

EVALUATION OF SOME PHYTOPHAGOUS INSECT SPECIES' NUMBERS OF COLLECTION ACCORDING TO MONTHS AND ELEVATION RANGE FOR AGRICULTURAL STRUGGLE IN TURKEY

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ABSTRACT: In biological control, which is how much numerical data phytophagous insects on which month and which raises significant increase in the population. Turkey's collected from different regions, Coleptera, Hemiptera and Heteroptera insects months the arrest of phytophagous species belonging to the team and altitude (elevation) measure benefiting from the statistical information on are intended to reveal important information that contribute to agricultural biological control. The evaluation was made of the work done for this purpose; spring, summer and autumn numerical changes in male -female rates, quantitative differences in the number of collection and year they were gathered at different elevations (succession) were analyzed. For more effective agricultural biological control, it is expected to benefit from this information.

KEY WORDS: Biological control, Coleoptera, Hemiptera, Heteroptera

The prime aim of agriculture is not only to take to abundant products at basic zone, also to growth yields which sensible to environment and health of human and animal, convenient to maintainable agriculture technics (Uygun et al., 2010).

With same level of rise of the world's population, to apply of maintainable methods and steady-solution is obligation because of rise of products that has been asked for. It is possible only with maintainable agriculture (Öztemiz, 2008).

In application of maintainable agriculture, as firstly biological struggle, there are methods to alternatives of chemistry and systems of integrated combat. Integrated combat is a sustainable combat system to take into account to human health and balance of the environment and natural (Turhan, 2005).

Integrated combat is a management system which take into account to populations dynamics of harmful species and its realtion to the environment using appropriate combat methods and technics (Atış, 2004).

Insects take part to important section of lives. It is very influent to the field of agriculture due to feed with plants and cause to pollution and spread of seeds.

Hemiptera ordo's species falls to pieces to chlorophyll in the green and plant tissues in the green plant in view of sucking-in sucking on the plant, and as a result, such places turn yellow, then turn into silk and dry. This nutrition leads to deformities in fruit and to germination ability in seeds or to be completely destroyed (Bektaş, 2010).

However, as for Coleoptera order, when we mention to another family, Coleoptera ordo's species is known that it has nourish with water plants, mosses and herbal residues (Bektaş, 2015).

Helophoridae family, it has a wide-spread zone, has nearly 200 species in the earth (Bektaş, 2015). It has been saved 150 species at Palearctic region (Angus, 1984, 1985a, 1992), 41 species at Nearctic region (Smetana, 1985; Hansen, 1987) and 4 species at Ethiopia region (Angus, 1992).

Species of Helophoridae family is generally determined that they are found in the shallow parts of the reservoirs of the ponds or of the rich streams of the organic waters which are fed with snow waters. These insects prefer the slowly flowing stream in a small number of them and some of them are in the sand or muds in the transition regions between water and the land and the habitats of these species are wet, mosses and other plants (Smetana, 1985).

Hydrophilidae family is represented by 172 genera and 2716 species spread all over the world, thus these species found in Turkey where are more similar to Asian fauna (Kosswig, 1995) and those aquatic, semi-aquatic and terrestrial forms in which the length varies between 1-60 mm they usually live in all kinds of sweet waters, from other families; that the last three segments of the antennae are enlarged and hairy, that they are distinguished by the presence of five segments in the abdominal region. They feed on water plants, algae and herbal residues, fish and water birds, and those in the shallow sections of the fast flowing waters, those of the semi-aquatic ones in the land near the water or in the decay of plants and straw that began to rot, and those of the terrestrial ones in the cows (Spangler, 1982; Hansen, 1987, 1991, 1999, 2004; Hebauer, 2002). Vertebrates, are found in or under the feces, where there is a lot of vegetative decay, even in bird nests (Hilshoff, 1985, 1991). They are usually found in bright black, brown or yellowish color (Hansen, 1987, 1991; Angus, 1992; Oliva, 1993).

Studiness of Helophoridae, Hydrochiidae and Hydrophilidae family by native researcher is being realized as speedy (Kırpık, 1993). (Bektas et al., 2014) has added new species to Turkey fauna; (Darılmaz & Incekara 2011), have prepared checklist the whole country and (Yılmaz & Aslan, 2017; Özgen et al., 2017; Erdihan et al., 2017) have attached new records in several provinces and regions by their faunistic studiness.

The family of Dytiscidae, is usually adapted to all aquatic habitats. They can be found in deep, in wood, in the water above the leaf stalk, in hot springs, bitter waters, alkaline water deposits, forest lakes, marshes, dirty water deposits, water filled wheel traces and artesian wells. However, many of them are also found in lentic habitats such as shallow, weed-rich lakes, deposits, trenches and welds, as found in habitats such as groundwaters, rivers and streams, and small rivers fed by sources. Adult and larvae are found in the same environment (Güdücü, 2011; Yalçın, 2010).

MATERIALS AND METHODS

From previous studies have included individuals belonging to Coleoptera and Hemiptera and male and female individuals were taken into account and assessed with statistical information.

RESULTS

Hemiptera's family, such as; Alydidae, Belostomatidae, Coreidae, Corixidae, Gerridae, Nepidae, Notonectidae, Piesmatidae, Rhopalidae, Saldidae and Stenocephalidae (Bektas, 2010; Yıldırım et al., 2013) and members of the aquatic Coleoptera ordo, such as; Dytiscidae, Haliplidae, Helophoridae, Hydrophilidae, Hydrocidae and Noteridae families (Bektaş, 2014, 2015; Dacilin & Tanatmış, 2009; Mart et al., 2010) were examined and the graphical images were used statistical studies in order to be effective in a more effective biological struggle.

Numbers which have been monthly calculated was explained. The results obtained from the previous studies made; Figures first (1a,b) and second (2) show

the number of aggregations by month; male-female ratios in figures third (3). In figure fourth (4), the average number of catches according to elevation ranges are described below with graphical representations.

In June, July and August months, it was realized that species of all family was very abundant. Coreidea, Rhopalidae, Piesmatidae and Alydiade families individuals has been more than others. As whether is colder, numbers of family are more diminish of species number.

In figure 1a,b; the numbers of Piesmatidae and Rhopalidae individuals were found to be higher in Hemiptera order. In figure (2b), Dytiscidae, Helophoridae and Hydrophilidae species were found more frequently in aquatic beetles, especially in May and June.

In figures 2a,b; (Bektaş, 2015), studied 5 provinces (Hatay, Gaziantep, Kahramanmaraş, Kilis and Osmaniye) of Turkey and made up numbers of Helophoridae, Hydrochiidae and Hydrophilidae and ended of it biological, ecological and spread of it. (Darılmaz et al., 2015; Yalçın, 2012) established to important summary of Dydiscidae, Haliplidae and Noteridae. Numbers of Hydrophilidae and Helophoridae were seen from list of recorded article.

In addition to, Coleoptera order's members are seen abundant in the spring seasons from figure 2b. At the summer seasons, number of it dropped, then it hardly were seen there species.

On top of all this, when we look to ratio of male and female; in Coleoptera family, we realized that number of female individuals were many, male of it were fewer. But, in Hemiptera family, individuals numbers are adversely seen from figures 3a,b.

Consequently, when we look to percent of their numbers, we realize that sexual ratios are near to itself.

When we dealt with optimum oxygen, pressure and humidity, we can explain that Coleoptera family members prefer to between 500-1000 meters and between 2000-2500 meters. Hemiptera family members prefer to between 0-200 meters.

DISCUSSION

Nearly every living groups, such as, insects, mites, bacteria, fungi, viruses, nematodes, fishes, birds, mammals, snails and slugs, protozoa, etc., has natural enemy species, all of which have an indispensable prescription in the biological struggle, especially in the protection of the natural balance in the natural biological struggle. But, the highest success in human-directed biological struggle is seen in parasitoids, predators and entomopathogens. Of course, it should also necessary to know the life span of pests that are harmful to the biological struggle.

Families that has been examined in the Coleoptera team are the ones in the Middle and Eastern Black Sea Region (Amasya, Bayburt, Giresun, Gümüşhane, Ordu, Tokat and Trabzon), South Marmara (Balıkesir, Bilecik, Bursa and Canakkale), Kilis, Kahramanmaraş and Osmaniye) and Erzurum province (Bektaş, 2014, 2015; Ertoran & Tanatmış, 2009; Mart et al., 2010; Darılmaz et al., 2015); those families belonging to the order Hemiptera has been compiled from research conducted across Turkey (Bektaş, 2010; Yıldırım et al., 2013).

In this review, some species belonging to the Hemiptera and Coleoptera team were taken and significant statistical information was emerged in terms of finding a more effective method and more advanced methods in the biological struggle.

Some of the Hemiptera team from the previous studies (Bektaş, 2010; Yıldırım et al., 2013) counted the total number of individuals belonging to Rhopalidae, Pentotomidae and Alydidae families. Summarized numbers has been

calculated arithmetic ratios, than it has been interpreted graphically using statistic informations.

It is assumed that in family Rhopalidae species of Hemiptera ordo, the numbers of collected are going through numerical changes (succesions) in some species between 2010 and 2012.

CONCLUSION

While male to female ratios are considered (fig. 3); it has been noticed that female individuals are found in less than Hemiptera but a little more in Coleoptera. As looking at the elevation ranges (fig. 4); It has been understood that they spread from 0 meters to 3000 meters in a very wide fan, probably due to the influence of heat, migrating to certain altitudes. While Hemiptera members were abundant in the summer seasons, Coleoptera members were abundant in the spring seasons.

The methods of combat institutions that are trying to minimize or completely eliminate drug use are known for their biological methods, these informations is known to useful.

Because of more effective agricultural biological control, it is expected to benefit from these informations.

Notes: This study was compiled from the studies given in the references.

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Family	April	May	June	July	August	September
Alydidae	0	4	14	37	63	0
Belostomatidae	0		1	2		4
Coreidae	0	2	59	64	29	9
Corixidae	0	0	1	2	11	2
Gerridae	0	0	13	7	36	4
Nepidae	0	0	0	0	0	2
Notonectidae	0	0	3	21	6	8
Piesmatidae	0	4	68	103	114	1
Rhopalidae	0	0	245	253	272	0
Saldidae	0	0	7	2	2	1
Stenocephalidae		0	15	23	6	5

Figure 1a. Collected numbers of Hemiptera family (summarized from Bektas, 2010; Yıldırım et al., 2013).

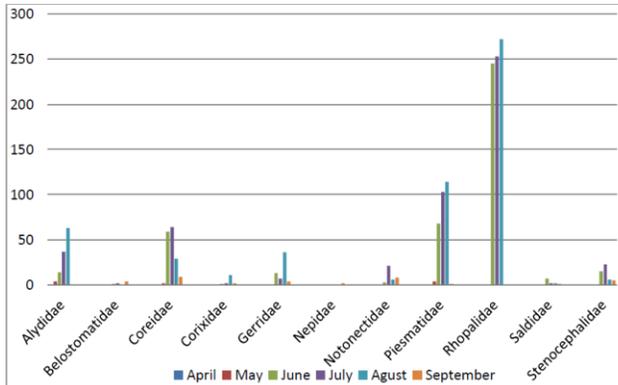


Figure 1b. According to months, spread of collected-number of Hemiptera Family (prepared and summarized from Bektas, 2010; Yıldırım et al., 2013).

Family	April	may	June	July	August	September	October
Districidae	0	177	103	41	39	41	26
Haliplidae	0	3	1	5	1	4	5
Helophoridae	1968	854	1887	841	374	142	36
Hydrochidae	0	0	1	0	2	0	0
Hydrophilidae	1969	954	1301	845	144	48	0
Noteridae		65	59	22	6	0	16

Figure 2a. Collected numbers of Coleoptera Family (summarized Bektas, 2015; Yalçın, 2012 and Darılmaz et al., 2015).

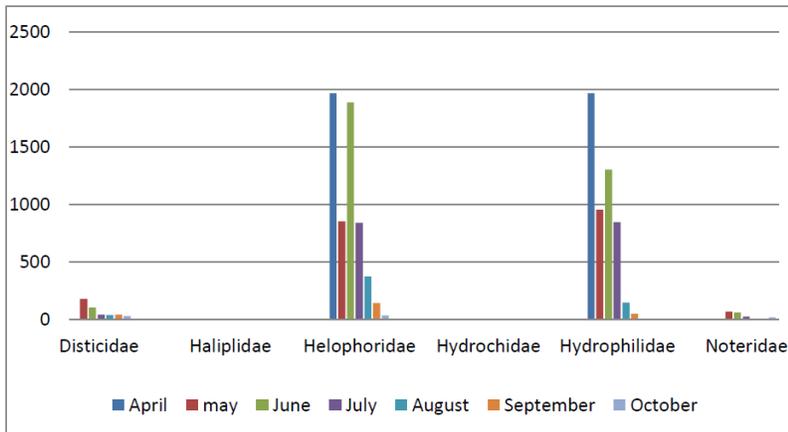


Figure 2b. According to months, graphics of collected numbers of Coleoptera Family (summarized Bektas, 2015; Yalçın, 2012 and Darılmaz et al., 2015).

Familya	Male (♂)	Female (♀)
Coleoptera	896	1000
Hemiptera	562	445
Total	1458	1445

Figure 3a. Numbers of male and female altitude, from collected records (from Bektas, 2015; Yıldırım et al., 2013).

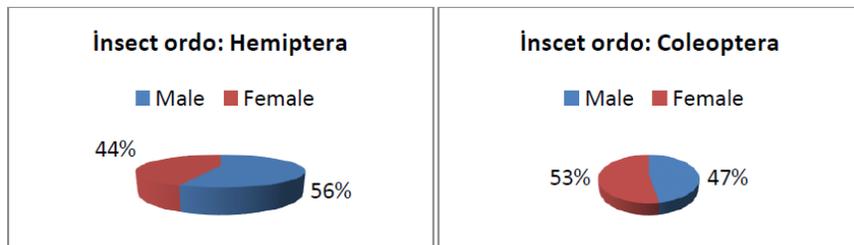


Figure 3b. Percentage of male and female sex, from collected records (from Bektas, 2015; Yıldırım et al., 2013).

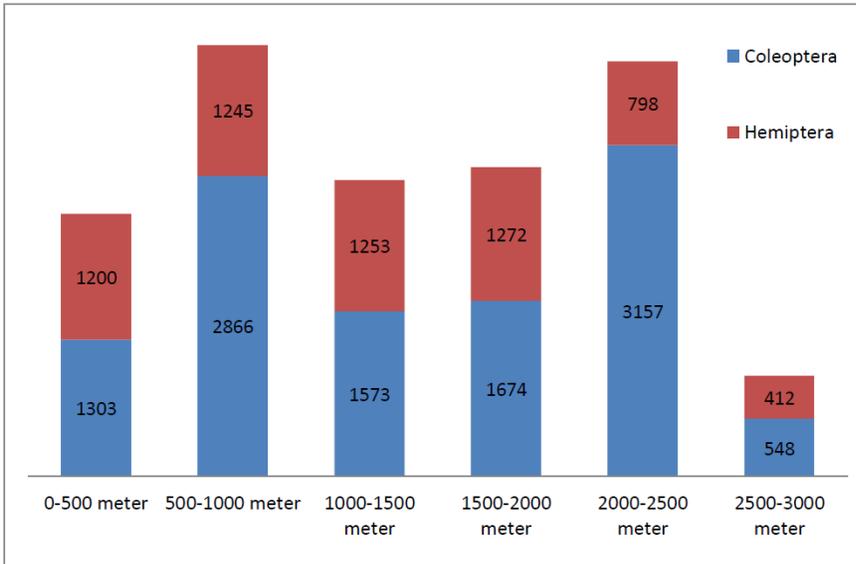


Figure 4. As altitude, collected numbers of Heteroptera ve Coleoptera family (Bektaş, 2014, 2015; Ertorun & Tanatmış, 2009; Mart et al., 2010; Darılmaz et al., 2015).