Ground beetles (Coleoptera, Carabidae) collected in winter wheat fields of the western Azerbaijan

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Abstract


Key words: Carabids, cereals, western Azerbaijan, winter wheat, pest
Introduction

About 40,000 species of carabid beetles are described in the World (Larsen et al., 2003), and approximately 300 species were recorded in Azerbaijan (Aliyev, 2004). Most carabids live on the ground feeding on various invertebrates. From the appearance of most species of this family indicates their predatory lifestyle. Ex.: Calosoma Weber, Brosicus Panzer, Scarites Hamilton, Carabus Linnaeus. Many species of ground beetles are very sensitive to changes in soil PH and humidity and they are successfully used as biological indicators (Hurka, 1996). Carabid beetles are considered to be mostly opportunistic feeders that consume a variety of foods; however, the majority of species have been observed as primarily predatory, feeding on other insects and related organisms. Most species locate food by random search, although some day-active (diurnal) species hunt by sight. A few species have also been observed to detect chemical cues from springtails, mollusks, and aphids (Lovei & Sunderland, 1996). Therefore, carabids are important model organisms in numerous ecological works for a long period of time.

The high diversity of carabids in Azerbaijan and presence of species which are pests of crops in the fauna of the country, makes this group of beetles important for investigation.

Material and Methods

The research was carried out in the laboratory and in the field from 2006 to 2010. Collection was made in the west Azerbaijan in spring, summer, autumn, and early in winter. The materials (larvae, pupae and adults) were collected and treated according to methods of Fasulati (Fasulati, 1971). The laboratory works were carried out at the Institute of Zoology of Azerbaijan NAS. All the specimens are deposited in the entomological collection of the institute of Zoology in Baku. Beetles were identified by prof. K.V. Makarov from Moscow State Pedagogical University. The western regions of Azerbaijan are Ganja, Shamkir, Tovuz, Aghstafa, Gazakh. Approximately 145 species of Poaceae Barnhart are part of the vegetation of the steppes in this region. Triticum aestivum Linney (1753) is dominated. Fields of winter wheat and wild cereal meadows and steppes were preferred for study (Figure 1).

Fig. 1-Map of Azerbaijan. ▲ – material collected area.

The systematics of species presented in this paper is given according to Biolib (Zicha O (ed.), 1999-2014) and Fauna Europaea (De Jong, 2014) electronic databases, while their distribution according to Carabidae of the World (Anichtchenko, 2007-2015) electronic database.

Abbreviations: v. – village; sp. – species; L – larva; leg. – legislation; m. – male; f. – female
Results and Discussion

During the period of research 5 subspecies and 12 species of carabid beetles (Carabidae) belonging to 11 genera and 6 subfamilies were found. Of these 5 species and 5 subspecies are new for the fauna of Azerbaijan. Following is the annotated list and collection data of all collected species.

1– *Pterostichus (Platysma) niger* Shaller, 1783

Subfamily Pterostichinae Bonelli, 1810

Tribe Pterostichini Bonelli, 1810

Genus *Pterostichus* Bonelli, 1810;


**Distribution:** Europe (Austria, Belgium, Bosnia & Herzegovina, Bulgaria, Byelorussia, Czech, Denmark, Estonia, Finland, France, Georgia, Germany, Great Britain, Hungary, Italy, Latvia, Lithuania, Moldavia, Netherlands, Norway, Poland, Russia, Serbia, Slovakia, Slovenia, Sweden, Switzerland, Ukraine), Asia (Kazakhstan, Tadzhikistan).

**Remarks:** Adult specimens of this species were collected in lowland winter wheat fields from second decade of May to July. It is the largest species of the genus. A eutoptic species, especially characteristic of woodland, occurring in almost every type of forest community, predominantly in deciduous and mixed stands on humus-rich, rather moist soil. It overwinters at larvae stage, and predominantly nocturnal mesophilous, thermophilic, litter stratobiont. According to literature it is typical zoophage (the food of which consists of insect larvae as well as of dead animals), but occasionally feed’s on sprouts of *Lactuca sativa* L.and fruits of *Fragaria vesca* L. (Nuriyeva, 2010).

2– *Zabrus tenebrioides longulus* Reiche & Saulcy, 1855

Tribe Zabrini Bonelli, 1810

Genus *Zabrus* Clairville, 1806


**Distribution:** Europe (Austria, Albania, Armenia, Belgium, Bosnia & Herzegovina, Bulgaria, Byelorussia, Croatia, Cyprus, Czech, Denmark, Estonia, Finland, France, Georgia, Germany, Great Britain, Greece, Hungary, Ireland, Italy, Lithuania, Luxembourg, Macedonia, Moldavia, Netherlands, Poland, Romania, Russia, Slovakia, Slovenia, Sweden, Spain, Switzerland, Ukraine), Asia (Iran, Kazakhstan, Turkey).
Remarks: In western Azerbaijan it is considered as major pest of winter wheat in the larval and adult stage. Predominantly in cereal fields and near-by grassland, both on sandy and clayish soil, it regularly causes damage to cereals. In the study area infestation of plants by *Z.tenebioides longulus* R&S constituted 11.44% / m² (118 plants) in March and 11.06% / m² (118 plants) in April.

New record for the fauna of Azerbaijan.

3– *Zabrus morio morio* Ménetries, 1832


Distribution: Europe (Armenia, Georgia), Asia (Afghanistan, Iran, Kazakhstan, Pakistan, Syria, Turkey, Turkmenistan, Uzbekistan).

Remarks: Periodically reproduces in mass numbers, with one generation per year. Over winters at larval stage. Pupation occurs in the soil at depths of 12-15 cm. In the study area mature individuals start to appear at the end of May. Night active species. Daytime spends in different hidden places. During warm and dry summer months, adult specimens enter to diapause. Herbivore, feeding primarily on winter wheat. In western Azerbaijan, it is one of the most harmful species of winter wheat from third decade of April to first decade of June.

New record for Azerbaijan fauna.

4– *Harpalus (Harpalus) froelichii* Sturm, 1818

Subfamily Harpalinae Bonelli, 1810

Tribe Harpalini Bonelli, 1810

Genus *Harpalus* Latreille, 1802


Distribution: Europe (Austria, Belgium, Bulgaria, Byelorussia, Czech, Denmark, Finland, France, Georgia, Germany, Great Britain, Hungary, Italy, Latvia, Lithuania, Moldavia, Netherlands, Poland, Romania, Russia, Slovakia, Slovenia, Sweden, Switzerland, Ukraine), Asia (China, Kazakhstan, Kyrgyzstan, Mongolia, North Korea, Turkmenistan, Uzbekistan).

Remarks: The species was found at the end of June and September, night-active species. During the day, it usually burrows the sand at plant roots. Both larvae and adults are mixophytophage feeding on plant grains. Mesophilous, stenothermic, geo-chortobiont. New record for the fauna of Azerbaijan.

5– *Harpalus (Harpalus) tardus* (Panzer, 1797)

Specimens examined: Shamkir District, Sabirkend v., 20 June 2007, *T.aestivum* L., 1 m; Same District, Saritepe v., 21 June 2007, *T.aestivum* L., 2 m., 1 f.

Distribution: Europe (Albania, Armenia, Austria, Belgium, Bosnia & Herzegovina, Bulgaria, Byelorussia, Croatia, Czech, Denmark, Estonia, Finland, France, Georgia, Germany, Great Britain, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Macedonia, Moldavia, Netherlands, Norway, Poland, Portugal, Romania, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine), Asia (Iran, Turkey, Uzbekistan), New Zealand.
Remarks: Mixophytophagous. Mesophilous, thermophyllic, geo-chortobiont species. Xerophilous, usually occurring in open country on sandy, sometimes clay-mixed soil with more and less dense vegetation, also on cultivated soil. According to our observations this common species in western Azerbaijan reaches the highest density in winter wheat fields.

6- Harpalus (Pseudoophonus) griseus (Panzer, 1797)


Distribution: Europe (Armenia, Austria, Azores, Belgium, Bosnia & Herzegovina, Bulgaria, Byelorussia, Croatia, Czech, Denmark, Estonia, Finland, France, Georgia, Germany, Great Britain, Greece, Hungary, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Macedonia, Malta, Moldavia, Netherlands, Poland, Romania, Russia, Ukraine, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland), Asia (Afghanistan, Azerbaijan, China, Iraq, Iran, Israel, Japan, Kazakhstan, North Korea, South Korea, Tadzhikistan, Turkey, Turkmenistan, Uzbekistan), Africa (Algeria, Egypt, Morocco, Tunisia).

Remarks: In the study area occurs from third decade of April to October. A xerophilous, mesophilous geo-chortobiont species, which occurs on dry, sandy meadows and grassland with sparse vegetation also in fallow fields. Predominantly night-active species sometimes attracted in large numbers to electric light. During daytime rests under stones or among plant roots. Representatives of this species were collected in cereal fields and adjacent pastures.

7– Harpalus (Pseudoophonus) rufipes (De Geer 1774)


Distribution: Europe (Albania, Armenia, Austria, Azores, Belgium, Bulgaria, Bosnia & Herzegovina, Byelorussia, Croatia, Cyprus, Czech, Estonia, Finland, France, Georgia, Germany, Great Britain, Greece, Hungary, Ireland, Italy, Denmark, Latvia, Liechtenstein, Lithuania, Luxembourg, Macedonia, Malta, Moldavia, Morocco, Netherlands, Norway, Poland, Portugal, Romania, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine), Asia (Afghanistan, Azerbaijan, China, Iraq, Iran, Kazakhstan, Kyrgyzstan, Tadzhikistan, Turkey, Turkmenistan, Uzbekistan), Africa (Algeria, Tunisia).

Remarks: Eurytopic, stenotermic geo-chortobiont. It migrates to man-made landscapes from various mesophilous biotopes. In western Azerbaijan produces one generation per year. Adult specimens were found from the end of April to the end of June. Hibernates at larval stage. In the study area, this species is most harmful at imago stage when they feed on immature grains of winter wheat. A eurytopic species, which occurs on almost every kind of open ground, notably on clay, mull-rich soil. It is especially typical of cultivated fields, meadows and gardens also on waste land and ruderal places. While being mixophytophagous as adult, it is a polyphagous predator at larval stage preying upon larvae and pupa of different beetles. Due to this fact H.rufipes DeGeer is frequently found in those biotopes where epigeic beetles are especially abundant.
8- Harpalus (Pseudoophonus) calceatus (Duftschild, 1812)


Distribution: Europe (Albania, Andorra, Armenia, Austria, Belgium, Bulgaria, Bosnia & Herzegovina, Byelorussia, Croatia, Czech, Denmark, Estonia, Finland, France, Georgia, Germany, Great Britain, Greece, Hungary, Italy, Latvia, Lithuania, Luxembourg, Macedonia, Moldavia, Norway, Poland, Portugal, Romania, Russia, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine), Asia (Azerbaijan, Afghanistan, China, Japan, Kazakhstan, Kyrgyzstan, Mongolia, North Korea, Tadzhikistan, Turkey, Turkmenistan, Uzbekistan).

Remarks: At larval stage preys upon various animals occurring in soil. In western Azerbaijan adult specimens occur from the end of May (depending on temperature, sometimes from the beginning of June) to the end of September – beginning of October. Females lay their eggs to rather moist layers of soil. Hibernates at larval stage. Produces one generation per year. Imagines being mixophytophagous feed on grains of winter wheat. A xerophilous species, occurring on open, sandy ground with sparse vegetation of grasses, also on agricultural land, e.g. in fallow fields. Predominantly nocturnal species, often flying at night and readily coming to light.

9- Cryptophonus melancholicus melancholicus Dejean, 1829

Genus Cryptophonus Brandmayr & Zetto Brandmayr, 1981


Distribution: Europe (Austria, Belgium, Bosnia & Herzegovina, Bulgaria, Croatia, Czech, Denmark, France, Germany, Great Britain, Greece, Hungary, Moldavia, Poland, Portugal, Romania, Russia, Slovakia, Sweden, Ukraine), Asia (Iran, Turkey).

Remarks: This species was collected in the winter wheat fields and neighboring pastures in May - June. Confined to dry, sandy habitats with sparse vegetation. Usually near coasts: on sandy grassland under Artemisia. During daytime, the beetles are buried in the sand at the roots of plants (Lindroth, 1986). Mixophytophagous, mesophilous species.

New record for the fauna of Azerbaijan.

10– Acinopus (Acinopus) picipes (Olivier, 1795)

Genus Acinopus Dejean, 1821


Distribution: Europe (Albania, Armenia, Bosnia & Herzegovina, Bulgaria, Croatia, Cyprus, France, Georgia, Greece, Hungary, Italy, Macedonia, Malta, Moldavia, Portugal, Romania, Russia, Slovenia, Spain, Ukraine), Asia (Iraq, Iran, Israel, Turkey).
Remarks: Mesophilous, phytophagous geo-chortobiontous species. Very common inhabitant of winter wheat plantings in Ganja-Gazakh zone, where feeds on immature grains of winter wheat. In western Azerbaijan occurs from the second decade of May to the end of June.

11– Dixus obscures Dejean, 1825
Genus Dixus Billberg, 1820

Distribution: Europe (Albania, Armenia, Bulgaria, Cyprus, Georgia, Greece, Italy, Macedonia, Moldavia, Romania, Ukraine), Asia (Azerbaijan, India, Iran, Israel, Syria, Turkey).

Remarks: According to my observations this species occurs in numbers in winter wheat fields of western Azerbaijan from middle of May to the early of July, where feeds on fully matured grains of winter wheat. Phytophagous, xerophylous, geo-chortobiontous species. Primarily day-active.

12– Scarites (Scarites) cylindronotus Faldermann, 1836
Subfamily Scaranitae Bonelli, 1810
Tribe Scaritini Bonelli, 1810
Genus Scarites Fabricius, 1775

Distribution: Asia (Iran, Kazakhstan, Kyrgyzstan, Uzbekistan, Pakistan, Tadzhikistan, Turkmenistan).

Remarks: Mesophilous, fossorial geobiont. Predatory species. We observed representatives of this species in pastures predominated by wild cereals from the first decade of June to July. It is a rare primarily nocturnal species collected in single individuals.

New record for the fauna of Azerbaijan.

13– Sphodrus leucophthalmus Linnaeus, 1758
Subfamily Platyninae Bonelli, 1810
Tribe Sphodrini Laporte, 1834
Genus Sphodrus Clairville, 1806


Distribution: Europe (Armenia, Austria, Belgium, Bulgaria, Byelorussia, Croatia, Cyprus, Czech, Denmark, Finland, France, Italy, Georgia, Germany, Great Britain, Greece, Hungary, Latvia, Netherlands, Poland, Portugal, Romania, Russia, Slovakia, Slovenia, Spain, Switzerland, Sweden, Turkey, Ukraine), Asia (Afghanistan, India, Iraq, Kashmir, Saudi Arabia, Syria, Yemen), Africa (Algeria, Egypt, Libya, Morocco, Tunisia)
Remarks: In western Azerbaijan, it was collected in pastures in second decade of May, June and September. Running-fossorial geo-chortobiontous predator. Exclusively synanthropous species, occurring in cellars, stables, bakeries, mills, etc., sometimes a company with *Laemostenus terricola* (Herbst, 1784) and *Blaps* (Lindroth, 1986).

New record for the fauna of Azerbaijan.

14- *Calatus (Neocalathus) ambiguus ambiguus* (Paykull, 1790)

Subfamily Platytninae Bonelli, 1810
Tribe Sphodrini Laporte, 1834
Genus *Calathus* Bonelli, 1810


Distribution: Europe (Albania, Armenia, Austria, Belgium, Bosnia & Herzegovina, Bulgaria, Byelorussia, Croatia, Czech, Denmark, Estonia, Finland, France, Georgia, Germany, Great Britain, Hungary, Israel, Italy, Latvia, Lithuania, Luxembourg, Macedonia, Moldavia, Netherlands, Norway, Poland, Romania, Russia, Slovakia, Slovenia, Spain, Switzerland, Turkey, Ukraine), Asia (Afghanistan, Iran, Kazakhstan, Syria, Tadzhikistan, Turkmenistan, Uzbekistan).

Remarks: Litter stratobiont. I collected representatives of this species in winter wheat fields, at margins of lakes and in pastures predominated by wild cereals. In the study area, it is most abundant from third half of May and end of September. Living in open, dry country on sandy or gravelly, sometimes clay-mixed soil with sparse vegetation, notably on southern slopes. Eurytopic, mesophilous, mixophytophagous species.

First record for the fauna of Azerbaijan.

15- *Calathus (Calathus) longicollis* Motschulsky, 1865


Distribution: Europe (Armenia, Bulgaria, Cyprus, Georgia, Greece, Israel, Russia, Turkey), Asia (Lebanon).

Remarks: Despite adult specimens of this species are found in numbers in June, some individuals could be observed starting from second half of May. Hibernates at adult stage. Overwinters chose The underside of rocks or upper layers of soil. Produces one generation per year. Mesophilous, mixophagous, stratobiont inhabiting upper layer of litter. In the study area frequents mostly in winter wheat fields.

New record for the fauna of Azerbaijan.

16- *Nebria (Eunebria) picicornis luteipes* Chaudoir, 1850

Subfamily Nebriniæ Leporće, 1834
Tribe Nebrini Laporte 1834
Genus *Nebria* Latreille, 1802

**Distribution:** Europe (Austria, Belgium, Czech, France, Germany, Italy, Poland, Slovakia, Spain, Switzerland, Turkey, Ukraine), Asia (Iran).

**Remarks:** Hygrophilous, mixzoophagous species. Enters to diapause in winter and summer. Periods of activity are spring and summer. I collected the species at the end of September and early October. New record for the fauna of Azerbaijan.

**17 - Broscus semistriatus** (Dejean, 1828)

Subfamily Broscinae Hope, 1838
Tribe Broscini Hope, 1838
Genus *Broscus* Panzer, 1813


**Distribution:** Europe (Albania, Bulgaria, Moldavia, Romania, Russia, Ukraine), Asia (Azerbaijan, Kazakhstan).

**Remarks:** Cursorial, heat-preferent, xerophilous species. According to its ecological peculiarities belongs to running fossorial geobionts. It should be noted that despite the common characteristics in literature of this species as xerophilous, I collected its representatives in mesic areas such as pastures predominated by wild cereals. Active nocturnal predator. Daytime spends in burrows or under stones.

**Discussion.**

The most abundant species from above listed carabids occurring in cereal agro- and biocenoses in western Azerbaijan are: *Z.tenebrioides longulus* R&S., *C.ambiguus ambiguus* Pay., *H.griseus* Pan., *A.picipes* Ol. and *D.obscurus* Dej.

Harmfulness degree and feeding strategies of carabid beetles (Carabidae) occurring in western Azerbaijan have shown in table 1.

According to life forms the carabids occurring in western Azerbaijan could be devided into the following groups (the division is based on well known system suggested by Sharova (Sharova, 1981):


2- Stratobionts: A) crevice stratobionts: a) surface litter stratobionts—*N. picicornis luteipes* Ch., *C. longicollis* Mot., *C. ambiguus ambiguous* Pay.; B) soil burrowing stratobionts: a) litter-soil stratobionts—*P.niger* Sh.

3- Geobionts: a) running-fossorial geobionts—*B.semitriatus* Dej.; b) fossorial geobionts—*S. cylindronotus* Fal., *S. leucophthalmus* L.

Ecological features of Carabid beetles have provided in table 2.

Generalizing above presented data one can conclude that carabid beetles occurring in cereal fields and biocenoses predominated by wild cereals in western Azerbaijan represented by geo-chortobionts—58.8% (among them 17.6% zabroid geo-chortobionts, 35.3% harpaloid geo-chortobionts and 5.9% ditomoid geo-chortobionts), litter stratobionts—17.6%, surface litter stratobionts - 5.9%, fossorial geobionts—11.8% and running-fossorial geobionts-5.9%.

By relation to humidity, 82.3% constitute mezophilous species, 11.8% xerophilous and 5.9% hygrophilous.

The number of species collected at various years in different location of Azerbaijan and the number of carabid beetles (Carabidae) in winter wheat fields of the western Azerbaijan in the years of 2006-2010 have given in table 3.
### Table 1- Harmfulness degree and feeding strategies of carabid beetles (Carabidae) occurring in western Azerbaijan

<table>
<thead>
<tr>
<th>№</th>
<th>Species</th>
<th>Harmfulness degree</th>
<th>Feeding strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Z. tenebrioides longulus R&amp;S</td>
<td>+ + +</td>
<td>Phytophage</td>
</tr>
<tr>
<td>2.</td>
<td>Z. morio morio Mén.</td>
<td>+ +</td>
<td>Phytophage</td>
</tr>
<tr>
<td>3.</td>
<td>P. niger Sh.</td>
<td>-</td>
<td>Zoophage</td>
</tr>
<tr>
<td>4.</td>
<td>H. froelichii S.</td>
<td>+ +</td>
<td>Mixophytophage</td>
</tr>
<tr>
<td>5.</td>
<td>H. tardus Pan.</td>
<td>+ +</td>
<td>Mixophytophage</td>
</tr>
<tr>
<td>6.</td>
<td>H. griseus Pan.</td>
<td>+ +</td>
<td>Mixophytophage</td>
</tr>
<tr>
<td>7.</td>
<td>H. rufipes DeGeer</td>
<td>+ +</td>
<td>Mixophytophage</td>
</tr>
<tr>
<td>8.</td>
<td>H. calceatus Duft.</td>
<td>+ +</td>
<td>Mixophytophage</td>
</tr>
<tr>
<td>9.</td>
<td>C. melancholicus melancholicus Dej.</td>
<td>+</td>
<td>Mixophytophage</td>
</tr>
<tr>
<td>10.</td>
<td>A. picipes Ol.</td>
<td>+ + +</td>
<td>Phytophage</td>
</tr>
<tr>
<td>11.</td>
<td>D. obscurus Dej.</td>
<td>+ + +</td>
<td>Phytophage</td>
</tr>
<tr>
<td>12.</td>
<td>S. cylindronotus Fal.</td>
<td>-</td>
<td>Zoophage</td>
</tr>
<tr>
<td>13.</td>
<td>S. leucophthalmus L.</td>
<td>-</td>
<td>Zoophage</td>
</tr>
<tr>
<td>14.</td>
<td>C. ambiguus ambiguus Pay.</td>
<td>+</td>
<td>Mixozoophaghe</td>
</tr>
<tr>
<td>15.</td>
<td>C. longicollis Mot.</td>
<td>+</td>
<td>Mixozoophaghe</td>
</tr>
<tr>
<td>16.</td>
<td>N. picicornis luteipes Ch.</td>
<td>+</td>
<td>Mixozoophaghe</td>
</tr>
<tr>
<td>17.</td>
<td>B. semistriatus Dej.</td>
<td>-</td>
<td>Zoophage</td>
</tr>
</tbody>
</table>

* + + + - strongly harmful; + + - moderately harmful; + - little harmful; - harmless

### Table 2- Ecological features of carabid beetles (Carabidae) distributed in the western Azerbaijan

<table>
<thead>
<tr>
<th>№</th>
<th>Species</th>
<th>Ecological indices</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Life forms of Carabid adult specimens</td>
</tr>
<tr>
<td>1.</td>
<td>Z.tenebrioides longulus R&amp;S</td>
<td>zabroid geo-chortobiont</td>
</tr>
<tr>
<td>2.</td>
<td>Z.morio morio Mén.</td>
<td>zabroid geo-chortobiont</td>
</tr>
<tr>
<td>3.</td>
<td>P.niger Sh.</td>
<td>litter-soil stratobiont</td>
</tr>
<tr>
<td>4.</td>
<td>H.froelichii S.</td>
<td>harpaloid geo-chortobiont</td>
</tr>
<tr>
<td>5.</td>
<td>H.tardus Pan.</td>
<td>harpaloid geo-chortobiont</td>
</tr>
<tr>
<td>6.</td>
<td>H.griseus Pan.</td>
<td>harpaloid geo-chortobiont</td>
</tr>
<tr>
<td>7.</td>
<td>H.rufipes DeGeer</td>
<td>harpaloid geo-chortobiont</td>
</tr>
<tr>
<td>8.</td>
<td>H.calceatus Dej.</td>
<td>harpaloid geo-chortobiont</td>
</tr>
<tr>
<td>9.</td>
<td>C.melancholicus melancholicus Dej.</td>
<td>harpaloid geo-chortobiont</td>
</tr>
<tr>
<td>10.</td>
<td>A.picipes Ol.</td>
<td>zabroid geo-chortobiont</td>
</tr>
<tr>
<td>11.</td>
<td>D.obscurus Dej.</td>
<td>ditomoid geo-chortobiont</td>
</tr>
<tr>
<td>12.</td>
<td>S.cylindronotus Fal.</td>
<td>fossorial geobiont</td>
</tr>
<tr>
<td>13.</td>
<td>S.leucophthalmus L.</td>
<td>fossorial geobiont</td>
</tr>
<tr>
<td>14.</td>
<td>C.ambiguus ambiguous Pay.</td>
<td>surface litter stratobiont</td>
</tr>
<tr>
<td>15.</td>
<td>C.longicollis Mot.</td>
<td>surface litter stratobiont</td>
</tr>
<tr>
<td>16.</td>
<td>N.picicornis luteipes Ch.</td>
<td>surface litter stratobiont</td>
</tr>
<tr>
<td>17.</td>
<td>B.semistriatus Dej.</td>
<td>running-fossorial geobiont</td>
</tr>
</tbody>
</table>
Table 3- The number of specimens collected at various years in different location of in 2006-2010

<table>
<thead>
<tr>
<th>Names of species</th>
<th>Number of individuals [in specimens]</th>
<th>Percentage contribution in given region</th>
<th>Number of individuals [in specimens]</th>
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<th>Number of individuals [in specimens]</th>
<th>Percentage contribution in given region</th>
<th>Number of individuals [in specimens]</th>
<th>Percentage contribution in given region</th>
</tr>
</thead>
<tbody>
<tr>
<td>P.niger Sh.</td>
<td>1 4 0 0 0 5 83,3</td>
<td></td>
<td></td>
<td></td>
<td>1 1</td>
<td>16,7 6 3,3</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Z.tecnebroi des longulus R&amp;S</td>
<td>5 23 3 31 79,5</td>
<td>2 2 5,1</td>
<td>2 2 5,1</td>
<td>4 4 10,3 39 22,0</td>
<td>4 4</td>
<td>20 10 5,6</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Z.morion morion Mén.</td>
<td>4 4 8 80</td>
<td></td>
<td></td>
<td></td>
<td>2 2</td>
<td>50</td>
<td>4 2,3</td>
<td></td>
</tr>
<tr>
<td>H.froelichi Sturm.</td>
<td>2 2 50</td>
<td></td>
<td>2 2 50</td>
<td>4 2,3</td>
<td>20 10 5,6</td>
<td>10 5,7</td>
<td>9,5</td>
<td></td>
</tr>
<tr>
<td>H.tardus Pan.</td>
<td>4 4 100</td>
<td></td>
<td></td>
<td></td>
<td>4 2,3</td>
<td>10 5,7</td>
<td>9,5</td>
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Acknowledgements

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References


سوسک‌های کاراییده (سخت‌بالیشان، کاراییده) جمع‌آوری شده از مزارع گندم زمستانه در غرب کشور اذربایجان

گفتار پنجمانورا

موسسه جامع فنی اطلاعات، آکادمی ملی علوم ایران: 1382، پاساز 1382، جلد 13 (1395) 27

چکیده

5 زیر گونه و 12 گونه از سوسک‌های کاراییده (Carabidae) مربوط به 11 جنس و 6 زیرخانواده طی سال‌های 2006-2010 در غرب کشور اذربایجان جمع‌آوری و شناسایی شد. گونه‌های Harpalus froelichii Sturm، 1818، Sphodrus leucophthalmus Linnaeus، Scarites cylindronotus Faldermann، 1836، Dixius obscurus Dejean، 1825، Calathus longicollis Motschulsky، 1865 و 1758، Z.morio morio Ménetries، 1832، Zabrus tenebrioides longulus Reiche & Saulcy، 1855، Calathus ambiguus ambiguus (Paykull، 1790)، Cryptophonus melancholicus melancholicus Dejean، 1829 و Nebria picicornis luteipes Chaudoir، 1850 برای فرآیند جمع‌آوری و شناسایی فهرست‌های جغرافیایی و زیست‌محیطی شناسایی شدند.

واژه‌های کلیدی: Carabidae، غلات، اذربایجان، گندم، زمستانه، آفر

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