Medicinal uses of honey (Quranic medicine) and its bee flora from Dera Ismail Khan District, KPK, Pakistan

Sarfaraz Khan Marwat[1], Muhammad Aslam Khan[2], Fazal-ur-Rehman[3] and Kaleem Ullah Khan[4]

[1]University WENSAM College, Gomal University, Dera Ismail Khan, KPK, Pakistan
[2]Department of Islamic and Religious Studies, Hazara University, Mansehra, KPK, Pakistan
[3]Faculty of Pharmacy, Gomal University, Dera Ismail Khan, KPK, Pakistan
Faculty of Biological Sciences, Quaid-i-University, Islamabad, Pakistan

Abstract: This study was carried out during 2005-2008 to identify existing plant species visited by workers of honeybees for nectar and pollen collection in Dera Ismail Khan (D.I.Khan) District, Pakistan. The honeybee species investigated in the area were, rock bee (*Apis dorsata* F.), little bee (*A. florea* F.) and European honeybee (*A. mellifera* L.). A detailed list of 86 plant species both wild and cultivated was prepared, out of which 12 species, Phulai (*Acacia modesta* Wall.), Sarsoon (*Brassica campestris* L.), Kaghzi nimboo (*Citrus aurantifolia* L.), Khatta (*C. medica* L.), Malta (*C. sinensis* (L.) Osbeck.), Shisham (*Dalbergia sissoo* Roxb.), Date (*Phoenix dactylifera* L.), Barseen (*Trifolium alexandrianum* L.), Shaftal (*T. resupinatum* L), Makai (*Zea mays* L.), Ber (*Zizyphus mauritiana* Lam.) and Jher beri (*Z. numularia* (Burm. f.) Wight & Arn.,) were found as major sources (table 1) for the production of surplus honey in a year at different localities in the District. Among the minor sources various plant species were included (table 2). These plants fill the flowering gaps between the major sources in various parts of the year and help in continuous supply of food to honey bees.

Keywords: *Apis mellifera*, DI Khan, pollen grains, nectar

INTRODUCTION

Dera Ismail Khan (DIKhan) District is located in the south of Khyber Pakhtun Khwa (KPK) of Pakistan. It is lying between 31° 15' and 32° 32' north latitude and 70° 11' and 71° 20' east longitude with an elevation of 173 meters from the sea level. Its total reported geographical land is 896,000 hectares out of which 300,000 hectares is cultivated (Khan, 2003). The climate is continental with marked temperature fluctuations both seasonal and diurnal, with significant aridity. January is the coldest month of the year and July the hottest. The mean maximum and minimum temperatures during winter are 20.3°C and 4.2°C respectively, compared to 42°C and 27°C during summer. Average annual rainfall is 259 mm. (Anonymous, 1998).

The fascinating process of making honey begins when the bees feast on flowers, collecting the flower nectar in their mouths. This nectar then mixes with special enzymes in the bees' saliva, an alchemical process that turns it into honey. The bees carry the honey back to the hive where they deposit it into the cells of the hive's walls. The fluttering of their wings provides the necessary ventilation to reduce the moisture's content making it ready for consumption.

Honey is a sweet and viscous fluid made by bees using nectar of flowers. Its production is also made from the secreted fluid of living tissue of plants or discharged waste matter of plant feeding insects (SMEDA, 2009).

It is known as *'Asal, Asal-u-Nahl'* in Arabic, '*Mel*'in Brazilian, '*Miel*' in French, '*Honig*' in German, '*Meli*' in Greek, 'Madhu, Shahd' in Hindi, 'Honing' in Dutch, 'Shat, Gabeen' in Pashto, 'Angabeen, Shahd' in Persian 'Shahd' in Urdu (Farooqi, 2000).

Religion, human civilizations and history all have regarded honey a valuable and sacred food. It has been used by the ancient civilization for the purpose of mummification. Medicinal use of honey was very common among all nations of the ancient civilizations (SMEDA, 2009).

Both the Holy Quran (Holy book of Muslims) and Ahadith [Sayings of Holy Prophet Muhammad (*Sallallahu Alaiyhi Wassallam*)] refer to honey as a healer of diseases.

The Holy book (Quran) says:

> *And your Lord inspired the bees, saying: "Take your habitation in the mountains and in the trees and in what they erect. "Then, eat of all the fruits, and follow the ways of your Lord made easy (for you)." There comes forth from their bellies, a drink of varying colour, wherein is healing for men. Verily, in this is indeed a sign for people who think*" [Al-Nahal: 68, 69].

**Corresponding author:* e-mail: skhan.marwat@gmail.com

According to Ahadith, Prophet Muhammad (*Sallallahu Alaiyhi Wassallam*) strongly recommended honey for healing purposes:

1. *Narrated Abu Said Al-Khudri: A man came to the Prophet and said, "My brother has some abdominal trouble." The Prophet said to him "Let him drink honey." The man came for the second time and the Prophet said to him, 'Let him drink honey." He came for the third time and the Prophet said, "Let him drink honey." He returned again and said, "I have done that ' The Prophet then said, "Allah has said the truth, but your brother's abdomen has told a lie. Let him drink honey." So he made him drink honey and he was cured* (Farooqi, 1998).
2. *Narrated Ibn 'Abbas (Radiyallahu Anhu): The Prophet (Sallallahu Alaiyhi Wassallam) said, "there are three sources for healing: use of honey, bleed patient by suction through a cupping-glass and branding with fire."But I forbid my followers to use (cauterization) branding with fire." (Sahih Bukhari)* (Farooqi, 1998).
3. *Narrated Aisha (Radiyallahu Anha): The Prophet (Sallallahu Alaiyhi Wassallam) used to like sweet edible things and honey (Sahih Bukhari)* (Farooqi, 1998).
4. *Narrated Anas (Radiyallahu Anhu), reported: I served drink to Allah's Messenger (Sallallahu Alaiyhi Wassallam) in this cup of mine: Honey, Nabidh, Water and Milk [Sahih Muslim]* (Farooqi, 1998).
5. *In another tradition, the Prophet (Sallallahu Alaiyhi Wassallam) said: "Make use of the two remedies: Honey and the Qur'an"* (Khan, 1989).

Rasulullah (Sallallahu Alaiyhi Wassallam) has pointed out many benefits of honey more than 1400 years ago. Thus, one could use the above Remedies with the intention (niyyah) of a Sunnah, and through its Barakah one will be rewarded for fulfilling a Sunnah, as well as, receive its cure, Insha-Allah.

Chemically honey is a mixture of water (14-20%), sugars, acids, proteins and different minerals. It also contains some minor components like flavour and aroma substances, enzyme, vitamins and tannins. Moreover, honey is easily digestible and a pleasant food. It provides large amount of energy as it is comprised of 75-85 % fructose and glucose (Kamal *et al.*, 2002).

The quality of honey can be determined by its fragrance, taste, and consistency. Ripe and freshly collected honey is said to be of high-quality if (1) at room temperature (20°C) it flows in a straight stream from a knife and does not break into separate drops. (2) After falling down, it forms a bead. (3) It, when poured, forms small, temporary layers that disappear fairly quickly, indicating high viscosity. If not, it indicates excessive water content (over 20%) of the product. Honey with excessive water content is not suitable for long-term preservation (Wikipedia, 2011).

There are many wild and cultivated plants in the area which yield nectar and pollen for honey bees. As nectar and pollen are essential components on which apiculture is solely based, a thorough knowledge of the nectar and pollen yielding plants is very important for successful bee keeping in the area.

It is prerequisite to have an adequate knowledge about type, density and quality of bee flora of an area for successful bee keeping. By getting such information beekeepers become able to utilize them at the maximum level for harvesting a good yield of honey and other bee products in addition to effective pollination which increases crop yields. The knowledge of honey flow and floral dearth period(s) of short or long duration of a region helps in the effective management of bee colonies during such periods (Bista and Shivakoti, 2001/2000)

Keeping in view these facts, the present study was conducted to enlist the existing bee flora of D.I.Khan district, their approximate distribution and blooming date. With this information, beekeepers should be able to better manage their colonies and/or move them to maximize production. Finding good locations for colonies, based on proximity to good honey flora, is both an art and science; it takes a good deal of care and often several years of experience at one location to determine suitability. In this regard, the beekeeper must learn to become a careful experimenter and observer.

MATERIALS AND METHODS

This study was carried out in Dera Ismail Khan (D.I.Khan.) District, KPK, (Pakistan) during 2005-2008 to investigate honeybees and honeybee flora. In total 86 plant species (visited by workers of honeybees for nectar and pollen collection) and three honeybee species were found after extensive survey of the area. Identifications of the plants were made with the help of available literature (Jafri, 1966; Qureshi & Khan, 1971; Nasir & Ali 1972-1984; Ali & Nasir 1989) and by comparing with the already identified plant specimens of the herbarium, Quaid-i-Azam University, Islamabad. After correct identification, the plants were deposited in the above herbarium for future references. Bee keepers and professional honey collectors were also interviewed for documentation of information about honey, honeybee species present in the area. Medicinal uses of honey were reported from second hand literature and also documented from local inhabitants. All the photographs were drawn by the author except the last two.

RESULTS

Data revealed that the honey bee flora comprises 86 plant species (tables 1-2) both wild and cultivated. Of these the

following 12 plant species, Phulai (*Acacia modesta*), Sarsoon (*Brassica campestris*), Kaghzi nimboo (*Citrus aurantifolia*), Khatta (*C. medica*), Malta (*C. sinensis*), Shisham (*Dalbergia sissoo*), Date (*Phoenix dactylifera*), Barseen (*Trifolium alexandrianum*), Shaftal (*T. resupinatum*), Makai (*Zea mays*) and Ber (*Zizyphus mauritiana*) and Malla, Jher beri (*Z. numularia*) were found as major source for the production of surplus honey (table 1). Among the minor sources various plant species were included (table 2). These plants fill the flowering gaps between the major sources in various parts of the year and help in continuous supply of food to honey bees.

The honeybee species investigated in the area were, rock bee (*Apis dorsata* F.), little bee (*A. florea* F.) and European honeybee (*A. mellifera* L.) (table 3 and photographs A-F).

DISCUSSION

Several factors are involved in the success of bee keeping, out of which accessibility to the bee plant species is the basic one. Bees get nectar, pollen, or both from flowers, which are the basis of honeybee's life. People from various parts of the world have observed the importance of plants in this regard (Bista and Shivakoti, 2000/2001).

Table 1: Major bee flora of DI Khan district providing the nectar and pollen to the honey bees

S. No.	Scientific name	Local name	Family	Habit	Yield*	Flowering Period	Honey colour
1	*Acacia modesta*	Palosa, Phulai	Mimosaceae	Tree	N	Mar-May	White or lightly tinged.
2	*Brassica campestris*	Sarsoon	Brassicaeae	Herb	N-P	Jan-Mar	Yellow
3	*Citrus aurantifolia*	Kaghzi nimboo	Rutaceae	Shrub	N-P	Winter months	Light amber
4	*Citrus medica*	Khatta	Rutaceae	Small tree	N-P	Mar-Apr	Light amber
5	*Citrus sinensis*	Malta	Rutaceae	Small tree	N-P	Mar-Apr	Light amber
6	*Dalbergia sissoo*	Tali, shisham	Papilionaceae	Tree	N	Apr	Amber to dark-amber
7	*Phoenix dactylifera*	Khaji/Khajur	Arecaceae	Palm	N-P	Jul-Aug	Dark amber
8	*Trifolium alexandrianum*	Shaftal	Papilionaceae	Herb	N-P	May-Jun	-----
9	*T. resupinatum*	Barseem	Papilionaceae	Herb	N-P	May-Jun	-----
10	*Zea mays*	Makai	Poaceae	Herb	P	Jul-Oct	-----
11	*Zizyphus mauritiana*	Ber	Rhamnaceae	Tree	N-P	Jul-Oct	Dark amber
12	*Z. numularia*	Malla, Jher beri, Karkanra	Rhamnaceae	Shrub/ Small tree	N-P	Jul-Oct	Dark amber

Table 2: Minor bee flora of DI Khan district providing the nectar and pollen to the honey bees

S. No.	Scientific name	Local name	Family	Habit	Yield	Flowering Period
1	*Abelmoschus esculentus*	Bhindi	Malvaceae	Herb	P	May-Jun
2	*Acacia nilotica*	Kikar	Mimosaceae	Tree	N	Mar-Jun
3	*Aerva javanica*	Buhi	Amaranthaceae	Shrub	----	May-Nov
4	*Albizia lebbek*	Sirin,siris	Mimosaceae	Tree	N	Apr
5	*Allium cepa*	Vasal,piaz	Alliaceae	Herb	N-P	Mar-Apr
6	*Althaea rosea*	Gul-i-Khaira	Malvaceae	Shrub	N-P	Mar-Apr
7	*Amaranthus viridis*	Chulai	Amaranthaceae	Herb	-----	Nov-Dec
8	*Andropogon sorghum*	---------	Poaceae	Herb	P	Jul-Aug
9	*Asphodelous tenuifolium*	Vasal	Asphodliaceae	Herb	P	Mar-Apr
10	*Azadirachta indica*	Neem	Meliaceae	Tree	N	April-May
11	*Bauhinia variegata*	Kachnal,	Caesalpiniaceae	Tree	N-P	Feb-Mar
12	*B. oleracea* var. *botrytis*	Phool gobi	Brassicaeae	Herb	N-P	Jan-Mar
13	*Brassica rapa*	Shalghum	Brassicaceae	Herb	N-P	Feb-Mar
14	*Calendula officinalis*	----------	Asteraceae	Herb	N-P	Feb-May
15	*Callistemon lanceolatus*	Bottle brush	Myrtaceae	Tree	N	Apr-May
16	*Capparis decidua*	Kreeta	Capparidaceae	Tree	P	Mar-Apr
17	*Cassia fistula*	Girdnali	Caesalpiniaceae	Tree	N	May-Jun
18	*Cenchrus ciliaris*	----------	Poaceae	Herb	P	Sept
19	*Centauria cyamus*	----------	Asteraceae	Herb	P	Mar-Apr

Continued…

Continue…

S. No.	Scientific name	Local name	Family	Habit	Yield	Flowering Period
20	*Chrysanthemum sp*	Gul-i-Daudi	Asteraceae	Herb	P	Feb-Mar
21	*Cicer arietinum*	Channa	Papilionaceae	Herb	N	Mar
22	*Cichorium intybus*	Kasni	Asteraceae	Herb	N	Mar-Apr
23	*Cordia myxa*	Lassoora	Boraginaceae	Tree	N	Apr
24	*Coriandrum sativum*	Dahnia	Apiaceae	Herb	P	Feb-Mar
25	*Cosmos bipinnatus*	---------	Asteraceae	Herb	P	Sep-Oct
26	*Cucumis melo* var. *utilissimus*	Tar /Kakri	Cucurbitaceae	Herb	P	Apr-May
27	*Cucumis sativa*	Khira	Cucurbitaceae	Herb	P	May-Jun
28	*Cucurbita pepo*	Kadoo	Cucurbitaceae	Herb	---	Jun-Aug
29	*Dahlia variabilis*	Dahlia	Asteraceae	Herb	P	Mar-Apr
30	*Daucus carota*	Gajar	Apiaceae	Herb	N-P	Apr
31	*Dicliptera roxburghiana*	----	Acanthaceae	Herb	N-P	Sep-Oct
32	*Dodonaea viscosa*	Sanatha	Sapindaceae	Shrub	-----	Feb-Apr
33	*Duranta repens*	Duranta	Verbenaceae	Shrub	P	Apr-Jun
34	*Eruca sativa*	Oossoo	Brassiceae	Herb	N-P	Feb-Mar
35	*Eucalyptus camaldulensis*	Lachi	Myrtaceae	Tree	N-P	Jan-Apr
36	*Euphorbia hetrophylla*	-----	Euphorbiaceae		P	April
37	*Euphorbia pulcherrima*	-----	Euphorbiaceae	Shrub	P	Nov-Jun
38	*Foeniculum vulgare*	Saunf	Apiaceae	Herb	N-P	Mar-Apr
39	*Fumaria indica*	-----	Fumariaceae	Herb	-----	Feb-Apr
40	*Gossypium herbaceum*	Kappas	Malvaceae	Herb	N	Jul-Sep
41	*Grewia asiatica*	Phalsa	Tiliaceae	Shrub	N	Apr-Jun
42	*Grewia tenax*	Anjeerai	Tiliaceae	Shrub	N	Apr-Jun
43	*Helianthus annuus*	Suraj mukhi	Asteraceae	Herb	P	Jul-Sep
44	*Hibiscus rosa-sinensis*	-----	Malvaceae	Shrub	-----	Jan-Nov
45	*Ipomoea carica*	Ishq paicha	Convolvulaceae	Herb	P	Sep
46	*Lagenaria siceraria*	Lauki	Cucurbitaceae	Herb	P	May-Jun.
47	*Lathyrus aphaca*	Jangli Matter	Papilionaceae	Herb	-----	Feb-Mar
48	*Luffa cylindrica*	Tori	Cucurbitaceae	Herb	-----	Aug-Sep
49	*Lycopersicum esculentum*	Tamater	Solanaceae	Herb	P	Jan-Apr
50	*Melia azedarach*	Bkayan	Meliaceae	Tree	N-P	
51	*Mentha longifolia*	Podina	Lemiaceae	Herb	P	Sept-Oct
52	*Momordica charantia*	Karela	Cucurbitaceae	Herb	P	May-Jun
53	*Morus alba*	Toot	Moraceae	Tree	-----	Apr-May
54	*Nerium oleander*	Kaner	Apocynaceae	Shrub	-----	Apr-Oct
55	*Olea ferruginea*	Kao	Oleaceae	Tree	-----	Apr-Jun
56	*Oxalis spp.*	-----	Oxalidaceae	Herb	P	September
57	*Portulaca grandiflora*	-----	Potulacaeae	Herb	P	Apr-Jun
58	*Portulaca oleracea*	Kulfa	Portulacaeae	Herb	-----	May-Aug
59	*Prosopis juliflora*	Pirasoo	Mimosaceae	Shrub	-----	Jul-Aug
60	*Psidium guajava*	Amrood	Myrtaceae	Tree	N-P	May-Jun
61	*Punica granatum*	Anar	Punicaceae	Tree	NP	Apr-May
62	*Quisqualis indica*	-----	Combretaceae	Shrub	N-P	Apr-May
63	*Ranunculus muricatus*	-----	Ranunculaceae	Herb	N-P	Feb-Mar
64	*Raphanus sativus*	Mooli	Brassicaceae	Herb	N-P	Jan-Mar
65	*Rosa indica*	Gulab	Rosaceae	Shrub	P	Mar-Jun
66	*Ruellia prostrata*	-----	Acanthaceae	Herb	P	May-Sep
67	*Rumex dentatus*	-----	Polygonaceae	Herb	N-P	Winter
68	*Solanum melongena*	Vathanvoo	Solanaceae	Herb	P	May-Jun
69	*Solanum nigrum*	Mako	Solanaceae	Herb	N-P	Feb-Jul
70	*Syzygium cumini*	Jamu/Jaman	Myrtaceae	Tree	N	May-Jun
71	*Tamarix aphylla*	Khagal/Ghaz	Tamaricaceae	Tree	N	May-Sep
72	*Taraxacum officinale*	-----	Asteraceae	Herb	N-P	Spring
73	*Tropaeolum sp*	-----	Tropaeolaceae	Herb	N-P	Mar-Apr
74	*Vitex negundo*	-----	Verbenaceae	Tree	-----	Jun-Sep

* N = Nectar source, P = Pollen source

Fig. A: *Apis dosata* getting nectar and pollen from *Portulaca oleracea* flower. **B.** Colonies of *A. dosata* in high building of Water Tanchi. **C.** *A. florea* getting nectar from *Zizyphus mauritiana* flower. **D.** Colonies of *Apis florea* in *Callistemon lanceolatus* plant (**Source:** Photos, A-D by author), **E.** *Apis mellifera* getting nectar and pollen from flowers of a plant of Asteraceae. (**Source of E:** http://www.google.com.pk/search?hl=en&sugexp=gsih&cp=23&gs_id=21&xhr=t&q=Honey+of+Apis+mellifera&gs_sm=&gs_upl=&biw=1024&bih=600&wrapid=tljp1316331753875044&um=1&ie=UTF-8&tbm=isch&source=og&sa=N&tab =wi), **F.** *Apis mellifera* colonies (in honey bee boxes) and beekeepers. (**Source of F**: http://www.smeda.org/downloads/Districts_Profile_Karak.pdf)

The flora of DIKhan District has a great potential for honeybees. The area was extensively surveyed to identify existing plant species visited by workers of honeybees for nectar and pollen collection. A detailed list of 86 plant species (tables 1-2) both wild and cultivated was prepared, out of which 12 species, were found as major source for the production of surplus honey (table 1).

Acacia modesta (Phulai) supplies sufficient quantity of nectar. Its honey is white or very lightly tinged. *Brassica campestris* (Masterd - Sarsoon) is a good source of nectar and pollen. Its honey is yellow in colour and becomes granulated in a few days after extraction. Citrus species provide nectar as well as pollen for bees. Their pollens are especially very useful for early brood rearing after swarming. The honey from citrus is of light amber colour. *Dalbergia sissoo* (Shisham): The honey from shisham is of amber to dark-amber in colour and of strong flavour. *Phoenix dactylifera* (Date - Khajoor) is a major source of nectar and pollen. Its honey is of dark amber colour and

Table 3: Comparison of yield of three honeybee species found in DIKhan District (Pakistan)

S. No.	Scientific name	Common name	Origin	Yield/colony/annum	Reference
1	*Apis dorsata*	Giant honeybee, rock bee	SEAsia	20-45 kg	Ahmad and Munawar, 1985
2	*Apis florea*	Dwarf honeybee, little bee	SEAsia	2-3 kg	Ahmad and Munawar, 1985
3	*Apis mellifera*	European honeybee	Europe,Middle East & Africa	More than 50 kg	Saha, 2002

Table 4: Uses of honey and Cinnamon

Disease/Problem	Recipes
Bladder Infections	If a mixture of two tablespoons of cinnamon powder and one teaspoon of honey in a glass of luke warm water is taken. The germs of the bladder will be destroyed.
Cancer	Use of one tablespoon of honey with one teaspoon of cinnamon powder 3 times a day for one month is very effective for the successful treatment of advanced cancer.
Colds	The use of one tablespoon lukewarm honey with 1/4 teaspoon cinnamon powder daily for 3 days is recommended for the treatment of common or severe colds. This treatment also cures most chronic cough, cold and clears the sinuses.
Hair Loss	One tablespoon of honey, one teaspoon cinnamon powder and hot olive oil are mixed to form paste. This paste is spread on hairs of those suffering from hair loss and kept for 15 minutes before bath. After that the hairs are washed. It is very effective remedy even if kept for 5 min.
Heart Diseases	Honey and cinnamon powder are mixed to make paste. Regular utilization of this paste with bread in breakfast decreases the cholesterol in the arteries. It is also effective for the treatment of heart attack and loss of breath, and for strengthening the heart beat.
Hearing Loss	The employment of mixture of honey and cinnamon powder in the ratio of 1:1 twice a day is useful for the restoration of hearing.
Immune System	The immune system is made stronger and the body is protected from microbial attacks by using honey and cinnamon powder daily. Regular use of honey strengthens the white blood corpuscles to fight against bacteria and viral diseases.
Indigestion	Cinnamon powder is spread on two tablespoons of honey and is taken before meal. This treatment reduces acidity and digests the heaviest of foods.
Liver Complaints	Honey has been used in the traditional medicine for the treatment of ailments of the liver since long. Its useful result is because of its chemical constituents, especially due to its high glucose content. Glucose feeds the tissues of the liver, increases its reserve of glycogen and improves the process to tissue replacement.
Pimples	Honey and cinnamon powder are mixed in the ratio of 3:1 to form paste. The application of the paste on the pimples before sleeping at night daily for 15 days is recommended for the removal of pimples from the roots.
Skin Infections	The use of mixture of honey and cinnamon powder in equal proportion is useful for the treatment of Eczema, Ringworm and various types of skin diseases.
Weight Loss	If mixture of honey and cinnamon powder is boiled in one cup of water and used regularly twice a day, 30 minutes before breakfast on empty stomach and at night before sleeping it will reduce the weight of fat person. It also prevents the deposition of fats in the body even a high calorie diet may be eaten by a person.

Source: http://alislaah4.tripod.com/moreadvices2/id18.htm

strongly flavoured. *Psidium guyava* (Guava – Amrood) is a good source of nectar and pollen. *Trifolium alexandrianum* and *T. resupinatum* (Clovers) are best source of nectar and pollen. The bulk of honey in the irrigated plains comes from this source. *Zea mays* (Maize-Makai) supplies larger quantities of pollen than other plants. *Zizyphus mauritiana* and *Z. numularia* (Ber) provide plenty of nectar and pollen for bees. Their honey is of dark amber colour.

Detail of minor sources (plant species) of nectar and pollen has been summarized in table 2. These plant

species fill the flowering gaps between the major sources in various parts of the year and help in continuous supply of food to honey bees (Shahid and Qayyum, 1977).

Four species of Honeybees viz., *Apis cerana, A. dorsata, A. florea, A. mellifera* have been reported from Pakistan. The fist three are indigenous and the last one, *Apis mellifera*, is imported and established in Pakistan. These species are widespread in diverse ecological areas of the country (Noor *et al*., 2009). The last three species, *A. dorsata, A. florea, A. mellifera*, were also investigated in DI Khan District (photographs A-F).

The colonies of rock bees *Apis dorsata* are distributed through out the province, KPK (Khan 1984). Honey production is good and may be 20-45 kg per year by a single productive colony (Ahmad and Munawar, 1985; Saha, 2002), but it is comparatively of inferior quality. Domestication of *Apis dorsata* in wooden boxes has not been possible. Research is being done in this connection (Saha, 2002). *Apis florea* is a small honey bee. It occurs almost throughout Pakistan in the foot hills and plains of all provinces of Pakistan (Ahmad and Munawar, 1985; Noor *et al.*, 2009). Honey production is not good and a single productive colony may produce in an average 2-3 kg of honey per year (Ahmad and Munawar, 1985). Quality of honey is very good. The domestication of this species in wooden boxes has not been possible (Saha, 2002). *A. mellifera* has been imported in Pakistan from Australia and Russia in 1979. They are reared here successfully (Noor *et al*., 2009). Production is good and may be in average 50 kg per year by single productive colony, but this depends on the good beekeeping source.

Beekeeping has been practiced in the Northern Areas of Pakistan since the dawn of the civilization (Hussain, 1988). It is a beneficial business in the country. About 7,000 beekeepers are now nurturing foreign species, *Apis mellifera* in the up to date beehives (Ashfaq, 2006). They were imported from Germany in 1972-73 but failed because of unsuccessful mating of queen. Again Pakistan Agriculture Research Council (PARC), Islamabad, imported European bee colonies from Australia and Russia in 1973, which successfully collected nectar and pollen from Barseem (*Trifolium resupinatum*), Phulai (*Acacia modesta*), Shaftal (*T. alexandrianum*), Ber (*Zizyphus mauritiana*) and Sarsoon (*Brassica campestris*) and yielded honey double than local bees (Ahmad, 1981).

The above cited plant species are very common in D.I.Khan District. Barseem (*T. resupinatum*), Shaftal (*T. alexandrianum*), and Sarsoon (*Brassica campestris*) are cultivated. Ber (*Zizyphus mauritiana*) is found throughout the area and Phulai (*Acacia modesta*), commonly occurs in Dara Zinda hills, Sheikh Buddin hills and Khisore Range.

The honey collected is then sold in local markets. The price of honey fluctuates during different seasons of the year. It also depends upon the species of bees. The price of honey of little bees is higher than others in the market.

It is suggested that D.I.Khan District has a great potential for honey bee production industry since the area has sufficient flora and presence of various races of honey bee.

REFERENCES

Ahmad R (1981). A guide to honey bee management in Pakistan. Jor. (Pakistan Agriculture Research Council, Islamabad), p.38.

Ahmad R and Munawar (1985). Beekeeping in Pakistan. *Progressive Farming*, **5**(1): 35-39.

AL-Islaah Publications (1995). Uses of Honey & Cinnamon & its Benefits Weekly World News, Canada. [http://alislaah4.tripod.com/ moreadvices2/ id18.htm]

Ali SI and Nasir E (1989). Flora of Pakistan, Karachi.

Anonymous (1998). District Census Report of Dera Ismail Khan. Census Publication No.50. Population Census Organization Statistic Division Government of Pakistan Islamabad, pp.1-2.

Ashfaq M (2006). Honey Production, Pakistan Agriculture Research Council. http://www.parc.gov.pk /Faq/hbm.html

Bista S and Shivakoti GP (2000/2001). Honeybee Flora at Kabre, Dolakha District. *Nepal Agric. Res. J*., 4 & 5.

Farooqi I (1998). Ahadith Mein Mazkoor Nabatat, Adwiya Aur Ghizain. Ilm-o-Irfan Publishers, 9-lower Mall, Aqab Mian Market, Urdu Bazar Lahore, Pakistan, pp.135-137.

Hussain AS (1988). Review Paper on Importance Scope and Management of Beekeeping in NWFP. B.Sc. (Hons.) Thesis. Department of Entomology, Faculty of Agriculture, Gomal University, Dera Ismail Khan, pp.1-30.

Jafri SMH (1966). The Flora of Karachi. The Book Corporation, Karachi, pp.9-349.

Kamal A, Raza S, Rashid N, Hameed T, Gilani M, Qureshi MA and Nasim K (2002). Comparative Study of Honey Collected from Different Flora of Pakistan. OnLine *J. Biolog. Sci.*, **2**(9): 626-627.

Khan BM (1984). UNHCR Beekeeping Project for Afghan Refugees. Published by Agri-Research Wing Govt. of NWFP. *Technical Bulletin*, **9**: 1-9.

Khan MA (1989). Significance of Honey under Tib-e-Nabvi. *Gomal Univ. J. Resear.*, **9**(1-2):145-154.

Khan RU (2003). Facts about AZRI, Pakistan Agricultural Research Council, Arid Zone Research Institute Ratta Kulachi, DI Khan, pp.2-4.

Muzaffar N and Ahmad R (1990). Research Note: Apis spp. (Hymenoptera, Apidae) and their Distribution in Pakistan. *Pak. J. Agric. Res*., **11**(1): 65-69.

Nasir E and Ali SI (Eds.) (1972-1984). Flora of Pakistan (Fasciles series), Islamabad, Karachi.

Noor MJ, Khan MA and Camphor ES (2009). Palynological Analysis of Pollen Loads from Pollen Sources of Honeybees in Islamabad, Pakistan. *Pak. J. Bot.*, **41**(2): 495-501.

Qurashi MA and Khan SA (1972). Flora of Peshawar District and Khyber Agency. Vol. II Part I (A). *Pak. J. For*. Pakistan Forest Institute, Peshawar, **22**(2): 153-220.

Saha J Ch (2002). Beekeeping for Rural development, its potentiality and beekeeping against poverty, Bangladesh Perspective, pp.1-6.

Shahid M and Qayyum A (1977). Bee Flora of NWFP. *Pak. J. Fores*. Pakistan Forest Institute, Peshawar, **27**(1): 1-11.

SMEDA (2009). Karak District Profile. Small and Medium Enterprise Development Authority. Ministry of Industry and Production, Government of Pakistan, pp.1-14. http://www.smeda.org/downloads/Districts_Profile_Karak.pdf

Wikipedia, Honey from Wikipedia, the free encyclopedia. Available at: http://en.wikipedia.org/wiki/Honey Accessed September 24, 2011.