Minia Journal of Agricultural Research and Development

Volume 24
No. 2 2004

Established in 1974 ISSN- 1110-0257
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Minia University
Faculty of Agriculture

Minia Journal of Agricultural Research and Development

Volume 24 No. 2
2004

Minia J. of Agric. Res. & Develop.
Vol.(24) No.2 pp 191-210 ,2004

DISEASES AND PESTS ASSOCIATED WITH HONEYBEE COLONIES IN SAUDI ARABIA

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Received 28 April 2004 **Accepted 24 May 2004**

ABSTRACT

The occurrence and distribution of diseases and pests of honeybees *Apis mellifera* L. in Saudi Arabia were surveyed during February-May 1989. A total of 375 colonies at fourteen localities were visually examined for pest and signs of bee diseases.

Most of the diseases that attack honeybees were found in Saudi Arabia. Nosema disease was found in six apiaries inspected. Another protozoan, *Malpighamoeba mellificae*, the cause of bee amoebae disease, was detected in two apiaries. *Ascosphaera apis*, the cause of chalkbrood, was found in six apiaries. American foulbrood (AFB), caused of bacterium *Bacillus larvae*, was found in two apiaries. *Bacillus alvei*, secondary bacterium, was found in three apiaries. The bacterium, *Melissococcus pluton*, the cause of European foulbrood (EFB), was found in one apiary. The mite, *Varroa jacobsoni*, and the bee louse, *Braula coeca*, were present in 18 and 21 apiaries, respectively. Egypt and/or Japan bee virus (EBV and/or JBV) were present in three areas. Chronic bee paralysis virus (CBPV) was found in two areas. Bee virus Y, Black queen cell virus (BQCV), and sacbrood virus (SBV) were each detected in one area.

Also, most of the pests and predators that attack honeybees are present in Saudi Arabia. Bee wolves (*Philanthus triangulum*) and hornets (*Vespa orientals* Somalica) were collected from five areas. Palarus (*Palarus latifrons*) was collected from three areas.

Bembis (*Bembis arenaria*) and death's head hawk moths (*Acherontia atropos*) were found in two areas. *Campsomereilla thoracica*, oil beetles (*Meloe variegatus*), *Delta campniforme* gracile, and paper wasps (*Polistes wattii*) were each collected in one area. Infestation of wax moth (*Galleria mellonella* or *Achroia grisella*) were observed in most areas. The praying mantis was commonly found in South and Southwest areas.

Spiders were observed in two areas. Reptiles and bee eater *Merops apiaster* were observed in most areas. *Merops orientals* cyanophrys Arabia were found in five areas. Blue-checked bee eaters were found in one area only.

Some factors assisting in the distribution and spread of honeybee diseases and pests are discussed. Since this is the first survey to be made in Saudi Arabia, it will help focus future research efforts.

INTRODUCTION

Beekeeping began in the Arabian Peninsula thousands of years before Saudi Arabia became a country. The first written evidence dates back 1400 years. Most beekeepers in Saudi Arabia are traditional, using log hives for their bees. However, the use of modern beekeeping techniques and the importance of commercial apiaries are increasing. Present knowledge of the occurrence of bee diseases, pests and predators in Saudi Arabia is poor.

Abou el Naga (1987) reported the presence of European Foulbrood (EFB), caused by the bacterium *Melissococous pluton* but, there are no other publications. Hence, there is a need for a quantitative survey of bee diseases.

Some Hymenopterus insects are listed in the Fauna of Saudi Arabia (Richard, 1984) but not as honey bee enemies. Hence a survey for pests and predators is important. In Saudi Arabia favorable conditions exist for most of the pests and predators of honeybees and they are serious economic problems.

The awareness of the beekeepers of honeybee pests, predators and diseases and adoption of modern hive and colony management techniques would help in developing the beekeeping industry in Saudi

Arabia, thus decreasing the importation of honey and of bee packages and queens.

The objective of this research was to survey diseases, pests and predators of the honey bees in the Emirates of Saudi Arabia, that will help set priorities for the future study of the most important diseases, pests and predators that cause the most damage to bee colonies.

MATERIAL AND METHODS

A total of 375 colonies from 102 apiaries at fourteen localities (Table 2) were visually examined for the presence and symptoms of honeybee diseases and presence of pests, predators and parasites.

Disease surveyed

A field trip of three months was carried out to Saudi Arabia starting from mid February till mid May 1989; during the active season for the bees in most areas of the country. The presence of the brood usually influences the diseases, especially the brood diseases and parasitic mites.

Smears of abnormal and apparently healthy larvae were tested for the presence of acute bee paralysis virus (ABPV), Arkansas bee virus (ArBV), black queen cell virus (BQCV), chronic bee paralysis virus (CBPV), sacbrood virus (SBV), cloudy wing virus (CWV), filamentous virus (FV), Japan and/or Egypt bee virus (JBV, EBV) and Kashmir bee virus. Dead bees from hive bottom boards and entrance were tested for the viruses listed above.

Bacterial assays for American foul brood *(Bacillus larva),* European foul brood *(Melissococcus pluton),* and secondary bacteria were performed as well.

Randomly selected life adult worker bees were collected and tested for the presence of the Protozoa *Nosema apis* and Malpighamoeba, *Braula coeca,* the tracheal bee mite *Acarapis woodi,* and for the mite *Varroa jacobsoni.*

Collected samples and slides were placed in labeled vials, and transported on ice to different laboratories to be analyzed.

Testing for viruses

Gel diffusion tests and transmission electronic microscopy as describe by Bailey (1981) were used to test the presence of viruses. The antiserum was provided by Ms. Ball at Rothamsted Station.

Abdomens of 10-25 bees per hive were removed, grounded in mortar and viewed under 400x magnification in a light microscope for the presence of *N. apis* spores and *M. mellificae cysts.*

Another method for identifying protozoan diseases was used. The midgut and hindgut from individual bees were placed on a slide and examined after spreading out the parts with needles. Water was added to dilute the mass and the tissues were examined at 400x magnification.

Testing for Chalkbrood

The identification of chalkbrood, caused by *Ascosphaera apis* was done visually by looking at the frames with infection. Dead larva appeared as hard, chalky-white remains ('mummies') lying along the length of the cell. Mummies were sometimes also found outside the hives or on the bottom board of the hive.

Testing for tracheal bee mites

Samples of 10-25 bees per hive were collected dissected and examined by light microscopy to confirm infestation in thoracic trachea.

Testing larvae for American and European foul brood

Smears were prepared from larvae, which showed signs of the diseases. The pulped bodies of the suspected larvae were spread on glass slides, air dried, away from the direct sun, and the slide was kept in a slide carrier for examination.

In the laboratory, the smears were re-suspended in distilled water, then smeared onto another slide, and heat-fixed over an open flame, flooded with 0.2% carbol fuchsin stain for 30 second, washed, air dried and examined with the oil-immersion lens for the presence of *B. larvae* road or spores and for the presence *M. pluton.*

Testing for Varroa mites and Braula

Capped brood cells of workers and drones were opened with forceps. Larvae or pupae were removed and checked for *V. jacobsoni.*

Also, chemical diagnosis was done by using one strip of Folbex VA. The hive floor was covered with paper, and the hive entrance was closed, before treatment. After one hour, the paper was removed and the debris was examined carefully for *V. jacobsoni* and *B. coeca.* In hives that contained honey for harvest, the tobacco smoke detection technique was used (Ritter 1981).

For traditional hives, the paper was slid into the open front of the hive, half strip of Folbex VA was fixed with a pin and burnt and then the front block was returned. The paper was removed and examined for *Varroa and Braula.*

Apiaries and hives were visually examined for the presence of pests, predators and parasites. Samples of insects, nests, or other pests, predators and parasite were collected, kept in boxes or vials and later identified.

Birds were observed flying around the apiaries, and sometimes killed samples were collected also.

RESULTS AND DISCUSSION

Table 1 lists the viruses found infecting honeybees colonies in Saudi Arabia. The geographical distribution of these viruses seems to be confined to five areas where apiaries were inspected.

The results of the present study clearly indicate the presence of. black queen-cell and Y virus in Al-Qasim (Unayzah), chronic paralysis in Abha (Beljurshi), sacbrood in Makkah (Jeddah), and Egypt and/or Japan bee virus in Abha (Abha, Al-Namas), and Al-Bahah (Beljurshi). In fact, both Egypt and Japan viruses react similarly with the same anti-serum (Ball, personal communication) and, therefore, it was difficult to differentiate between them. No attempt was made to differentiate between them in the present study. BQCV, FV, and YV are intimately associated with *Nosema apis* (Bailey, 1981). BQCV was found in Unayzah in the apiary that was infected with *N. apis.* Y virus was also found in an apiary that was infected with *N. apis* in Burayadh.

Table 1. List of viruses detected in Saudi Arabia.

Virus	Area
Black queen-cell (BQCV)	Unayzah
Chronic paralysis (CPV)	Beljurshi, Abha
y acute paralysis (APV)	Unayzah
Sacbrood (SBV)	Jeddah
Egypt and/or Japan (EBV/JBV)	Al-Namas, Beljurashi, Abah

Transmission Electron Microscopy was used to detect filamentous (FV); all samples were negative.

Ball (1988) stated that in Germany, where bees are severely infested with the parasitic mite *Varroa jacobsoni,* acute paralysis virus is the major cause of both adult bee and brood mortality. APV was not found in Saudi Arabia in this survey.

Table 2 lists all the honeybee diseases which were diagnosed in Saudi Arabia with respect to their geographical distribution, and numbers of apiaries inspected and colonies examined.

Nosema apis

Nosema apis was found in six areas, and *M. mellificae* was found in two areas only. The frequencies of the protozoans *N. apis and M. mellificae* were low, not exceeding 6 and 2 percent of the apiaries inspected, respectively. Both protozoans were found at Al-Qasim and in the same colonies. This is not surprising, since both are transmitted in the same way (Bailey, 1981). Interestingly, *N. apis* was found at three other sites: Makkah, Al-Bahah and Abha but there were no signs of *M. mellificae.* It is tempting to speculate that climatic variation may explain the differences in distribution, Makkah being hot like Al-Qasim but far more humid, while Al-Bahah and Abha are cooler, being at a higher altitude. Indirect evidence for the effect of climate on the spatio-temporal distribution of these organisms is presented by Bailey (1981), who found fewer *M mellificae* cysts during the summer than spores of *N. apis* and suggested that they had insufficient time to develop in the short-lived bees of summer. A parallel situation may exist with respect to *M mellificae* in bees in Saudi Arabia.

Table 2. Honeybee diseases and paraites in the Emirates of Saudi Arabia.

Diseases Location	Nosema	Amoeba	Chalkbrood	AFB	EFB	*Bacillus alvei*	*Acarapis woodi*	*Varroa jacobsoni*	Bee lous	No. of apiaries inspected	No. of hives examined
* Al-Riyadh											
Al-Riyadh	-	-	+	-	-	-	-	+	+	5	25
Al-Kharj	-	-	+	-	-	+	-	+	+	4	20
* Eastern											
Province											
Al-Hofuf		-	-	-	-	-	-	+	+	4	16
Al-qateef	-	-	+	-	-	-	-	-	+	4	17
* Al-Qasim											
Unayzah	+	+	-	+	-	-	-	+	+	4	18
Burayadh	+	+	-	+	-	-	-	+	+	4	16
* Ha'il											
Ha'il	-	-	-	-	-	-	-	+	+	4	19
* Turayf	=	=	=	=	=	=	=	=	=	=	=
* Al-Jawf	=	=	=	=	=	=	=	=	=	=	=
* Al-Qurayyat	=	=	=	=	=	=	=	=	=	=	=
* Tabuk	-	-	-	-	-	+	-	-	+	3	10
* Al-Madinah											
Al-Madinah	-	-	-	-	-	-	-	+	+	4	20
Al-Fdqurah	-	-								15	15
* Makkah											
Jeddah	+	-	+	-	-	-	-	+	+	4	20
Al-Taif	+	-	-	-	-	-	-	+	+	4	20
Al-Qunfudaha	-	-	-	-	-	-	-	+	+	3	12
* Al-bahah											
Al-bahah	+	-	+	-	+	-	-	+	+	4	12
Beljurashi	-	-	-	-	-	-	-	+	+	4	20
Tahama	-	-					-	+	+	7	14
* Abha											
Abha	+	-	+	-	-	-	-	+	+	4	20
Mahayl	-	-					-		+	3	4
Al-namas	-	-	-	-	-	-	-	+	+	4	20
* Jizan											
Jizan	-	-	-	-	-	-	-	+	+	2	10
Sabea	-	-	-	-	-	-	-	+	+	4	20
Fyfa										4	4
Farasan Island	=	=	=	=	=	=	=	=	=	=	=
* Najran											
Najgran	-	-	-	-	-	-	-	+	+	4	20
Dharan Al janub	=	=	=	=	=	=	=	=	=	=	=
% infestation of apiaries inspected	6	2	6	2	1	3	0	18	21	102	373

+ indicates that the diseases is present. - indicates that the diseases is not present.
= indicates that there are no bees (According to the ministry of Agriculture branch in the area).
( ) indicates that it was not possible to examine the traditional hives.
* indicates the Emirates names.

Ascosphaera apis

Ascosphaera apis, the cause of chalkbrood, was only diagnosed in six areas and was not found in 13 others. Its presence or absence could not be confirmed in six areas where traditional hives were found. *A. apis* was found in Al-Riyadh, Eastern Province, Al-Qasim, Makkah, Al-Bahah, and Abha. The infection was moderate, not exceeding 6 percent of the apiaries inspected. A few cells in one or two frames in each apiary were infected, except in one of the apiaries in Riyadh where tens of mummies were found on the ground in front of the hives. In Saudi Arabia, some of the beekeepers import large quantities of pollen to feed their bees when needed. This pollen may be contaminated with chalkbrood spores. It has been proven that feeding honeybees with commercially purchased pollen containing large numbers of mummies contaminated by *A. apis* caused the disease in 97 out of 124 colonies fed (Moffett, et al., 1978).

There are contradictory reports about the effect of the weather in encouraging chalkbrood growth and spread. Currently, Heath (1985) concluded that chalkbrood is essentially a disease of temperate climates. Although the fungus has undoubtedly been imported to most tropical countries at some time, it seems to have failed to become generally established.

Bacillus larvae

AFB was only detected in two areas. It was not found in 17 areas while its presence or absence could not be confirmed in 9, because of the difficulty in examining traditional hives. AFB was recorded in two percent of the apiaries inspected.

Bacillus larvae was found only in Al-Qasim, and all hives in three apiaries were severely infected in both Unayzah and Burayadh. Although, the symptoms were obvious, samples were taken to the laboratory for examination. The imported honey, used for feeding bees, may be one of the important sources of introducing and spreading of some diseases in the country. Gochnauer (1981) examined honey, pollen and wax cappings extracted from colonies that were heavily infected with AFB and found that honey from infected hives was shown to contain 24,300,000 spores per gram, pollen

contained 4,500,000 spores per gram, and wax contained 9,000,000 spores per gram.

Honey bee worker may have as many as 500,000 cysts per bee, and *N. apis* up to 30 million spores per bee. If by any chance honey gets contaminated by one or a few bees during extraction, there would be enough cysts or spores to infect several colonies. So these diseases, too, could be introduced into the country in contaminated honey or pollen.

The spores of AFB are resistant to sunlight, desiccation, heating, freezing and common disinfectants and they retain their viability for many years in honey (Aughterson, 1970). EFB and CB spores have been shown to survive at least three years in contaminated equipment or honey. Nosema spores, on the other hand, can survive at least one year (Homitzky, 1984).

Melissococcus pluton

The cause of EFB (*M. pluton*) was found only in one area (Al-Bahah). However, the presence or absence of EFB was not confirmed in 9 other areas. It is present only in Al-Bahah. EFB is the only honeybee disease that was reported in Saudi Arabia by Abo el Naga (1987).

Bacillus alvei

Bacillus alvei was recorded at Al-Kharj, Tabuk and Al-Bahah, being absent in 16 others and its presence or absence could not be confirmed in nine areas.

The infection was light, not exceeding 3 percent of the apiaries inspected. *B. alvei* is one of the secondary bacteria that may accelerate the death of infected larvae. Bailey (1981) reported that *B. alvei* forms very resistant spores and becomes established in colonies that have had endemic European foulbrood for several years; it causes a characteristic foul odor. The previous report may augment the evidence for the presence of EFB, especially because *B. alvei* was found in the same apiary at Al-Bahah as that in which EFB was suspected to be present.

Acarapis woodi

Acarapis woodi was not found during this survey, and all the samples were mite-free. However, the presence or absence of Acarine could not be confirmed in six areas, for the same reason already mentioned.

Varroa jacobsoni

The second most commonly occurring disease was *Varroa jacobsoni*; it is widespread in the country (Table 2). It was recorded in 18 areas, absent at two others. Eight areas could not be tested. Its absence or presence in these 8 areas cannot be confirmed. It was found in 17 percent of the apiaries inspected.

The mite was first seen by the author in the summer of 1986 while visiting an apiary in Beljurashi City. The presence of the mite in Saudi Arabia was later confirmed by Bradbear (1988). Most likely, the mites were introduced much earlier than this time. De Jong and Goncalves(1981) concluded that mites are in an area two to six years before colonies show obvious signs of infection. The death of honeybee colonies follows the initial period of infestation. This stage has been reached in Saudi Arabia. By now the bees in these two areas have been damaged as a result of infection and most of the apiaries, if not all, are infested with Varroa as well as other diseases. Some apiaries containing between 50 to 200 hives have been completely destroyed as a result of Varroa infection.

The second part of the country that has a severe infection rate is the mountainous area in the South and Southwest where native bees and traditional hives are concentrated. Imported bees attack the smaller native bees and introduced many diseases to the area.

During this survey, it was found that in most of the apiaries visited, the numbers of deformed native bees were considerably higher than those of imported bees. In this case, native drones were the most affected segment of the bee population.

Some apiaries have two to five Langestroth hives beside the traditional hives in the same apiary which enabled examination of the brood. The author found up to 15 *V. jacobsoni* female mites per cell.

In some cases there were imported and native bees in the same apiary where both were about equally. However, the bees on the ground with deformed wings were native bees.

In the temperate zone of Europe, 76 percent of female mites entering worker brood produce offspring. In the subtropical zones of Europe and the Middle East, and the tropical zones of Asia, the proportions of mites entering worker brood that do or do not produce offspring are approximately equal (Ifantidis, 1983; Ritter and De Jong, 1984; Ritter and Schneider-Ritter, 1986). In contrast, Ritter and De Jong (1984) found only 43 percent of mite females reproduced in the worker cells from tropical areas of South America. This might explain why the infestation is high in the South and Southwest where it is cooler than other parts of Saudi Arabia (temperature ranged from -10 to 30°C.) However, there is less infection by Varroa in the other parts of the country except in Jeddah and Riyadh, where the infestation probably started earlier and has not been discovered until recently.

The race of bees in the South and Southwest may have an influence on increasing the rate of infection. However, no work has been done on *Apis mellifera jemenitica* in Saudi Arabia with respect to disease susceptibility.

The beekeeping management practice may also influence the increasing rate of infection in the South and the Southwest since more than 90 percent of the hives in that area are traditional hives, which are log hives. It was difficult to examine them in comparison with the modern hives. However, there has been no study to assess the damage that mites cause to the bees in the traditional hives, except in Tunisia, where they have the same sort of hives. Michel and Ruttner (1981) reported that the number of traditional colonies in northwest Tunisia dropped from 25,000 to 2,450, which is more than 90 percent, within 3 to 4 years from the beginning of Varroa infection.

Braula coeca

A total of 373 hives in 102 apiaries in 21 areas were examined for the presence or absence of this parasite. Infection with *B. coeca* was diagnosed at 21 areas throughout the Provinces of the Kingdom (Table 2) hence it was the most commonly occurring parasite. Only in

two areas was *B. coeca* not recorded and at eight others it was not possible to look for its presence either because of the difficulty in examining traditional hives or because of the absence of domesticated bees. *B. coeca* was recorded in 20 percent of the apiaries inspected. *B. coeca* were found in 9 and 10 Emirates, respectively, out of the 11 Emirates surveyed during the present study. It seems that this parasite is widely distributed and do not follow any particular geographical pattern.

Pests, predators, and parasites associated with honeybees colonies in Saudi Arabia are listed in Table (3). Local vernacular names, scientific names and areas where these enemies were found are all shown. They include a variety of organisms including insects, arachnids, reptiles and birds. Insects were the most commonly found pests, representing eleven different species, where as birds were only represented by three species of bee-eaters. Arachnids (spiders) and reptiles (lizards) were represented by one species each.

Philanthus triangulum

Bee wolf (*P. triangulum*) was found in Tubuk, Unayzah, Jeddah, Tahama, and Jizan. Their presence, particularly in these areas, may be due to the fact that they are ground-nesters and that the soil at these localities is characterized as being moderately to consolidate clay, loam, or sandy loam. Being ground-nesters, they easily build their nests in such soils. They were found in a mass at the entrances of the hives, the maximum number of which was 15 wasps at the entrance of one hive, therefore preventing the bees from foraging. The beekeepers in Saudi Arabia regard it as one of the most serious pests. In Egypt, Simonhomas and Simonhomas (1978) reported that one bee-wolf may catch up to ten honeybees per day.

Palarus latifrons

P. latifrons has been found in masses preying bees, similar to *P. triangulum*, in the following areas: Jeddah, Al-Qunfudaha, Thahma, and Jizan. This species is a new record for the Saudi Arabian fauna. It has been recently collected by the author and identified by K.M. Guichard of the British Museum (Natural History), London. It is an African species originally. Clauss (1983) claims that in Botswana,

131 *P. latifrons* were killed in front of the hive within 75 minutes, yet some of them were still left.

Bembix arenaria

Bembix arenaria was found in Jeddah and Al-Qunfudah. It has a very strong body and it is relatively larger than *Palarus latifrons*. It was found preying on bees in both areas.

Vespa orientalis

The oriental hornet *Vespa orientalis somalica* was found in Al-Khari, Tahama, Abha, Fyfa, and Najran. It is widely distributed especially where date palm trees grow; Richard (1984) listed some of the areas where *V. orientalis somalica* has been found. This is in agreement with the findings of the present study. Their nests were found in most apiaries examined and some of the wasps were found resting individually or in groups in the same apiary during this survey.

***Campomereilla thoracica and Delta campaniforme* gracile**

C. thoracica and D. campaniforme gracile have been found outside the hive feeding on honey. It seems there is no direct harm caused by these insects to the bees. However, these wasps, as well as other wasps, might contribute to the spread of V. *jacobsoni* by transferring them from one hive to another or from one apiary to another. Gerig (1989) reported that a Swiss beekeeper observed that wasps feeding at sugar sacks were each infested with two or three of the mites. Upon inspecting three combs from the wasp's nest containing over 2,500 cells, 42 mites in various stages of development were found. However, reproduction of mites was not observed within the wasp's cells.

Wax moths (*Galleria mellonella* L. and *Achroia grisella* Fab.)

Greater and lesser wax moths were found everywhere in the study area. This was due to the mismanaged and/or poorly maintained apiaries of each site where, in fact, some hives were only opened when honey was to be taken. However, most commercial apiaries and some state owned apiaries were properly managed and well maintained. In this case, infestation by wax moth was minimized.

Table 3. Pests and predators associated with honeybees in Saudi Arabia.

Vernacular names	Arabic common names	Species	Area
Bee Wolves	Daeb al nahel	*Philanthus triangulum* Lepeletier	Tubuk, Unayzah, Jeddah, Tahama, Jizan
Palarua	" "	*Palarus latifrons* Kohl	Jeddah, Al-Qunfundah, Tahama
Bembix	" "	*Bembix arenaria* Handlirsch	Jeddah, Al-quanfudah
Hornets	Dabour al ballah	*Vespa Orientalis* Somalica Giordanisokia	Al-Kharj, Tahama, Abha, Fyfa, Najran
"	Dabour	*Camposmereilla thoracica* F.	Al-Madinah
"	"	*Delta campaniforme gracile* Saussure	Unayzah
Paper wasps	Dabour Ahmor	*Polistes wattii* Cameron	Hufuf
Greater Waxmoth	Dodat al Shama	*Galleria mellonella* L.	Found in most areas
Lesser waxmoth	" "	*Achroia grisella* Fabricius	Found in most areas
Death's Head Moths	Farasht al-simisim	*Acherontia atropos* L.	Hfa'il, Al-Qateef
Ants	Namel		Found in most areas
Blister (Oil beetles)	Kanfoos	*Meloe variegatus* Donvon	Unayzah
Praying Mantis	Faras Al-Naby		
Spider	Ankabout		Madinah, Riyadh
Lizard	Wazgah		Found in most areas
Bee eaters	Wir war, Warakah	*Merops orientalis cyanophrys* Arabia	Madinah, Jeddah, Tahama, Qunfudah, Abha
" "	" "	Blue-cheeked Bee-eater	Riaydh
" "	" "	*Merops apiaster*	Found in most areas

Diseases and pests of honeybee

Ants

Ants were found in most areas especially where the temperature is high. They are considered one of the most common enemies of honeybees in Saudi Arabia.

Meloe variegatus

M. variegatus, is commonly called the blister or oil beetle. Meloe larvae are parasitic to honeybees. Adults, on the other hand, are not parasitic to bees (Caron, 1987). About five of these first larval stages, the triungulin, were found on the abdomens of bees in one area only, namely Unayzah. It was not easy to remove them from between the segments due to the clinging of the triungulin's claws to the hairs of the bee. As soon as the larvae are removed from the bees they crawl fast and try to hide.

Praying mantides

Praying mantides were observed by the author feeding on honeybees on two occasions in front of log hives in Al-Baha. This observation was made in the afternoon.

Spiders

Spiders were noticed by the author in two areas (Riyadh and Madinah). The spider catches the bee at the entrance and keeps holding it for at least 15 minutes.

Lizards

Lizards have been found in most areas, both in weak and strong colonies, and mostly inside the hives, especially modern ones. They often hide in the empty space between the outer and inner covers of the hive, and they are seldom found at the entrance of the hives. When the hive is opened they run away. No attempt was made to assess the damage they might cause, but some beekeepers believe that they can cause the sudden loss of the queen from the weak colony.

Bee-eaters

As is clear from Table 3, bee-eaters are widely distributed and most beekeepers in different parts of the country regard them as serious pests.

Merops apiaster

M. apiaster is a migratory species, which preys on bees in an apiary for a period of time and then moves on to another locality. However, when it is present around the apiary it produces specific sounds which the bees recognize and they then stay inside the hive.

Merops orientalis cyanoprys

M. orientalis cyanoprys Arabia has been seen by the author in the following areas: Madinah, Jeddah, Tahama, Qunfudah, and Abha. It is less harmful to the bees than *M. apiaster*.

The blue-cheeked bee-eater

The blue-cheeked bee-eater is rarely seen by the beekeepers in the country. However, a sample of this species was collected by the author from the Riyadh area.

Bee-eaters, especially the European bee-eaters, are particularly dangerous to beekeeping operations because of their tendency to attack bees in an apiary in flocks of hundreds. The foraging bees and the queen going out for mating are all vulnerable to bee-eaters.

Most of bee-eaters attack the apiary between 8:00-9:00 a.m. and again at 4.00 p.m. while their numbers decline by midday and around sunset. This is followed by a second group at 4:00 p.m. which. The author found up to 150 stings in a trapped bee-eater, most of which were in its head. In contrast, the maximum number of workers which have been found in the stomach of a bee-eater in Saudi Arabia was only 25 bees.

Several factors assist in the distribution and spread of honeybee diseases. These include: regular importation of diseased packages and queens from different parts of the world, importation of contaminated bee products, lack of trained quarantine personnel, lack of trained beekeepers, favorable tropical climatic conditions, and the migratory practices of beekeeping. These factors may combine to complicate the honeybee disease situation in Saudi Arabia.

The presence of most of the honeybee diseases and pests in Saudi Arabia add more problems to the beekeeping industry and the result of this survey will be helpful to beekeeping specialists to help

them identifying what diseases and pests are present in the country and to concentrate on those that cause the most damage to the colonies.

Awareness of bee diseases by beekeepers and the adoption of modem hive and colony management techniques could help develop the beekeeping industry in Saudi Arabia. This could result in decreasing the importation of honey, bee packages, and queens.

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Diseases and pests of honeybee

الأمراض والآفات المصاحبة لطوائف نحل العسل
فى المملكة العربية السعودية

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تم حصر وتوزيع الأمراض والآفات المصاحبة لطوائف نحل العسل خلال الفترة من فبراير – مايو موسم 1989 حيث تم فحص 375 طائفة نحل فى أربعة عشرة منطقة .

وقد سجلت معظم الأمراض التى تهاجم طوائف نحل العسل خلال تلك الدراسة حيث سجلت النوزيما فى ستة مناحل بينما سجل مسبب مرض الأميبا فى منحلين فقط . سجل أيضاً مسبب الحضنة الطباشيرية فى ستة مناحل بينما سجل مسبب تعفن الحضنة الأمريكى فى منحلين والمسبب الثانوى فى ثلاثة مناحل بينما سجل مسبب تعفن الحضنة الأوربى فى منحل واحد وقد سجل وجود طفيل الفاروا فى 18 منحلاً بينما سجلت القملة العمياء فى 21 منحلاً . وقد سجل وجود فيرس النحل المصرى واليابانى فى ثلاثة مناحل وفيروس شلل النحل الحالى فى منحلين . وفيما سجلت كل من فيرس النحل Y فى منطقة واحدة .

ومن خلال تلك الدراسة أيضاً معظم الآفات التى تهاجم طوائف نحل العسل لوحظ تواجد ذنب النحل ودبور البلح فى خمسة مناطق . كما سجل دبور البالاريوس فى ثلاثة مناطق كما سجلت فراشة السمسم فى منطقتين كما سجلت أنواع من الدبابير الأخرى . والدبور الأصفر فى منطقة واحدة . ولقد لوحظ تواجد دودة فراشة الشمع الكبيرة والصغيرة فى معظم المناطق . وسجل وجود مفترس حشرة فرس النبى فى مناطق جنوب وجنوب غرب المملكة . وسجلت العناكب فى منطقتين وسجلت طيور آكل النحل (الوروار) فى بعض المناطق حيث سجل نوع الوروار الشرقى فى خمسة مناطق والوروار الأزرق فى منطقة واحدة .

وقد نوقشت العوامل التى تؤثر فى توزيع الأمراض والآفات فى المناطق المختلفة بالمملكة وتعتبر تلك الدراسة هى الأولى من نوعها والتى تساعد فى جهود البحث المستقبلية .

مجلـــــة
البحـــوث والتنميـــة
الزراعيـــة بالمنيـــا

مجلد ٢٤ رقم ٢
٢٠٠٤

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رقم الفاكس: ٠٨٦/٣٦٢١٨٢ — رقم التليفون: ٠٨٦/٣٦٢١٨٢