buddleja hybrida, Callistemon citrinus* (Curt.) Staph (Bottle brush), *Callicarpa macrophylla* Vahl., *Caryopteris odorata* (Ham.) B. L. Robinson, *Dahlia variabilis* (Willd.) Desf. (Dahlia), *Euonymus japonicus* Thunb., *Holmskioldia* sp., *Hibiscus mutabilis* L. (Gulekhera), *H. syriacus* L. (Gulekhera), *Ipomoea purpurea* (L.) Roth (Common morning glory), *Jasminium* spp., *Koelreuteria paniculata* Laxm. (Crape myrtle), *Lagerstroemia indica* L., *Lantana camara* L. (Panj phool), *Leucaena leucocephala* (Lam.) de-Wit., *Myrtus communis* L. (Murtle/Wilayati mehendi), *Polygonum* sp., *Prosopis glandulosa* Torr. (Mesquite), *Rosa* spp. (Roses), *Tradescantia* sp., (Basket plant), *Tecoma stans* L. Juss. (Yellow bell). *T. radicans* Juss. (Trumpet wine), *Sambucus nigra* L., *Sophora griffithii* Stocks, *Sterculia* sp.

Agricultural Crops

Major sources: *Brassica campestris* L. (Sarsoon), *Trifolium alexandrianum* L. (Berseem), *T. resupinatum* L. (Shaftal), *Zea mays* L. (Maize)

Minor sources: *Helianthus annus* L. (Sunflower).

Calendar reveals that among major sources seven Eucalyptus species, *Eriobotrya japonica, Dombeya acutangula, Brassica campestris* and *Acacia modesta* provide nectar and pollen for longer periods in various parts of the year. Blossoming period of *Eucalyptus camaldulensis* is the largest of all (9 months) followed by *E. ochropholia* (7 months) *E. tereticornis* (6 months), *Eriobotrya japonica* (4.5 months), *Eucalyptus pilularis* and *Dombeya acutangula* (3.5 months each), *Eucalyptus fruticetorum, E. microtheca, E. rudis, Acacia modesta* and *Brassica campestris* (3 months each). Among minor sources *Callistemon citrinus, Helianthus annus, Tecoma stans, Rosa* spp., *Holmskioldia* sp. and *Dahlia variabilis* bloom for long peirod and provide nectar and pollen to honey-bees.


CALENDAR
OF
BEE- FORAGING PLANTS
MAJOR SOURCES
J F M A M J J A S O N D
1 BRASSICA CAMPESTRIS
2 DONBEYA ACUTANGULA
3 BRASSICA OLERACEA
4 BUDDLEJA ASIATICA
5 CITRUS SPP.
6 LONICERA SP.
7 ACER PICTUM
8 ERYTHRINA BLAKEI
9 ACACIA MODESTA
10 ACER OBLONGUM
11 GREWIA ASIATICA
12 AMORPHA FRUTICOSA
13 EUCALYPTUS ALBA
14 E. KITSONIA
15 E. MACULATA
16 GLEDITSIA SP.
17 OLEA CUSPIDATA
18 TRIFOLIUM ALEXANDRIANUM
19 T. RESUPINATUM
20 INDIGOFERA SP.
21 BUTEA MONOSPERMA
22 PARKINSONIA ACULEATA
23 RHUS TYPHINA
24 PSIDIUM GUAJAVA
25 ZEA MAYS
26 SWIETENIA MACROPHYLLA
27 TERMINALIA ARJUNA
28 EUCALYPTUS MICROTHECA
29 E. OCHROPHLOIA
30 E. MELANOPHLOIA
31 SYZYGIUM CUMINII
32 GREWIA VILLOSA
33 EUCALYPTUS CREBRA
34 E. ALULARIS
35 E. CAMALDULENSIS
36 E. CITRIODORA
37 E. ROBUSTA
38 E. TERETICORNIS
39 ERIOBOTRYA JAPONICA
40 EUCALYPTUS POPULNIA
41 E. RUDIS
42 E. FRUTICETORUM
43 E. POLLIDIFOLIA
44 E. GLOBULUS
45 E. TORELLIANA
MINOR SOURCES
1 TRADESCANTIA SP.
2 DAHLIA VARIABILIS
3 PRUNUS AMYGDALUS
4 SALIX SPP.
5 BUDDLEJA HYBRIDA
6 CARYOPTERIS ODORATA
7 BOMBAX CIBBA
8 PRUNUS PERSICA
9 PYRUS COMMUNIS
10 JASMINIUM SPP.
11 PRUNUS ARMENIACA
12 ALBIZIA SP.
13 SOPHORA GRIFFITHII
14 CALLISTEMON CITRINUS
15 PRUNUS DOMESTICA
16 BERBERIS SP.
17 SAMBUCUS NIGRA
18 ROSA SPP.
19 WOODFORDIA FLORIBUNDA
20 CALLICARPA MACROPHYLLA
21 DALBERGIA SISSOO
22 STERCULIA SP.
23 TECOMA STANS
24 HIBISCUS SYRIACUS
25 KOELREUTERIA PANICULATA
26 HELIANTHUS ANNUUS
27 PROSOPIS GLANDULOSA
28 MYRTUS COMMUNIS
29 LAGERSTROEMIA INDICA
30 EUONYMUS JAPONICUS
31 TAMARIX APHYLLA
32 TECOMA RADICANS
33 SCHINUS MOLLE
34 SCHINUS TEREBINTHIFOLIUS
35 ABUTILON MOLLE
36 BARLERIA CRISTATA
37 CASSIA SP.
38 HETEROPHRAGMA SP.
39 HIBISCUS MUTABILIS
40 IPOMOEA PURPUREA
41 LANTANA CAMARA
42 LEUCAENA LEUCOCEPHALA
43 HOLMSKIOLDIA SP.
44 BAUHINIA VARIEGATA
45 POLYGONUM SP.
REFERENCES
1. NECTAR
2. POLLEN
3. BOTH

Calendar also showes that August and September are the two dry months in plains when almost all major and minor sources are exhausted. *Tecoma stans* which blooms from August to November can meet the requirements of bees in the dry months in the plains.

Keeping in view the importance of bigger plants yielding more nectar and pollen than the smaller herbaceous plants as described by Holmes and Henniker (1978) it is recommended that *Eucalyptus camaldulensis, E. ochrophloia, E. tereticornis, E. pilularis, E. fruticetorum, E. microtheca, E. rudis* (Beautiful avenue and timber tree), *Acacia modesta* (Useful firewood and shade tree), *Eriobotrya japonica* (Fruit plant), *Callistemon citrinus, Holmskioldia* sp., *Tecoma stans, Dombeya acutangula* (Ornamentals) should be planted on avenues along side roads, canals and railways tracks, around the agricultural fields and gardens. These plants will certainly provide plenty of bee – pasturage in addition to the much needed timber and fruit. The shelter and aesthetic value of these plants will be an added use. *Tecoma stans* will cover the dearth period if propagated on large scale in the plains.

ACKNOWLEDGEMENT

The authors express their deep gratitudes to Mr. Sartaj Beg Akhtar, Garden Overseer, Botany Branch, Pakistan Forest Institute for identification of the plants in the field.

The authors are also highly grateful to Mr. Sayeed Ahmad Khan, Research Assistant, Botany Branch, Pakistan Forest Institute, for his cooperation in confirmation of the identified plant specimens.

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