J. Agric. Sci. Technol. (2006) Vol. 8: 351-355

RESEARCH NOTES

Report and Survey of Morphometric Characteristics of *Varroa destructor* (Acari:Varroidae) Collected from Honey Bees in Tehran Province, Iran

H. Rahmani[1]*, K. Kamali[1], A. Saboori[2] and J. Nowzari[2]

ABSTRACT

This research explains the morphometric characteristics of *Varroa destructor* Anderson and Trueman in Tehran Province. 180 adult female mites were collected from three different colonies of *Apis mellifera* L. in three apiaries during September 2003 to May 2004. These colonies were divided according to three altitudes-less than 1000m, 1000-1500m and more than 1500m above the sea level. The morphological characteristics of mite samples were examined using light microscopy. Measurements of mite specimens including body lengths, widths, mean size of leg segments and chelicerae were obtained from 180 females. Data were analyzed using the SAS package. The results revealed that: with 95% confidence intervals, body lengths were 1152.6-1218.9 (for less than 1000m altitude), 1163.2-1220.7 (for 1000-1500m altitude) and 1167.1-1228.3 (for grater than 1500m altitude). Also, body widths for those apiaries with 95% confidence intervals were: 1709.8-1818.2, 1712.1-1819.5 and 1720.4-1820.6, respectively. Mean body lengths were 1197.2, 1199.2 and 1200.1 and mean body widths were 1775.6, 1781.7 and 1789.9, respectively. No significant differences were observed between the size of leg segments and chelicerae among specimens studied. Comparison between measurements of body lengths and widths of specimens which were collected from Firozkoh (above 1500m altitude), Karaj(1000-1500m altitude) and apiaries in Varamin (less than 1000m altitude) in Tehran Province revealed that there was no significant difference between the three colonies. These specimens were also differ from *V. jacobsoni*. The results showed that our specimens were *V. destructor* not *V. jacobsoni*. Moreover, the Tehran Province specimens are similar to *V. destructor* in that they are less spherical than *V. jacobsoni*.

Keywords: Honey bee, Morphometric characteristics, Tehran Province, *Varroa destructor*.

INTRODUCTION

The mite that parasitizes European honey bees (*Apis mellifera* L.) was previously known as *Varroa jacobsoni* Oudemans, 1904 and was recorded as an ectoparasite of eastern honey bees (*Apis cerana* Fab.) (Boudagga *et al.*, 2003). This mite was identified as *Varroa destructor* by a morphological study of many females collected throughout the world including Asia. *Varroa jacobsani* (Acari: Varroidae) has been known as a major pest of honey bees in Iran. Ruttner and Maul (1983) reported this species from Iran for the first time and there is a little information available about different aspects of this mite (Bahreini *et al*., 2000). This mite was first described as an ectoparasite of the east-

1. Department of Entomology, College of Agriculture, Tarbiat Modarres University, Tehran, Islamic Republic of Iran.
2. Department of Plant Protection, College of Agriculture, University of Tehran, Karaj, Islamic Republic of Iran.
* Corresponding author.

[DOR: 20.1001.1.16807073.2006.8.4.9.3]

ern honey bee, *Apis cerana* in Java (Asia). The introduction of commercial *Apis mellifera* L. colonies into areas with *A. cerana* populations allowed *V. jacobsoni* switching to the new host, of which it has now became a serious worldwide pest (Boudagga *et al*., 2003). After studying mtDNA CO-I gene sequences and morphological characters of populations of *V. jacobsoni* from many parts of the world (not including Iran), Anderson and Trueman (2000), proved that this species is a complex of two species including *V. jacobsoni* and *V. destructor*. *V. jacobsoni* infests *Apis cerana* in the Malaysia-Indonesia apiaries and *V. destructor* attacks its natural host, *A. cerana*, on mainland Asia as well as *A. mellifera* world wide (Anderson and Trueman 2000).

In this paper, we explain the status of Tehran Province species of *Varroa*, using the morphological characters of female mites. All measurements are given in micrometers.

MATERIALS AND METHODS

Female *Varroa* mites were collected from *A. mellifera* populations from Firozkoh (higher than 1500m altitude), Karaj (1000-1500m altitude) and apiaries in Varamin (less than 1000m altitude) in Tehran Province (Iran) and were preserved in 70% ethanol. These specimens were obtained from the surface of workers honeybees with collection of these honeybees and female *Varroa* mites separated from body of them. One hundred and eighty female specimens of *Varroa* were collected from three colonies during September 2003 to May 2004. They were transferred to the laboratory for further studies. These three colonies were divided according to the altitude of their location, including less than 1000m, 1000-1500m and above 1500m. Collected specimens were kept in lactophenol and mounted using Faure liquid. Microscopic slide mounts of mites were prepared and compared with pertinent references for purposes of identification. Measurements of mite specimens were made in micrometers. To confirm the specific identity, the mite morphology was examined using light microscopy and the length and width of each female as well as the size of the leg segments and chelicerae were measured individually. These measurements were obtained from sixty females from each colony and compared between the three colonies. Morphological data were analyzed using the SAS package and compared with *V. jacobsoni*.

Table 1. Measurements (in micrometers) of the body size of *Varroa* females from Tehran apiaries, compared with those of *V. jacobsoni* and *V. destructor* as reported by Anderson and Truman (2000); Zhang (2000) and Boudagga *et al*. (2003).

Species	Body length		Body width		No. of specimens examined
	Mean	SD	Mean	SD	
V. destructor (Anderson and Trueman 2000)	1167.3	26.8	1708.9	41.2	42
V. jacobsoni (Anderson andTrueman 2000)	1063.0	26.4	1506.8	36.0	73
V. destructor (Zhang 2000)	1159.0	21.6	1700.0	46.5	5
V. destructor (Tn) Nord (Boudagga *et al*. 2003)	1204.9	40.10	1738.5	35.30	20
V. destructor (Tn) Centre (Boudagga *et al*. 2003)	1164.9	38.46	1711.2	47.44	20
V. destructor (Tn) Sud (Boudagga *et al.* 2003)	1197.1	28.31	1756.9	39.29	20
V. destructor (Iran) No 1	1197.2	22.22	1775.6	38.81	60
V. destructor (Iran) No 2	1199.2	20.27	1781.7	42.39	60
V. destructor (Iran) No 3	1200.1	23.31	1789.9	47.69	60

No 1: Apiaries at below 1000m altitude.
No 2: Apiaries at between 1000-1500m altitudes.
No 3: Apiaries at above 1500m altitude.

[DOR: 20.1001.1.16807073.2006.8.4.9.3]

RESULTS AND DISCUSSION

Examination of specimens from the three apiaries revealed that: with 95% confidence intervals, body lengths were measured as 1152.6-1218.9 (for below 1000m altitude), 1163.2-1220.7 (for a 1000-1500m altitude) and 1167.1-1228.3 (for above 1500m altitude). Also, body widths with 95% confidence intervals were: 1709.8-1818.2, 1712.1-1819.5 and 1720.4-1820.6, respectively. Mean body lengths were 1197.2, 1199.2 and 1200.1 and mean body widths were 1775.6, 1781.7 and 1789.9 for the above-mentioned altitudes, respectively. Table 1 presents the means of morphometric measurements of *V. destructor* in three apiaries, with the values reported by Anderson and Trueman (2000), Boudagga *et al.* (2003) and Zhang (2000). Anderson and Trueman (2000) showed that they differ mainly in mtDNA CO-I gene sequences, but could also be separated according to female body size: *V. destructor* is larger than *V. jacobsoni* and has a less spherical shape. Comparison of measurements of body lengths and widths of the specimens studied revealed that there is no significant difference between the three apiaries. Also, they were different from *V. jacobsoni*; thus it can be concluded that morphometric characteristics of the specimens studied fit with *V. destructor* and not *V. jacobsoni*. Moreover, the Tehran Province specimens were similar to *V. destructor* in that they are less spherical than *V. jacobsoni*.

Also measurements of leg segments of female mites from three apiaries showed that there are no significant differences among them. Table 2 presents data obtained from

Table 2. Lengths of leg segments of *V. destructor* collected from three apiaries of Tehran Province (data based on 60 samples for each apiary).

		Leg I		Leg II		Leg III		Leg IV	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
Coxa	No 1	181.8	15.65	158.6	11.00	151.7	7.76	184.3	5.25
	No 2	183.9	10.06	157.4	6.13	151.9	6.60	183.0	4.40
	No 3	182.1	7.89	157.0	5.09	152.4	4.99	183.0	4.67
Trochanter	No 1	75.2	16.12	92.1	11.04	93.4	6.47	81.3	5.83
	No 2	76.0	8.79	89.3	11.95	95.7	4.73	81.7	4.58
	No 3	76.56	5.43	90.2	6.09	95.6	4.29	78.8	4.39
Telofemur	No 1	84.9	12.98	77.8	9.71	92.5	5.91	75.2	7.18
	No 2	86.6	11.61	77.3	6.48	95.0	6.83	74.0	5.05
	No 3	84.7	6.63	79.2	3.98	93.0	8.95	76.5	3.60
Basifemur	No 1	46.1	6.59	55.4	5.75	63.9	4.62	57.7	5.11
	No 2	47.8	4.73	56.3	5.18	62.7	4.25	55.8	7.17
	No 3	47.1	3.58	53.8	4.19	61.2	4.84	56.6	9.68
Genu	No 1	101.8	11.57	109.2	11.08	98.5	7.49	99.2	6.97
	No 2	100.6	7.52	108.9	6.51	97.0	5.12	98.2	5.06
	No 3	100.7	5.12	107.5	4.65	97.2	4.55	98.4	3.76
Tibia	No 1	60.7	7.60	67.2	5.32	65.9	6.48	72.5	8.00
	No 2	59.3	9.42	67.0	4.42	66.9	5.92	73.2	3.98
	No 3	60.0	5.53	68.3	4.84	66.3	5.13	73.8	4.64
Tarsus	No 1	159.1	12.20	169.4	8.53	173.8	7.91	181.1	9.64
	No 2	156.7	6.72	170.9	4.78	173.0	6.09	181.6	4.42
	No 3	156.8	6.0	169.0	3.93	174.4	4.77	180.4	4.76
Pretarsus	No 1	71.4	10.35	85.8	5.65	77.3	6.53	84.2	6.71
	No 2	72.9	6.08	84.9	4.65	78.8	4.31	85.1	5.12
	No 3	72.3	5.78	85.5	4.49	77.0	4.49	84.9	4.93

No 1: Apiaries at below 1000m altitude.
No 2: Apiaries at between 1000-1500m altitude.
No 3: Apiaries at above 1500m altitude.

[DOR: 20.1001.1.16807073.2006.8.4.9.3]

Table 3. Mean length of chelicerae of *V. destuctor* collected from apiaries of Tehran Province (data based on 60 samples for each apiary).

	Apiary 1	Apiary 2	Apiary 3
Cheliceral length	220.7	221.9	219.5
SD	8.49	6.13	3.80

Apiary1: below 1000m altitude.
Apiary2: Apiaries at between 1000-1500m altitude.
Apiary3: above 1500m altitude.

the leg segments of female mites on three apiaries.

No significant difference was also observed among the length of chelicerae in examined specimens (Table 3).

CONCLUSIONS

The species *V. destructor*, is the only species parasitizing *A. mellifera* in Europe which has developed resistance to chemicals used against it. (Sammataro *et al*., 2000). It seems that, along with the migration of beekeepers, this mite was also distributed elsewhere and to Iran with name of *V. jacobsoni* (Mosaddegh and Bahreini, 1994). In contrast, this study was limited to Tehran Province and confirms the fact that *Varroa* species on the European honey bee in Tehran Province is *V. destructor* not *V. jacobsoni*. However, sequencing its mtDNA CO-I in future is required for further confirmation. Moreover, the morphological study of *Varroa* mites collected from other parts of Iran is also recommended.

ACKNOWLEDGEMENTS

The authors thank Plant Protection Department of Tehran University especially Dr J. Nowzari and the many beekeepers of Tehran Province that allowed this study to take place with collection of data from their colonies.

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[DOR: 20.1001.1.16807073.2006.8.4.9.3]

گزارش *Varroa destructor* ازاستان تهران و بررسی صفات مرفومتریک آن

ح. رحمانی، ک. کمالی، ع. ر. صبوری و. ج. نوذری

چکیده

تحقیق حاضر در خصوص حضور یا عدم حضور گونه کنه *Varroa destructor* Anderson and Trueman در استان تهران انجام گرفت. تعداد ۱۸۰ نمونه کنه واروآی ماده ازسه زنبورستان در سه منطقه‌ی فیروزکوه، کرج ونواحی اطراف ورامین در استان تهران که برحسب ارتفاع به ترتیب در بالای ۱۵۰۰ متر، بین ۱۵۰۰-۱۰۰۰ متر و زیر ۱۰۰۰ متر تقسیم بندی شده بود، در طی تابستان و پاییز سال ۸۲ جمع‌آوری گردید. نمونه های جمع‌آوری شده به آزمایشگاه انتقال و جهت بررسی مورفولوژی کنه‌ها از میکروسکوپ نوری استفاده گردید. طول و عرض بدن وبندهای کلیسر هرکنه اندازه‌گیری شد.این اندازه‌گیری‌ها بر اساس میکرومتر (µm) و از ۶۰ ماده در هر منطقه انجام گرفت. سپس بررسی‌های آماری برروی آنها صورت پذیرفت. نتایج حاصله نشان داد که با اطمینان ۹۵٪ طول بدن برای نمونه‌های ارتفاع زیر هزار متر بین ۱۲۱۸/۹-۱۱۵۲/۶ ، نمونه‌های بین ۱۵۰۰-۱۰۰۰ متر بین ۱۲۲۰/۷ – ۱۱۶۳/۲ و نمونه‌های بالای ۱۵۰۰ متر بین ۱۲۲۸/۳- ۱۱۶۷/۱ میکرومتر بودند و عرض بدن برای نمونه‌های ارتفاع زیر هزار متر بین ۱۸۱۸/۲-۱۷۰۹/۸ و نمونه‌های بین ۱۵۰۰-۱۰۰۰ متر ارتفاع بین ۱۸۱۹/۵-۱۷۱۲/۱ و نمونه‌های بالای ۱۵۰۰ متر بین ۱۸۲۰/۶-۱۷۲۰/۴ میکرومتر بدست آمد، همچنین میانگین طول بدن نیز برای ۳ منطقه به ترتیب ارتفاع ۱۱۹۹/۲،۱۱۹۷/۲ و ۱۲۰۰/۱ و برای عرض بدن ، ۱۷۸۱/۷ و ۱۷۸۹/۹ میکرومتر بود. مقایسه اندازه‌گیری‌های طول و عرض بدن ماده‌های واروآی جمع‌آوری شده از مناطق مختلف استان تهران شامل فیروزکوه، کرج ونواحی اطراف ورامین نشان داد که با اطمینان ۹۵٪ بین ۳ ناحیه مورد بررسی اختلاف معنی‌داری از نظر طول و عرض بدن وجود ندارد. همچنین نمونه‌های جمع‌آوری شده از این نواحی با گزارشهای موجود در این زمینه نشان دادکه این نمونه‌ها با *V. jacoboni* متفاوت است و اندازه‌گیری‌ها وجود گونه *V.destructor* را که بزرگتر از گونه *V. jacoboni* بوده و عرض بیشتری نسبت به آن دارد، ثابت می‌کند.

[DOR: 20.1001.1.16807073.2006.8.4.9.3]