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AUCHENORRHYNCHA OF THE UPPER TERRAIN OF A SAND SOIL GRASSLAND: QUANTITATIVE RELATIONS, BIONOMIC AND ECOLOGICAL-VALENCE DATA

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Abstract

In 1977—1978, from among the 38 Auchenorrhyncha species, found in the upper terrain of the sand soil grassland of Bugac (Hungary), the following were rather important: *Psammotettix provincialis, Aphrodes elongatus, Aphrodes bicinctus, Recilia schmidtgeni, Turrutus socialis, Philaenus spumarius, Lepyronia coleoptrata,* and *Agallia ribauti. Macustus grisescens* is a new species in Hungary. 48.6 per cent of the occurring species are univoltin species, 22.9 per cent are bivoltin species, both spending the winter in the form of eggs. In larval sha e 11.3 per cent, as imagos 17.1 per cent of them spend the winter. Dry-grass specific are 48.6 per cent, xerophilous are 32.4 per cent, indifferent of this are 10.8 per cent and non-characteristic 8.1 per cent.

Introduction

It was also demonstrated by the investigations carried out, so far, in different grass types that the Auchenorrhyncha group forms a characteristic part of their fauna (MARCHAND, 1953), particularly of the primary consument fauna, being in immediate connection with the primary production (ANDRZEJEWSKA, 1971). In a sheep-walk, Cicadae have formed the herbivore insects of highest abundance of the plant parts over soil surface (ANDRZEJEWSKA, 1974). These are similarly ranged among the primary consuments by OSBORN (1939), WEIGERT and EVANS (1967), HEWITT and BURLESON (1975, 1976), HAAS (1976), HOKKANEN and RAATIKAINEN (1977), and others. In Hungary, the grassland and meadow types of Hortobágy were biocoenotically surveyed (KOPPÁNYI and WOLCSÁNSZKY, 1956).

The present investigation is part of a complex research, begun in 1976 by the Department of Zoology of the Attila József University in a sand soil grassland in the area of Bugacpuszta, in the Kiskunság National Park (MÓCZÁR et al. 1980). According to the data of 1976—1978, Auchenorrhyncha represented at the upper terrain, within all the Insecta, 74.43; 31.65; resp. 24.07 per cent (GALLÉ et al, 1980). This justifies, as well, their investigation in detail, of which we undertake in this paper the elaboration of the material according to species composition, species dominance, bionomics (wintering, number of generations) and ecological valence.

Methods

The detailed description of the investigated area and methods were given earlier (MÓCZÁR et al. 1980; resp. GALLÉ et al., 1980). From the strongly enough separated two terrains: the Auchenorrhyncha fauna of the higher lying ridges is treated here. The characteristic plant associations

are: *Potentillo-Festucetum pseudovinae danubiale* and *Festucetum vaginatae danubiale*. Collection took place from March till November, generally once a month. Biocoenometric collections were carried out in 1976 with informative character, completed with grass netting (GALLÉ et al., 1980).

To determine the Cicadae, I have used primarily the works of RIBAUT (1936, 1952) and DLABOLA (1954). Nominations are corrected according to NAST (1972). Some bionomial and ecological-valence data are completed from the works of SCHIEMENZ (1969, 1971, 1975, 1976).

Results

1. Qualitative and quantitative species composition

For evaluating the dominance relations, I have used Schiemenz's division, according to which (D-dominance):

D-group	D per cent	
+	<1	accessory species
1	1—4	
2	4—16	subdominant species
3	16—36	dominant species
4	36—64	
5	64—100	

According to SCHIEMENZ (1969)

On the basis of this, the dominance relations of the Auchenorrhyncha populations of the upper terrain are the following (Table 1).

Dominant species were in 1977 two *(Aphrodes elongatus, Psammotettix provincialis)*, in 1978 only one *(Psammotettix provincialis)*. Subdominant were in 1977 two, in 1978 seven species. The species with a dominant role on the ridges of sand-hills were, therefore, the following: *Psammotettix provincialis, Aphrodes elongatus, Aphrodes bicinctus, Recilia schmidtgeni, Turrutus socialis, Philaenus spumarius, Lepyronia coleoptrata, Agallia ribauti, Zyginella* sp. This agrees well with the results of ANDRZEJEWSKA (1971) in the proportions of the division of species dominance. The comparatively extreme environmental factors ensure adequate living conditions only to a few species. Therefore, apart from a few dominant populations, the number of „residual" elements is high. A number of these probably stay as guests in the upper, drier terrain, their real living-space is in the wind-furrows. Investigations referring to this are the subject of a future work.

II. Data on the bionomics of the occurring species

The wintering quality of the occurring populations, the number of developing generations may be characteristic of a given ecosystem. At the investigated sand soil level this took place in the following way:

1) There are wintering in imago form:

a) In one generation:

Jassidaeus lugubris — *Ulopa trivia*

b) In two generations:

Agallia ribauti — *Eupelix cuspidata*
Arboridia parvula — *Neoaliturus fenestratus*

Table 1. Auchenorrhyncha dominance relations in 1977–1978.

Species	1977		1978	
	D p.c.	DG	D p.c.	DG
Agallia ribauti Oss.	3.14	1	2.79	1
A. sinuata M. R.	4.92	2	0.55	+
Aphrodes albiger Germ.	—	—	0.83	+
A. bicinctus Schrk.	6.99	2	6.56	2
A. elongatus Leth.	16.36	3	5.93	2
Arboridia parvula Boh.	0.06	+	0.83	+
Artianus interstitialis Germ.	0.16	+	0.27	+
Batracomorphus allionii Turt.	0.03	+	–	–
B. irroratus Lew.	0.20	+	0.27	+
Bobacella corvina Horv.	0.30	+	–	–
Chanithus pannonicus Germ.	0.50	+	0.27	+
Doratura homophyla Flor.	0.60	+	0.27	+
D. stylata Boh.	3.74	1	0.27	+
Zyginella sp.	1.13	1	12.01	2
Eupelix cuspidata F.	0.71	+	–	–
Euscelis plebejus Fall.	1.17	1	–	–
Goniagnathus brevis H. S.	0.24	+	–	–
Hecalus glaucescens Fieb.	3.66	1	3.07	1
Jassidaeus lugubris Sign.	–	–	0.55	+
Kelisia sp.	0.97	+	2.51	1
Lepyronia coleoptrata L.	2.66	1	5.87	2
Macustus grisescens Zett.*	–	–	0.27	+
Mendrausus pauxillus Fieb.	1.90	1	0.27	+
Neoaliturus fenestratus E. S.	0.81	+	1.66	1
Neophilaenus infumatus Hpt.	1.42	1	0.55	+
Ommatidiotus incospicuus Stal.	0.50	1	1.11	1
Paluda preyssleri H. S.	–	–	0.27	+
P. vitripennis Flor.	0.28	+	0.27	+
Philaenus spumarius L.	2.89	1	6.91	2
Psammotettix alienus Dhlb.	1.61	1	0.54	+
P. confinis Dhlb.	3.83	1	2.79	1
P. pallidinervis Dhlb.	0.06	+	–	–
P. provincialis Rib.	31.65	3	22.71	3
P. striatus L.	0.06	+	–	–
Recilia schmidtgeni Wagn.	1.63	1	–	–
Trypetimorpha fenestrata Costa.	0.12	+	–	–
Turrutus socialis Fl.	2.00	1	7.82	2
Ulopa trivia Germ.	1.97	1	0.83	+
Other Cicadellidae	1.49		2.32	
Other Delphacidae	–		1.11	

D = dominance DG = dominance group

* This is a new species in Hungary

2) There are wintering in larval form:

a) In one generation:

Bobacella corvina *Macustus grisescens*
Hecalus glaucescens

b) In two generations:

Euscelis plebejus

3) There are wintering in egg-shape:
a) In one generation:

Agallia sinuata
Aphrodes albiger
Aphrodes bicinctus
Aphrodes elongatus
Artianus interstitialis
Batracomorphus allionii
Batracomorphus irroratus
Chanithus pannonicus
Doratura homophyla
Doratura stylata
Goniagnathus brevis
Lepyronia coleoptrata
Mendrausus pauxillus
Neophilaenus infumatus
Ommatidiotus incospicuus
Paluda preyssleri
Philaenus spumarius

b) In two generations:

Paluda vitripennis
Psammotettix alienus
Psammotettix confinis
Psammotettix pallidinervis
Psammotettix provincialis
Psammotettix striatus
Recilia schmidtgeni
Turrutus socialis

The majority of species (48.6 p. c.) are univoltin and they winter in egg-form; 22.9 p. c. are bivoltin and winter in egg-form. Comparing these data with the values obtained in boggy meadows, resp. dry grasslands (SCHIEMENZ, 1969), there is a high-degree identity with the dry grasslands (Table 2).

Table 2

	bog (Sch)	dry grassland (Sch)	own data
imago is wintering	9.6 p.c.	19.1 p.c.	17.1 p.c.
larva is wintering	26.9	10.3	11.3
egg is wintering	63.5	70.6	71.5

Sch = SCHIEMENZ (1969)

III. Division of the occurring species according to ecological valence:

1) Stenotopic species (X) in xerothermous biotopes, in Central Europe they only live in dry grasslands:

Arboridia parvula
Artianus interstitialis
Batracomorphus irroratus
Chanithus pannonicus
Goniagnathus brevis
Hecalus glaucescens
Jassidaeus lugubris
Mendrausus pauxillus
Neoaliturus fenestratus
Neophilaenus infumatus
Ommatidiotus incospicuus
Paluda preyssleri
Paluda vitripennis
Psammotettix pallidinervis
Psammotettix provincialis
Psammotettix striatus
Recilia schmidtgeni
Ulopa trivia

2) Eurytopic species:
a) They live in xerophilous and mesophilous biotopes but their centre of gravity is displaced towards the xerophilous character. $(\underline{X-M})$:

Trypetimorpha fenestrata
Agallia sinuata
Agallia ribauti
Aphrodes albiger
Aphrodes elongatus
Batracomorphus allionii
Bobacella corvina
Doratura homophyla

b) They occur equally in xerophilous, mesophilous and hygrophilous biotopes but they prefer the first of these ($\underline{X}-M-H$):

Euscelis plebejus
Eupelix cuspidata
Doratura stylata
Turrutus socialis

c) They occur in all the three biotope types, without preferring any of them ($X-M-H$):

Aphrodes bicinctus
Lepyronia coleoptrata
Psammotettix alienus
Psammotettix confinis

d) They prefer the mesophilous biotope ($X-\underline{M}-H$):

Athysanus argentarius

e) They prefer the mesophilous and hygrophilous biotopes ($X-\underline{M}-\underline{H}$):

Philaenus spumarius
Macustus grisescens?!

The dry-grassland specific species dominate: 48.6 per cent; the dry grassland is preferred by 32.4 per cent; 10.8 per cent are indifferent to the dry grasslands; and 8.1 per cent are not characteristic. Compared with SCHIEMENZ's data (1969), there the percentage is 44.1, 24.3, 21.7, and 9.9. It appears from all these that from among the Central European dry grassland the one investigated by us belongs to those being under more extreme environmental conditions where the quality of the populations that are able to survive is more strongly determined by the pressure of selection.

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