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COMPLEMENTARY STUDIES ON THE BIOLOGY OF *EURYGASTER INTEGRICEPS* Put. and *AELIA FURCULA* F. IN THE ALTITUDES OF IRAN

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Abstract

The main points of the present paper are as follows:

1. Fifteen plants have been found as the host plants of the nymphs and adult individuals of *E.integriceps* and *A.furcula* in their hibernation sites, in addition to sixteen plants reported before.
2. Migratory individuals of *E. integriceps* lay as many eggs as nearly twice in number, compared with those settled in the altitudes (non-migratory).
3. Sex ratio of the settled individuals of *E.integriceps* undergoes, during the different periods of the insect life cycle, less variations in comparison with that of migratory ones.

Introduction

There has been an obvious increase in the rate of destruction of the range-

lands all over the country, particularly during the recent years. This is mainly due to the irrational extension of rain-fed cereals and over-grazing. Along with these changes, the settled individuals of *E. integriceps* which used to feed on the wild plants in the altitudes, have extended progressively their field of activity in all directions and thus creating new areas of invasion.

To show the importance of the phenomenon we are trying to bring the wild plants fed by *E. integriceps* and *A. furcula* in the altitudes to light. In this regard, a preliminary list of plants was published in 1988 (Radjabi & Termeh). In the first list we had named *Stipa hohenackeriana* Trin-Rurr. and *Taeniatherum crinitum* (Scherb.) Nevski as the host plants of *E. integriceps*, on the basis of few individuals of the bug found on them. Since then we have never found again the insect on these plants convincing us consequently to scratch them out of the list.

Materials and Methods

1. To find the host plants of *E. integriceps* and *A. furcula* we carried out our investigations shortly after the usual time of return migration of the pest to the cereal fields to be sure that the remaining ones belong to the settled population. In this regard, we considered as the host plants only those with the pests nymphs feeding on them.
2. To compare the fecundity of the migratory and non-migratory bugs, we collected during March 1989 an adequate number of the overwintering adults of the two different groups on Gharaghadj altitudes of Varamin and Varcheh altitudes of Khomin respectively. The migratory insects were released on the leaves of wheat while the non-migratory ones were bred on the leaves of *Bromus inermis* in the laboratory. Thus they had the opportunity to make their pre-oviposition feedings.
3. To have accurate idea of the sex ratio of non-migratory bugs in comparison

with that of migratory ones we combined our data from Esfahan and Varamin for non-settled insects and compared them with those of Varcheh as a typical area of non-migratory *E. integriceps*. To base the studies on sufficient records we made calculations of sex ratio in three different periods as follows:

— just before the downward migration from the hibernation area to the fields or to the wild host plants.

— shortly after the final migration to the fields or to the wild host plants.

— just after their return flight (for the migratory bugs) and their return movements (for the non-migratory ones) to the hibernation areas. The surveys were carried out during 1987 and 1988.

Results and Discussion

1. The host plants of *E. integriceps* and *A. furcula* in the altitudes.

All the host plants collected during this second attempt belong to the family Gramineae. They are listed in Table 1.

In the altitudes with non-migratory bugs, the egg parasites are considerably active (Radjabi & Amir-Nazari, 1989).

2. Fecundity of non-migrating females of *E. integriceps*.

The results are given in Table 2.

3. Sex ratio of non-migrating *E. integriceps* compared with that of migrating population

Sex ratio, in this report, is defined as the number of males or females in one hundred individuals of *E. integriceps*. We found that the migrating *E. integriceps* in Esfahan region consist initially of equal number of males and females, and in spite of some considerable variations in some periods, chiefly their differential mortality principally in hibernation areas, the ratio remains

Table 1. Host plants of E. integriceps and *A. furcula* in the altitudes

Plant name	*E.integriceps*	*A.furcula*	Distribution area*	Habitat
Aegilops triuncialis L.	+		All over the country	30-2200m.
Agropyron pectiniforme Roemer&Schultes	+	+	NE-N-NW-C	60-2800m.
Alopecurus arundinaceus Poir. var. *arundinaceus*	+	+	NE-N-NW-E-C	1100-2900m.
Arrhenatherum kotschyi Boiss.	+	+	NE-NW-C	1300-3000m.
Boissiera squarrosa (Banks&Soland.)Nevski	+	+	N-CE-N-NW-E-W	1000-2580m.
Bromus danthoniae Trin. var.*lanuginosus*Roshev.	+		NE-NW-E-C-S	680-2640m.
Bromus lanceolatus Roth. var. *lanceolatus*	+	+	N-NE-C	1200-2600m.
Eremopoa persica (Trin.)Roshev.var.*persica*	+	+	All over the country	700-3300m.
Eremopyrum bonaepartis (Spreng.)Nevski var.*bonaepartis*	+	+	NE-N-NW-SE-C	700-2000m.
Eremopyrum distans(C.Koch) Nevski	+		All over the country	900-2700m.
Hordeum violaceum Boiss. & Huet.	+	+	NE-N-NW-C	900-3400m.
Melica jacquemontii Decne. subsp.*canescens*(Regel)Bor.	+	+	E-C-NE	1350-2100m.
Poa bulbosa L.var. *vivipara* Koel.	+	+	NE-N-NW-E-C	600-2800m.
Psathyrostachys fragilis (Boiss.) Nevski	+		N-NE-E-C	1200-3200m.
Puccinellia bulbosa (Grossh.) Grossh.		+	NW-C	1300-1900m.

* Distribution areas and altitudes cited in Table 1 are not presumably complete.

Table 2. Comparison of the fecundity of non - migrating and migrating females of *E. integriceps*

Number of eggs					
non - migrating females			migrating females		
Max.	Min.	Average	Max.	Min.	Average
48	14	27.4	95	16	50.6

almost the same. According to numerous observations, the overwintered males tend to migrate to the fields a little earlier than the females and they have the same tendency when flying back to the hibernation areas. Another important point is that the males start to die off shortly after copulation in the fields while the females survive very much longer and in many cases they can even be found along with the newly formed adults of the new generation.

Neglecting the above - cited points, will usually lead the researchers to errors in their calculations for the sex ratio. In addition, we remarked that the females usually fly farther than the males when migrating to the altitudes for hibernation and also when going back to the fields during the next year. To give more details we present some figures obtained from counts during spring (Tables 3 and 4).

Numerous samplings, during various years in the region of Varamin (near Tehran) and other irrigated areas, have shown a more or less similarity between them and Esfahan, indicating that in the regions with irrigated cereal fields there are approximately similar variations in the sex ratio of *E.integriceps*, in other words our records confirm entirely those of Brown (1962).

Comparing the results of Varcheh (with non-migrating bugs) with those

of Esfahan and Varamin regions (with irrigated cereals) we are convinced that:

Table 3. Sex ratio changes of the old generation of *E. integriceps* in the wheat fields (Esfahan region)

Date of sampling	Percentage of males	Percentage of females
April (1—10)	67.0	33.0
May (1—20)	36.3	63.7
June (1—10)	30.3	69.7

Table 4. Sex ratio changes of the old generation of non-migratory individuals (Varcheh region)

Date of sampling	Percentage of males	Percentage of females
April (10-20)	67.7	32.3
May (10-20)	39.2	60.8
June (1-10)	33.8	66.2

1. The proportions of males and females are almost the same when newly formed (new generation).
2. The range of variation of non-migratory *E.integriceps* is slightly less than that of migratory ones.
3. They pass through the same sex ratio changes as the migrating individuals in spring (Table 4). These variations are, as in the case of migrating bugs, attributed to the relatively earlier return flight of males to the cereal fields

resulting consequently in a higher proportion of them during April and the beginning of May and to the approximately prompt disappearance of males shortly after copulation. This phenomenon increase the proportion of females during May and June.

4. As in the case of migratory bugs, the non-migrating males undergo higher mortality than the females in the hibernation areas, but the difference is not as large as that of the migrating population.

As a rule, the males use up their food reserves earlier than the females in the hibernation areas and consequently succumb more readily to the adverse winter conditions.

References

BROWN,E.S. 1962. Researches on the ecology and biology of *Eurygaster integriceps* Put. (HEMIPTERA, SCUTELLERIDAE) in middle **east** countries, with special reference to the overwintering period. **Bul. Ent. Res.**, Vol. 53, Part 3.

RADJABI,Gh.and F. TERMEH 1988. Reproduction of *Eurygaster integriceps* Put. and *Aelia furcula* F. in their hibernation sites and its connection with these bugs extension in Iran. **Ent. Phyt. Appliq.** 55 (1&2): 131 - 139. (in Farsi and English).

RADJABI,Gh. and M.AMIR - NAZARI 1989. Egg parasites of Sunn Pest in the central part of Iranian plateau. **Ent. Phyt. Appliq.** 56(1&2): 1—12. (in Farsi and English).

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