



# *Entomofauna*

ZEITSCHRIFT FÜR ENTOMOLOGIE

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Band 35, Heft 18: 413-424

ISSN 0250-4413

Ansfelden, 2. Januar 2014

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## **On the genus *Adelphocoris* (Hemiptera: Miridae) in Guilan province (Iran) and its adjacent areas**

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### **Abstract**

In the plant bugs of Miridae, the species in the genus of *Adelphocoris* REUTER have been known as phytophagous on different host plants specially Fabaceae. Four species of genus *Adelphocoris*, including *Adelphocoris seticornis* (FABRICIUS 1775), *Adelphocoris ticinensis* (MEYER-DÜR 1843), *Adelphocoris vandalicus* (ROSSI 1790) and *Adelphocoris lineolatus* (GOEZE 1778) have been reported previously from Iran especially from Guilan province. Current paper is continuing of a series of synoptic taxonomic treatments on the Miridae known from Guilan province, Iran. In this paper diagnoses, host-plant information, distribution data, illustrations of the adults and their male genitalia are provided to facilitate identification.

Key words: Hemiptera, Miridae, *Adelphocoris*, taxonomy.

### **Zusammenfassung**

Aus der WanzenGattung *Adelphocoris* REUTER (Miridae) konnten in der iranischen Provinz Guilan bisher die vier Arten *Adelphocoris seticornis* (FABRICIUS 1775), *Adelphocoris ticinensis* (MEYER-DÜR 1843), *Adelphocoris vandalicus* (ROSSI 1790) und *Adelphocoris lineolatus* (GOEZE 1778) nachgewiesen werden. Vorliegende Arbeit ist eine Fortsetzung der Dokumentation der Miridae der Provinz Guilan und behandelt und illustriert Informationen zu den angesprochenen Arten.

## Introduction

Plant bugs of Miridae (Hemiptera: Heteroptera) comprises many genera rich in species which some are either harmful or beneficial. The harmful bugs are those that suck the plant sap and injure the plant or damage the reproductive organ. Among plant feeder bugs *Adelphocoris linolatus* is known as a pest causes damage to lucerne, sainfoin, clover, lupine and other leguminous grasses, sporadically cotton, peanut, chick-pea, lentil, soya, string bean and sunflower (GRICHANOV & OVSYANNIKOVA 2008). In Iran this species has been reported as a harmful pest on cotton in Gonbad (KHORMALY 2004) and Alfalfa in Hamedan (KHANJANI 2006).

Mirinae subfamily comprise six tribes (CASSIS & SCHUH 2012). So far among 297 discovered genera in tribe Mirini, the genus of *Adelphocoris* REUTER contains 48 species worldwide which are difference in size and color (SCHUH 2013).

Species of genus *Adelphocoris* usually are large size and elongated shape. Antennae and legs very long. Coller narrower than article II of the antennae. The bigger cell in membrane part of hemelytra with a cone angle at the top. Genital segment of male has a small spur to the left anterior of the opening. The spicule of vesica is comb-like.

The Guilan province enjoys a very diverse climate conditions. This remarkable aspect has prevailed the province with a variety of flora and fauna. Owing to the rich fauna of the province and the importance of insects as biological and ecological factors in an environment as a result identification of the harmful and useful species in the area are of the immense necessary.

So far there are a few taxonomic works has been done on Miridae bugs in Iran (HOSSEINI 1997; HOSSEINI & LINNAVUORI 2000; HOSSEINI et al. 2000, 2002 a,b; HOSSEINI 2013 a,b,c; LINNAVUORI & HOSSEINI 1998, 1999, 2000; LINNAVUORI & MODARRES 1999; LINNAVUORI 1999, 2006, 2007, 2009, 2010; ARKANI et al. 2011; LASHKARI et al. 2011; LASHKARI & HOSSEINI 2012; EBRAHIMI et al. 2012).

In the genus of *Adelphocoris* four species are known from Guilan province and its adjacent regions, including *Adelphocoris seticornis* (FABRICIUS 1775), *Adelphocoris ticinensis* (MEYER-DÜR 1843), *Adelphocoris vandalicus* (ROSSI 1790) and *Adelphocoris lineolatus* (GOEZE 1778) (LINNAVUORI 2007). This work is continuing of a series of synoptic taxonomic treatments and re-description on the Miridae known from Guilan province, Iran. Current paper is based on materials collected from Guilan province and its adjacent areas preserved in the Natural Museum of University of Guilan (Rasht, Iran). In this research, diagnoses, host-plant information, distribution data, illustrations of the adults and their male genitalia are provided to facilitate identification.

## Materials and Methods

### Collection of specimens

The sweep net (50 cm diameter) was used for collecting mirids on vegetation. The bugs felt on the net were quickly picked up by an aspirator. The collected specimens were

killed promptly in a small tube contains Ethyl acetate. Specimens after transferring to the laboratory were mounted on rectangular cards. Identification was done by relevant taxonomic keys (WAGNER 1971; WAGNER & WEBER 1964). All specimens were examined using an Olympus SZX 12 stereomicroscope. Illustrations of genitalia were prepared using a drawing tube attached to the stereomicroscope. Photographs of specimens were taken using a Canon EOS 500D (Digital Rebel/Kiss X3 Digital) camera equipped by a Canon EF 100 mm f/2.8 USM Macro Lens. Figures of adults were redrawn on the base of taken photographs with an appropriate magnification. Identified species were confirmed by mirid specialist Dr. R.E. Linnavuori. All species are kept in the insect collection of the Natural Museum of University of Guilan.

## Results and Discussion

### Key to the *Adelphocoris* species

- 1 Scutellum black..... *A. seticornis*
- Scutellum not black..... 2
- 2 Second antennal segment thickened at the end. Thickened part of the 2<sup>nd</sup> and the end of 3<sup>rd</sup> and 4<sup>th</sup> antennal segments black..... *A. vandalicus*
- Second antennal segment not thickened at the end. Second and the end of 3<sup>rd</sup> and 4<sup>th</sup> antennal segments not black..... 3
- 3 Body color reddish brown..... *A. ticinensis*
- Body color greenish or grayish with two black spot on pronotum..... *A. lineolatus*

### *Adelphocoris seticornis* (FABRICIUS 1775) (Fig. 1 A, Fig. 2. A-C)

**D i a g n o s i s :** Body color brownish black. Collar, posterior and lateral edges and center of pronotum yellowish. Scutellum black. Size of the first and the second antennal segment 0.75:2.62 mm. Segments 3rd and 4th of antennae reddish-brown. General part of hemelytra yellowish, cuneus red, its apex black. Legs reddish, the femora sometimes black. Head almost as long as its height. The second segment of antenna slightly longer than the width of the pronotum. Specific taxonomical diagnostic characters are shown in Table 5.

**C o m m e n t s :** This species lives on the different plants of Fabaceae such as *Medicago* and *Vicia*. Known throughout Europe and northern Asia (KERZHNER & JOSIFOV 1999). Palaearctic species (LINNAVUORI 2007).

**Table 1:** Collection sites and their Latitude, Longitude, Elevation and collection date of *Adelphocoris seticornis* (FABRICIUS).

Province	Collection site	Latitude and Longitude- Elevation	Collection date
ARDABIL	Khalkhal – Givi	37°41'08" N, 48°23'02" E, elev. 1479 m	22.vii.-
	Givi	37°40'40" N, 48°28'36" E, elev. 1642 m	9.-11.viii.2002
	Majareh-Kolur	37°31'46" N, 48°37'42" E, elev. 1919 m	21.vii.1996

It has been reported from Tehran province (LINNAVUORI 2007). Specimens are available in the insect collection of the Natural Museum of University of Guilan.

### *Adelphocoris vandalicus* (ROSSI 1790) (Fig. 1 B, Fig. 2 D-F)

**D i a g n o s i s :** Body color yellow ochraceous. Near the posterior margin of pronotum black band. The edges of cuneus often reddish, the apex reddish or blackish. Legs brownish, often red. More robust size. Size of the first and the second antennal segment 0.87:2.5 mm. Second antennal segment thickened at the end. Thickened part of the 2nd and the end of 3rd and 4th antennal segments black. First segment of the antennae 0.74 times shorter than the width of the head. Specific taxonomical diagnostic characters are shown in Table 5.

**C o m m e n t s :** This species lives in dry places on different plants such as *Verbascum*, *Echinops*, *Centaurea* and *Tanacetum*. Recorded from Europe, North Africa (Morocco), Asia (Azerbaijan, Kazakhstan, Armenia, Turkey and Georgia) (KERZHNER & JOSIFOV 1999). Holomediterranean species (LINNAVUORI 2007).

**Table 2:** Collection sites and their Latitude, Longitude, Elevation and collection date of *Adelphocoris vandalicus* (ROSSI).

Province	Collection site	Latitude and Longitude- Elevation	Collection date
GUILAN	Jirandeh	36°42'00" N, 49°47'28" E, elev. 1343 m	26.-27.vii.2002
	Manjil	36°44'25" N, 49°24'03" E, elev. 302 m	20.-26.ix.1998, 15.-17.ix.2000
	Parudbar	36°36'37" N, 49°44'03" E, elev. 505 m	29.-30.vii.2003, 25.-26.vi.2004
	Rustam Abad – Salan Sar	36°54'36" N, 49°26'20" E, elev. 741 m	8.-9.x.2000
	Sang Rud	36°39'59" N, 49°42'06" E, elev. 1338 m	30.vi.-1.vii.2000, 19.-20.viii.2002
ARDABIL	Firuzabad	37°30'56" N, 48°16'01" E, elev. 1485 m	9.viii.2002, 28.vii.2004
	Near Givi	37°40'40" N, 48°28'36" E, elev. 1642 m	8.vii.-1.viii.2002, 28.-29.vii.2004

It has been reported from Zanjan province (Abhar, near Gilvan, Mamalan) (LINNAVUORI 2007). Specimens are available in the insect collection of the Natural Museum of University of Guilan.

***Adelphocoris ticinensis* (MEYER-DÜR 1843) (Fig. 1 C, Fig. 2 G-I)**

**D i a g n o s i s :** Body color dark brownish red, usually uniform colored, rarely greenish with red designs. Antennae red. More robust size. Ocular index about 1.5. Size of the first and the second antennal segment 0.81:2.25 mm. First antennal segment about 0.65 times shorter than the width of the head. 3<sup>rd</sup> antennal segment about 0.85 times shorter than the second and more than 1.5 times longer than the 4th segment. Femora thick. Specific taxonomical diagnostic characters are shown in Table 5.

**C o m m e n t s :** This species lives mainly on herbs of marshy places (e.g. *Lythrum*, *Achillea*). Known to most of Europe, Asia (Azerbaijan, Kazakhstan, Armenia, Turkey and Georgia) (KERZHNER & JOSIFOV 1999). West-Palaeartic species (LINNAVUORI 2007).

Table 3. Collection sites and their Latitude, Longitude, Elevation and collection date of *Adelphocoris ticinensis* (MEYER-DÜR).

Province	Collection site	Latitude and Longitude- Elevation	Collection date
GUILAN	Asalem forest	37°41'09" N, 48°49'21" E, elev. 428 m	13.-15.ix.1998, 5.-7.vii.2002
	Gyssom	37°40'17" N, 49°02'46" E, elev. -19 m	11.-18.vi.1995
	Jafrud	37°26'45" N, 49°41'40" E, elev. -22 m	31.vii.-1.viii.2002
	Lashte Nesha	37°21'48" N, 49°51'03" E, elev. -15 m	31.vii.2002
	Masuleh	37°09'14" N, 48°59'11" E, elev. 1023 m	9.vii.1996
	Sang Rud	36°39'59" N, 49°42'06" E, elev. 1338 m	30.vi.-1.vii.2002
	Tutkabon – Rudbar	36°53'30" N, 49°31'43" E, elev. 181 m	2.viii.1998
	Ziba Kenar	37°25'44" N, 49°52'41" E, elev. -24 m	7.-10.vi.1995

It has been reported from Mazandaran province (Hassan Abad) (LINNAVUORI 2007). Specimens are available in the insect collection of the Natural Museum of University of Guilan.

***Adelphocoris lineolatus* (GOEZE 1778) (Fig. 1 D, Fig. 2 J-L)**

**D i a g n o s i s :** Body color greenish or yellowish gray, pale, with black hair. Pronotum often with two black spots. Scutellum with two brown longitudinal lines. Corium with a longitudinal brown triangular spot in its middle part. The apex of cuneus sometimes brownish. Femora spotted with brown. Large size and elongated shape. Ocular index 0.83 in males and 1.5 in females. Size of the first and the second antennal segment 1:2.87 mm. Specific taxonomical diagnostic characters are shown in Table 5.

**C o m m e n t s :** This species lives on the different host plants belong to Asteraceae (e.g. *Artemisia*), and Fabaceae (e.g. *Medicago*, *Trifolium*). On undergrowth in hilly forests and gardens. Known throughout Europe and Asia including Pakistan and Kashmir, North Africa (Algeria and Tunisia) and North America (KERZHNER & JOSIFOV, 1999). Holopalaeartic species (LINNAVUORI 2007).

Table 4. Collection sites and their Latitude, Longitude, Elevation and collection date of *Adelphocoris lineolatus* (GOEZE).

Province	Collection site	Latitude and Longitude- Elevation	Collection date	
GUILAN	Deylaman	36°53'05" N, 49°54'26" E, elev. 141 m	23.vii.1996	
	Deylaman – Barasar	36°49'10" N, 49°39'51" E, elev. 880 m	23.vii.1996	
	Jirandeh	36°42'00" N, 49°47'28" E, elev. 1343 m	6.-8.vii.1996	
	25 km S of Astara	38°23'02" N, 48°51'53" E, elev. -20 m	8.-9.vii.2003	
	Manjil	36°44'25" N, 49°24'03" E, elev. 302 m	16.v.-14.vi.1995 8.-10.v.2001	
	Masuleh	37°09'14" N, 48°59'11" E, elev. 1023 m	6.-26.vii.1995 26.vii.1996 4.-5.viii.2002	
	Parudbar	36°36'37" N, 49°44'03" E, elev. 505 m	25.-26.vi.2004	
	Rustam Abad	36°53'47" N, 49°30'28" E, elev.164 m	13.v.1995	
	Rustam Abad – Salan Sar	36°54'36" N, 49°26'20" E, elev. 741 m	24.vii.1996	
	Tutkabon – Rudbar	36°53'30" N, 49°31'43" E, elev. 181 m	29.vi.-8.vii.1996 29.v.-28.vi.1996	
	Ziba Kenar	37°25'44" N, 49°52'41" E, elev. -24 m	7.-10.vi.1995	
	ARDABIL	Ganjgah	37°42'26" N, 48°16'06" E, elev. 1271 m	9.-10.viii.2002
		Ghareh Ghaslagh	39°19'30" N, 47°55'39" E, elev. 320 m	27.-28.vii.2004
		Near Khalkhal	37°37'57" N, 48°30'33" E, elev. 1765 m	9.-11.viii.1998 8.vii.-11.viii.2002
		Khalkhal – Givi	37°41'03" N, 48°21'07" E, elev. 1307 m	22.vii.-viii.1996 8.vii.-1.viii.2002 28.-29.vii.2004
Khemes – Kolur		37°31'35" N, 48°38'06" E, elev. 1930 m	27.-29.vi.2002	
Majareh		37°34'05" N, 48°36'25" E, elev. 1957 m	21.-22.vii.1996 9.viii.1998	
Majareh– Kolur		37°31'46" N, 48°37'42" E, elev. 1919 m	21.vii.1996 15.ix.1998	

This species has been reported from Zanjan province (Abhar, Gilankesh, 15 km NW of Gilvan, Mamalan, Mamalan–Abhar, Zanjan). Tehran province (Azad Bar, near Firuzkuh, Kandovan, Shahrestanak). Mazandaran province (Chalus, Hassan Abad). Golestan province (Alagol, Baksht-e-Haft) (LINNAVUORI 2007). Specimens are available in the insect collection of the Natural Museum of University of Guilan.

### Acknowledgments

Author wish to thanks Dr. Rauno E. Linnavuori (Finland) for confirmation of the identified species.

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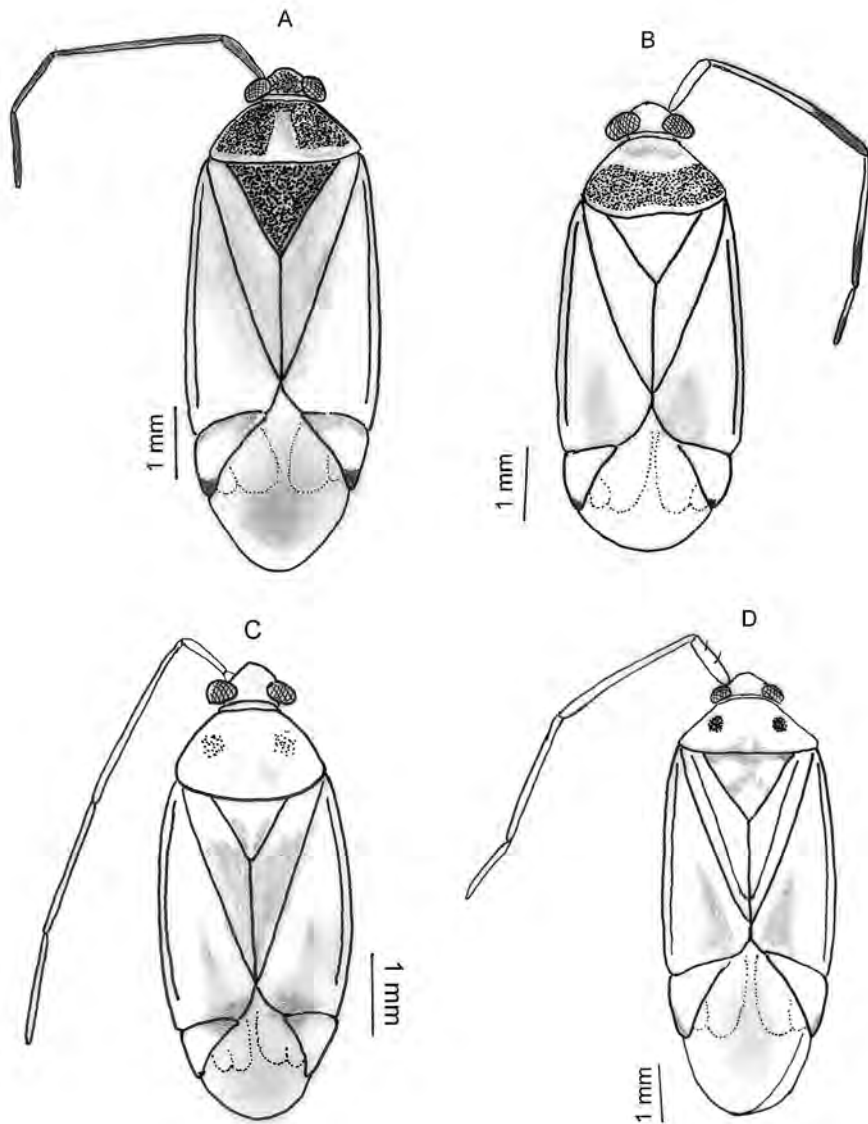
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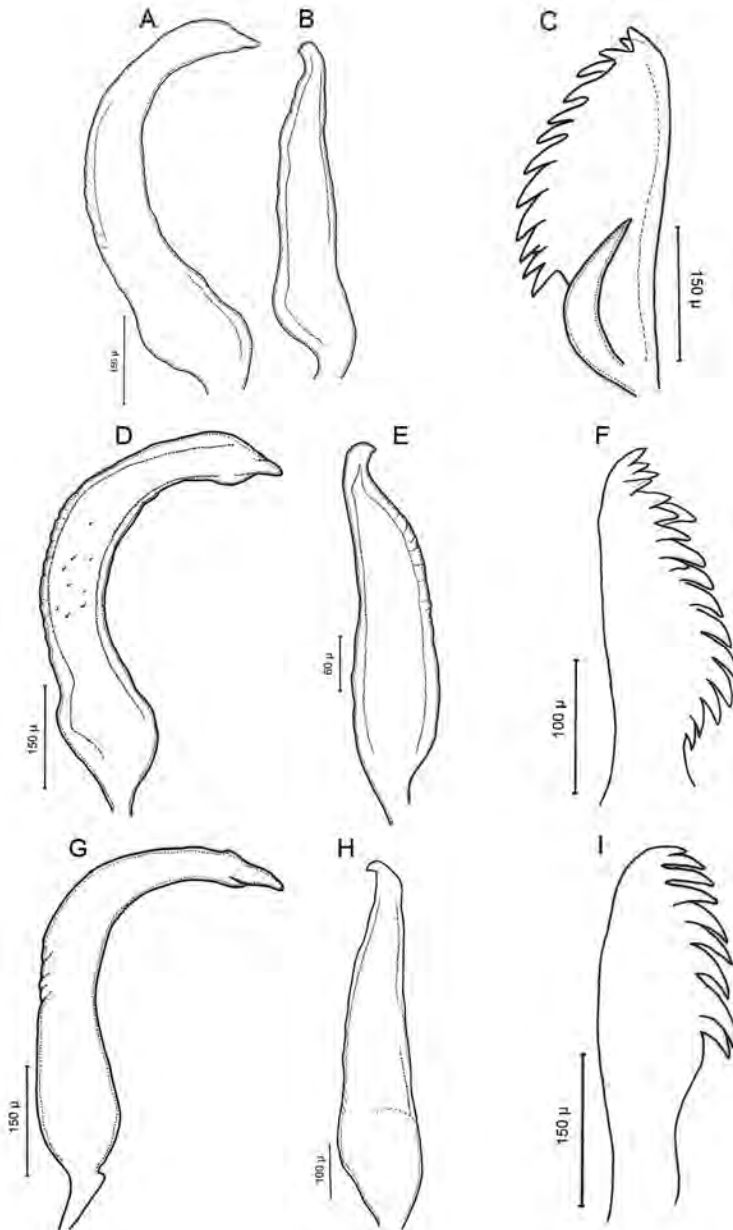
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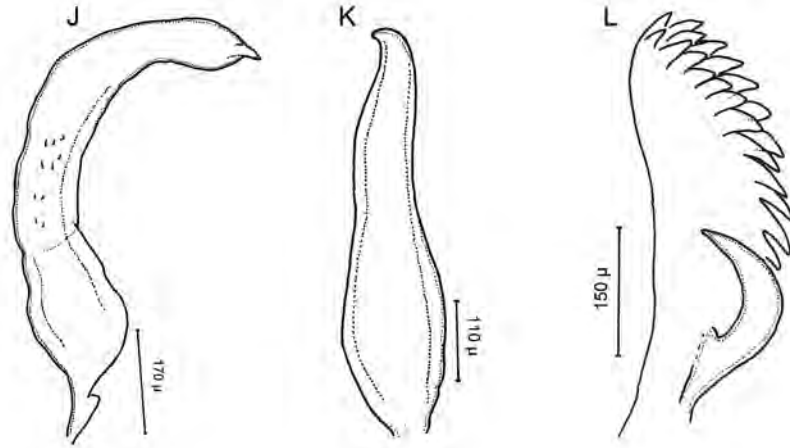




**Fig. 1:** (A) *Adelphocoris seticornis* (FABRICIUS), (B) *Adelphocoris vandalicus* (ROSSI), (C) *Adelphocoris ticinensis* (MEYER-DÜR), (D) *Adelphocoris lineolatus* (GOEZE).



**Fig. 2.** A-C: *Adelphocoris seticornis* (FABRICIUS), (D-F) *Adelphocoris vandalicus* (ROSSI), (G-I) *Adelphocoris ticinensis* (MEYER-DÜR), A, D, G: Left paramere; B, E, H: Right paramere; C, F, I: Spicule of vesica.



**Fig. J-L:** *Adelphocoris lineolatus* (GOEZE); J: Left paramere; K: Right paramere; L: Spicule of vesica.

**Table 5:** Diagnostic taxonomical characters in four species of *Adelphocoris* (Numbers are ratio or size (in mm))

	Diatone	Synthipsis	Ocular index	1 <sup>st</sup> antennal segment: diatone	2 <sup>nd</sup> antennal segment: diatone	2 <sup>nd</sup> antennal segment : base of pronotum	Base of pronotum: Length of Pronotum	Body size
<i>Adelphocoris lineolatus</i>	1.35	0.57 ♀	1.5 ♀	0.75 ♀	2.17 ♀	1.14	2	7.6 - 8.3 ♀
		0.4 ♂	0.83 ♂	0.72 ♂	2.09 ♂			8.3 - 9.5 ♂
<i>Adelphocoris ticinensis</i>	1.17	0.55	1.57	0.69	1.92	1.12	1.8	6.9 - 7.5 ♀
								7.2 - 7.6 ♂
								7.3 - 8.1 ♀
								7.5 - 8.5 ♂
<i>Adelphocoris vandalicus</i>	1.17	0.42	1.02	0.74	2.13	1.25	1.77	6.7 - 7.5 ♀
								8 - 8.4 ♂
<i>Adelphocoris seticornis</i>	1.22	0.4	0.93	0.61	2.14	1.17	2	6.7 - 7.5 ♀
								8 - 8.4 ♂

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Zeitschrift/Journal: [Entomofauna](#)

Jahr/Year: 2014

Band/Volume: [0035](#)

Autor(en)/Author(s): Hosseini Reza

Artikel/Article: [On the genus \*Adelphocoris\* \(Hemiptera: Miridae\) in Guilan province \(Iran\) and its adjacent areas 413-424](#)