# Fauna and Ecology of Bugs (Hemiptera, Heteroptera) in the Coastal Grey Dunes in Latvia

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**Abstract:** The bugs were investigated in six dune sites along the West coast of Latvia. Pit-fall traps were used to collect epigeic species and entomological net to collect grass-dwelling species. The population density of epigeic species was low and was limited by moss-lichen cover. *Nysius thymi* and Miridae had a high population density and dominated over grass-dwelling bug species. The vegetation cover of flowering plants also limited the distribution of bug species.

**Key words:** Heteroptera, fauna, ecology, coastal dunes, Latvia.

## Introduction

Coastal dunes have specific environmental conditions and thus possess a specific entomofauna. At the same time the coastline is a barrier for dispersing insects. In Latvia, dunes cover comparatively small area and are among the northernmost situated in Europe.

Dune invertebrates have been studied fragmentarily in Latvia. Only accidental data can be found in the literature. Very few faunistic notes can be found about the species composition and ecology of dune bugs (Spuris 1950; 1953; Spungis 2002; 2003).

The aim of this study was to identify species composition of the bugs and factors limiting their distribution in the grey dunes.

## Methods

Five study areas were selected at the West coast of Latvia (fig. 1, tab. 1,) where the largest grey dune areas are situated. The investigation was performed in dunes with different size. Therefore, sample plots were selected to cross the whole width of the respective dune, so the distance between sample plots was not always the same (tab. 1).

Simple pit-fall traps (plastic glasses 4.5 cm in diameter, preserving liquid – 10% formaldehyde with additive – detergent) were used in order to capture epigeic species. All macro-invertebrates, among them bugs, were studied. The numbers of traps in every sample plot are specified in Table 1. The traps were exposed on sites approximately from middle of May to middle of June. They were arranged either regularly ~~on~~ in a line on the sample plot, or arranged at indefinite even distances among them to cross whole grey dune. As numbers of traps in every sampling site were different the mean relative density (ind./trap) was calculated to compare the data.

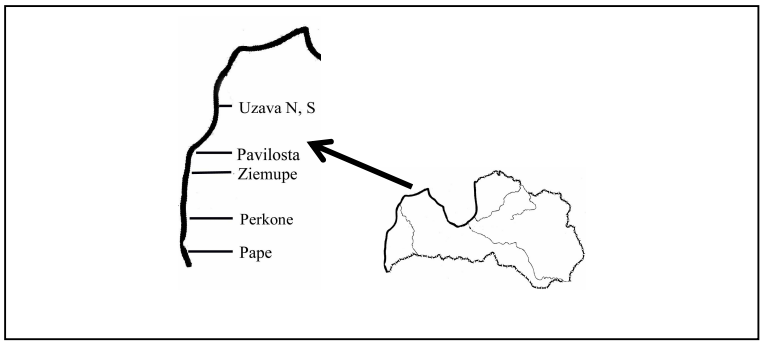



Figure 1. Study areas at the West coast of Latvia.

Table 1. Characteristics of the study sites of epigeic species in 2001-2004.

| Study site Coordinates | Sampling period | Numbers of sample plots | Numbers of traps in every plot | Distance between traps (m) | Description of dune habitats | Arrangement of sample plots |
|---|---|---|---|---|---|---|
| Ziemupe 21:03:11 E 56:49:25 N | 15.05-15.06.2001 | 30 | 10 | 3 | Ca. 50-100 m typical grey dune, bordering Scotch pine forest, relief flat | Three sample plots parallel to and at three distances from the white dune, in total 10 such sets of sample plots |
| Ziemupe 21:03:11 E 56:49:25 N | 21.05-18.06.2003 | 3 | 10 | Ca. 2 | The same as in 2001 | 3 parallel each other and perpendicular to white dune sample plots, and crossing grey dune |
| Ziemupe 21:03:11 E 56:49:25 N | 22.05-19.06.2004 | 3 | 30 | 2 | The same as in 2001 | Three 60 m long parallel each other and perpendicular to white dune sample plots, crossing grey dune |
| Pape 21:01:41 E 56:08:45 N | 15.05-13.06.2002 | 30 | 10 | 3 | Ca 300 m wide typical grey dune with invasive plants, bordering coastal meadows, relief moderately wavy | 10 sample plots parallel to and at 10 distances from the white dune, in total three such sets of sample plots |
| Pape 21:01:41 E 56:08:45 N | 21.05-18.06.2003 | 3 | 10 | Ca. 5 | The same as in 2002 | 3 parallel each other and perpendicular to white dune sample plots, and crossing grey dune |
| Užava (North) 21:24:52 E 57:15:00 N | 21.05-18.06.2003 | 3 | 10 | Ca. 2 | Ca. 50 m wide gravel-sandy grey dune, bordering Scotch pine forest, relief nearly flat | The same |
| Užava (South) 21:24:36 E 57:10:53 N | 21.05-18.06.2003 | 3 | 10 | Ca. 6 | Ca. 200 m wide gravely grey dune, bordering Scotch pine forest, relief flat | The same |
| Pērkone 21:00:05 E 56:27:17 N | 21.05-18.06.2003 | 3 | 10 | Ca. 5 | Ca. 80 m wide typical grey dune, bordering Scotch pine forest, relief strongly wavy | The same |
| Pāvilosta 21:11:25 E 56:53:42 N | 21.05-18.06.2003 | 3 | 10 | Ca. 5 | Ca. 300 m wide typical grey dune, bordering sedge meadow, relief flat | The same |

An entomological sweep net 40 cm in diameter was used to collect grass-dwelling insects. One sample included 30 sweeps. Samples were collected in two localities several times per season (tab. 2). Only in July populations were abundant and data could be used for analysis. The sweeping and pitfall trapping was performed on the same lines if the study sites coincided.

Table 2. Characteristics of the grass-dwelling insect study sites.

| Locality | Date | Numbers of samples | Remarks |
|---|---|---|---|
| Ziemupe | 24.07.2001 | 30 | Three sample plots parallel to and at three distances from the white dune, in total 10 such sets of sample plots |
| Pape | 15.07.2002 | 30 | 10 sample plots parallel to and at 10 distances from the white dune, in total three such sets of sample plots |
| Ziemupe | 25.07.2004 | 15 | Three 60 m long lines parallel to each other and perpendicular to the white dune |

The following scheme of observations was designed in order to study: changes in species composition and population density over an extensive area of grey dunes and to study the effects of natural variability of the dunes and of anthropogenic impact on invertebrates in Ziemupe in 2001; species distribution and diversity in grey dunes and possible influence of the invasive plant *Gypsophila paniculata* in Pape in 2002; species distribution and diversity in grey dunes with different relief and types of vegetation in six sites in 2003; in Ziemupe in 2004, sample plots were set in the area of sample plots No 9-24 (tab. 2) as in 2001, and transects as in 2003.

An anthropogenic influence (trampling, destroying the vegetation cover) was evaluated in classes from 0 to 10 (no influence to strong influence).

To characterise the interrelation of invertebrate populations and plant species diversity and vegetation cover data obtained by B.Laime and L.Liepiņa were used. Only adult bugs were considered and identified (Kerzner, Jachevskij 1964). Samples and collections are housed in the Faculty of Biology, University of Latvia. MS Excel and the software package SPSS were used for calculations.

## Results

### Epigeic bugs collected by pitfall traps

For Ziemupe population density of bugs (tab. 3, 4) was compared with the relative classes of anthropogenic influence (tab. 5) and correlations with vegetation cover were calculated.

Epigeic species diversity (numbers of species) positively correlated with the moss-lichens cover ($r=0.564$, $N=29$, $p<0.01$) and with species diversity (numbers of species) of flowering plants ($r=0.574$, $N=29$, $p<0.01$). No significant correlations were found among other variables.

*Sciocoris cursitans* dominated among epigeic bugs (41%) in accordance with A.D.Engelmann (1978). The density of *S. cursitans* positively correlated with moss-lichen cover ($r=0.807$, $N=29$, $p<0.01$) and species diversity of flowering plants

(r=0.374, N=29, p<0.05).

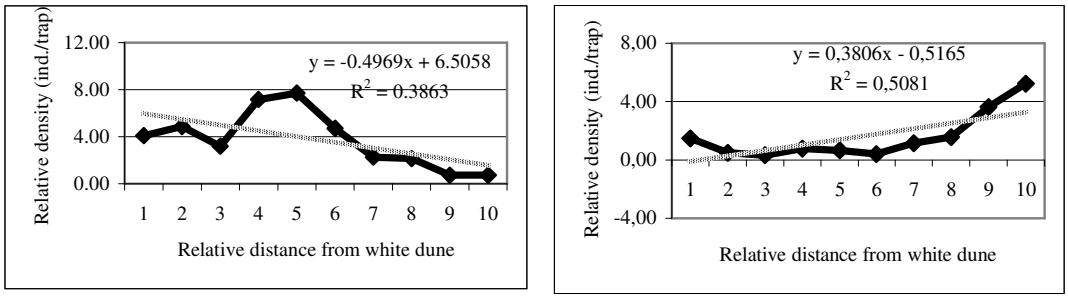
The total numbers of epigeic bug species also correlated with these variables (r=0.679, N=29, p<0.01) and (r=0.550, N=29, p<0.01), respectively.

In Pape, species composition and relative density of epigeic bugs (tab. 6) differed from those ones in the Ziemupe sample plots.

Table 3. Relative density (ind./trap) of epigeic bugs in the Ziemupe sample plots (15.05-15.06.2001). Explanation of numbers in the cells: upper – a sequence of sample plots; below – relative density. Cell shading: no shading – not recorded, light grey – up to 1 ind./trap; moderate grey - 1-2; dark grey – more than 2 ind./trap.

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Grey dune near white dune** | 1: 0.00 | 4: 0.00 | 7: 1.22 | 10: 0.78 | 13: 1.11 | 16: 1.22 | 19: 0.22 | 22: 0.13 | 25: 0.33 | 28: 0.22 |
| **Typical grey dune** | 2: 0.30 | 5: 0.11 | 8: 1.67 | 11: 1.43 | 14: 2.17 | 17: 4.29 | 20: 3.40 | 23: 1.60 | 26: 0.70 | 29: 0.57 |
| **Grey dune near forest** | 3: 0.70 | 6: 0.80 | 9: 1.00 | 12: 2.78 | No samples | 18: 2.50 | 21: 5.67 | 24: 6.00 | 27: 1.89 | 30: 1.11 |

*Pionosomus varius* was eudominant (60%), *Derephysia cristata* – dominant (25%), but the density of other species was low. Total density of bugs did not show a definite gradient towards inland. But species density analysis showed a significant decrease (p=0.05) for *Pionosomus varius* and an increase (p=0.01) for *Derephysia cristata* towards inland (Fig. 2).




**A** **B**

Figure 2. Changes in relative density (ind./sample) of *Pionosomus varius* (A) and *Derephysia cristata* (B) in Pape sample plots (15.05-13.06.2002). Aggregated data from three sets of sample plots represented.

A significant correlation was observed among the numbers of epigeic bug species and the cover of moss-lichen (r=0.473, N=30, p<0.01), and between the relative density of bugs and of moss-lichen cover (r=0.384, N=30, p<0.05). The analysis showed that there were no significant correlations among numbers of species of epigeic bugs, mean density of bugs, dominant species *Pionosomus varius* and numbers of flowering plant species, cover of the dominating dune grass *Festuca sabulosa* and the invasive plant *Gypsophila paniculata*.

The comparison of epigeic bugs in six dune areas by simultaneous collecting (tab. 1) in 2003 showed a significant difference in species composition and population density (tab. 7). In dunes consisting of bare gravel and sand and scarce vegetation (North to Užava) species diversity and density was extremely low. The dunes South to

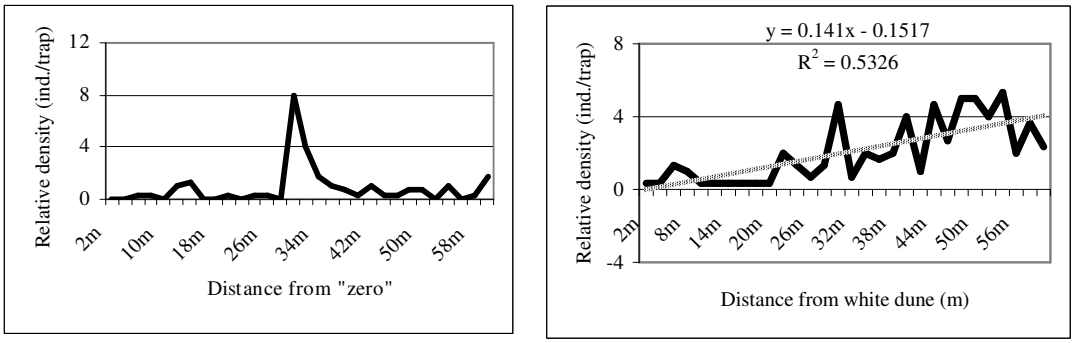
Užava can be characterised as gravel-sand desert and bugs were absent there. In Pāvilosta in flat dunes covered with permanent vegetation and with significant influence of *Carex arenaria* species diversity and population density increased slightly. In Pape with influence of invasive plants the bug species diversity and population density increased. In Ziemupe with typical grey dune vegetation these bug diversity and density increased even more. And in Pērkone in grey dunes with a complicated relief and permanent vegetation cover species diversity and population density reached the highest values.

Table 4. Relative density (ind./trap) of species of epigeic bugs in the Ziemupe sample plots at different zones of the grey dune (15.05-15.06.2001).

| Family | Species | Zone of grey dune | | |
|---|---|---|---|---|
| | | Influenced by white dune | Typical | Influenced by forest |
| Cydnidae | *Legnotus picipes* (FALLEN) | 0.04 | 0.16 | 0.06 |
| Lygaeidae | *Geocoris ater* (F.) | 0.05 | 0.15 | 0.07 |
| Lygaeidae | *Gonianotus marginepunctatus* (WOLFF) | 0.10 | 0.03 | 0.04 |
| Lygaeidae | *Macrodema micropterum* (CURTIS) | | 0.01 | 0.01 |
| Lygaeidae | *Peritrechus nubilus* (FALLEN) | | | 0.01 |
| Lygaeidae | *Pionosomus varius* (WOLFF) | 0.09 | 0.10 | 0.24 |
| Lygaeidae | *Plinthisus pusillus* (SCHOLTZ) | 0.03 | 0.03 | 0.05 |
| Lygaeidae | *Stygnocoris rusticus* (FALLEN) | | | 0.04 |
| Lygaeidae | *Trapezonotus arenarius* (L.) | 0.03 | 0.05 | 0.13 |
| Lygaeidae | *T. anorus* (FLOR) | | 0.03 | 0.09 |
| Lygaeidae | *T. desertus* SEIDENSTÜCKER | 0.03 | 0.01 | 0.10 |
| Miridae | Miridae gen. spp. | | 0.05 | 0.33 |
| Pentatomidae | *Sciocoris cursitans* (F.) | 0.13 | 0.70 | 1.00 |
| Scutelleridae | *Phimodera humeralis* (DALMAN) | 0.05 | | |
| Tingitidae | *Derephysia cristata* (PANZER) | 0.06 | 0.14 | 0.27 |
| Tingitidae | *Acalypta parvula* (FALLEN) | | | 0.01 |

*Pionosomus varius* and *Derephysia cristata* dominated in the study area in Ziemupe in 2004 (tab. 8). Total density of epigeic bugs increased insignificantly towards inland (fig. 3). *Pionosomus varius* had a gregarious distribution along transects and did not show any definite trend. The species also have an unexplained concentration of individuals in the middle of the sample plots, and thus influenced the figures on the distribution of all bugs on the sample plots. On the other hand, *Derephysia cristata* showed a significant ($p=0.05$) increase of the population density towards inland.

The population density of epigeic bugs significantly correlated with the numbers of species of flowering plants ($r=0.588$, $N=30$, $p<0.01$), numbers of species ($r=0.576$, $N=30$, $p<0.01$) and cover of mosses and lichens ($r=0.401$, $N=30$, $p<0.05$), and was not dependent on the flowering plant cover. These correlations were caused mainly by the dominating *Derephysia cristata* (correlation quotients: $r=0.724$, $N=30$, $p<0.01$; $r=0.634$, $N=30$, $p<0.01$; $r=0.703$, $N=30$, $p<0.01$, respectively).




**A** **B**

Figure 3. Changes in relative density (ind./trap) of *Pionosomus varius* (A) and *Derephysia cristata* (B) in Ziemupe sample plots (22.05-19.06.2004). Aggregated data from three sample plots represented.

Table 5. The anthropogenic influence expressed in classes in the Ziemupe sample plots (15.05-15.06.2001). Explanation of numbers in the cells: upper – a sequence of sample plots, below – class. Cell shading: no shading – no or weak influence; light grey – moderate; dark grey – strong influence.

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Grey dune near white dune** | 1:<br>5 | 4:<br>8 | 7:<br>1 | 10:<br>1 | 13:<br>1 | 16:<br>2 | 19:<br>1 | 22:<br>2 | 25:<br>0 | 28:<br>1 |
| **Typical grey dune** | 2:<br>0 | 5:<br>2 | 8:<br>2 | 11:<br>3 | 14:<br>5 | 17:<br>4 | 20:<br>5 | 23:<br>0 | 26:<br>0 | 29:<br>5 |
| **Grey dune near forest** | 3:<br>0 | 6:<br>0 | 9:<br>1 | 12:<br>1 | 15:<br>10 | 18:<br>3 | 21:<br>0 | 24:<br>1 | 27:<br>0 | 30:<br>1 |

### Grass-dwelling bugs collected by sweep net

The numbers of adult bugs was low in May and June but increased in July and only the data of July were used for calculations. In Ziemupe, *Nysius thymi* dominated and was unevenly distributed in the sample plots (tab. 9, 10). Lower population density was observed in the sample plots bordering white dune and in sample plots affected by anthropogenic factors. The population density of *N. thymi* positively correlated with the flowering plant cover ($r=0.385$, $N=30$, $p<0.05$), but did not correlated with the numbers of plant species or any particular plant species. In Pape, in July of 2002, *N. thymi* and species of Miridae dominated (tab. 9). The numbers of *N. thymi* positively correlated with the flowering plant cover ($r=0.404$, $N=30$, $p<0.05$), but not with any other variable. In Ziemupe, in July of 2004, *N. thymi* and species of Miridae dominated (tab. 9). The numbers of *N. thymi* positively correlated ($r=0.565$, $N=15$, $p<0.05$) with the numbers of species of flowering plant, but not with any other variable.

## Discussion

In dunes, bugs belonging to 43 taxa were found, of them 40 were identified to species. In the dune bug community epigeic species (26 species) dominate over grass-dwelling species (10 species). In general, the density of epigeic bugs was low, but the

density of grass-dwelling bugs can reach high values. Four species were regarded as accidental because they are known to feed on trees and bushes. Thus, accidental individuals from the neighbouring habitats can contribute to species composition in dunes also. *Plinthisus pusillus*, *Trapezonotus desertus*, *Xanthochilus quadratus*, and *Legnotus picipes* are new species in the fauna of Latvia. Some species were found additionally by direct observation: *Dolycoris baccarum* (1 ind., Ziemupe, 28.08.2004); *Drymus reyi* (1. ind., Pape, 02.10.2004); *Nysius helveticus* (1. ind., Pērkone, 05.07.2003); *Pygolampis bidentata* (1. ind., Ziemupe, 15.06.2001, a new Reduviidae species for Latvia), *Nemocoris falleni* (Pape, 02.10.2004, a new Coreidae species for Latvia). The study areas in Pape and Ziemupe are the southernmost in Latvia and new species may have dispersed along the seacoast. Dunes are "warm" habitats and more suitable for southern, xerophilous species.

Table 6. Relative density (ind./trap) of epigeic bugs in the sample plots in Pape in 2002 (15.05-13.06.2002). Explanations: numbers 1 to 10 indicate the relative distance from the white dune towards dune meadows. Aggregated data from three sets of sample plots are represented.

| Family | Species | Aggregated sample plots and relative density | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Aradidae | *Aradus cinnamomeus* (PANZER) | | 0.13 | | | | | | | | |
| Berytidae | *Neides tipularius* (L.) | | | | 0.13 | | | | | | |
| Cydnidae | *Microporus nigrita* (F.) | 0.10 | 0.13 | 0.21 | | | | | | | |
| Lygaeidae | *Megalonotus chiragra* (F.) | | | | | | | | | | 0.13 |
| Lygaeidae | *Pionosomus varius* (WOLFF) | 4.10 | 4.88 | 3.21 | 7.17 | 7.71 | 4.71 | 2.28 | 2.16 | 0.75 | 0.75 |
| Lygaeidae | *Plinthisus pusillus* (SCHOLTZ) | | | 0.13 | | 0.38 | | | | | 0.29 |
| Lygaeidae | *Sphragisticus nebulosus* (FALLEN) | | | 0.11 | | | | | 0.12 | 0.11 | 0.13 |
| Lygaeidae | *Trapezonotus arenarius* (L.) | | | 0.21 | 0.13 | 0.11 | | 0.21 | | | |
| Lygaeidae | *T. desertus* SEIDENSTÜCKER | | 0.13 | 0.43 | 0.13 | | 0.11 | 0.10 | | | 0.13 |
| Lygaeidae | *Xanthochilus quadratus* (F.) | | | | | | | | | | 0.25 |
| Pentatomidae | *Aelia acuminata* (L.) | | | | | | | 0.10 | | | |
| Pentatomidae | *Sciocoris cursitans* (F.) | 0.20 | 0.13 | 0.11 | 0.39 | 0.54 | 0.96 | 0.10 | 0.48 | 0.43 | 0.13 |
| Scutelleridae | *Phimodera humeralis* (DALMAN) | | | | | | | | 0.12 | | |
| Tingitidae | *Acalypta gracilis* (FIEBER) | | | 0.11 | | | 0.21 | | | | |
| Tingitidae | *A. parvula* (FALLEN) | | 0.13 | | 0.13 | 0.11 | | | | 0.11 | 0.38 |
| Tingitidae | *Derephysia cristata* (PANZER) | 1.50 | 0.50 | 0.32 | 0.78 | 0.64 | 0.43 | 1.14 | 1.56 | 3.64 | 5.25 |
| Tingitidae | *Dictyonota tricornis* (SCHRANK) | | | | | | | 0.10 | | | |
| | In total | 5.90 | 6.00 | 4.84 | 8.87 | 9.48 | 6.43 | 4.03 | 4.44 | 5.04 | 7.41 |

Among epigeic species *Pionosomus varius*, *Derephysia cristata* and *Sciocoris cursitans* were common in all study sites and usually are among dominant ones. Five species - *Gonianotus marginepunctatus*, *Trapezonotus arenarius*, *T. desertus*, *Plinthisus pusillus* and *Acalypta parvula* were found in the majority of sites in a low numbers. The remaining species were restricted to one or two sites. The mentioned epigeic species are characteristic for dry and sunny habitats as clearings of pine forests, dry sandy meadows (Spuris 1957). Among epigeic species some showed some preference to grey dunes, for example, *Gonianotus marginepunctatus*, *Trapezonotus arenarius*, *T. desertus*, *Geocoris ater*, *Pionosomus varius*, *Phimodera humeralis*, *Microporus nigrita*. The last two species could indicate early succession stages of grey dunes as they were recorded mostly in transition zone between white and grey

dunes. Species composition thus could indicate the succession stage of a grey dune. The diversity of epigeic species increased in the late stages of grey dune development – when transforming to dune meadows or gradual afforestation of dunes.

Table 7. Numbers of epigeic bugs collected at different study sites in 2003 (21.05-18.06.2003).

| Family | Species | Study site | | | | | |
|---|---|---|---|---|---|---|---|
| | | Užava (S) | Užava (N) | Pāvilosta | Pape | Ziemupe | Pērkone |
| Lygaeidae | *Drymus sylvaticus* (F.) | | | 1 | | | |
| Lygaeidae | *Eremocoris abietis* (L.) | | | | | 1 | 1 |
| Lygaeidae | *Eremocoris plebejus* (FALLEN) | | | 2 | | | |
| Lygaeidae | *Geocoris ater* (F.) | | | | | 2 | |
| Lygaeidae | *Gonianotus marginepunctatus* (WOLFF) | | | 1 | | 20 | 1 |
| Lygaeidae | *Graptopeltus lynceus* (F.) | | | | | | 2 |
| Lygaeidae | *Ischnodemus sabuleti* (FALLEN) | | | | 1 | 1 | |
| Lygaeidae | *Peritrechus nubilus* (FALLEN) | | | | | | 1 |
| Lygaeidae | *Pionosomus varius* (WOLFF) | | | 1 | 19 | 7 | 2 |
| Lygaeidae | *Plinthisus pusillus* (SCHOLTZ) | | | | | | 2 |
| Lygaeidae | *Sphragisticus nebulosus* (FALLEN) | | | 1 | | | |
| Lygaeidae | *Trapezonotus arenarius* (L.) | | | | | 2 | 2 |
| Lygaeidae | *T. desertus* (FALLEN) | | | | 2 | 3 | |
| Pentatomidae | *Sciocoris cursitans* (F.) | | | 3 | 2 | 7 | 14 |
| Scutelleridae | *Phimodera humeralis* (DALMAN) | | 4 | | 1 | 1 | |
| Tingitidae | *Acalypta parvula* (FALLEN) | | | 1 | | | |
| Tingitidae | *Derephysia cristata* (PANZER) | | | 4 | | 1 | 37 |
| | In total | 0 | 4 | 11 | 23 | 38 | 48 |
| | Numbers of traps | 25 | 25 | 24 | 24 | 24 | 24 |
| | Mean relative density of bugs (ind./trap) | 0.00 | 0.16 | 0.46 | 0.96 | 1.58 | 2.00 |

Among the grass-dwelling bugs *Nysius thymi*, Miridae spp. and *Chorosoma schillingi* were found in every locality, but only *N. thymi* always dominated. *Nithecus jacobaea Stictopleurus* sp. *Aelia acuminata*, *Myrmus miriformis*, *Nysius* sp. are characteristic for dry meadows and were found in low numbers. The typical dune species is *Ischnodemus sabuleti, which* develops only on *Elymus arenarius* and has been found only rarely in the sample plots.

Moss-lichen cover limited species diversity and population density of epigeic bugs in grey dunes. This was expressed as a trend of increase of these variables along white dune-grey dune- inland habitats gradient. The trend was stated only for epigeic species in total and for relatively abundant species as *Derephysia cristata*. For *Pionosomus varius* this trend was opposite, but not always significant. This species and other ones preferring dunes have to be adapted to natural disturbances – burial by sand and changes in vegetation cover. Anthropogenic influence - trampling - with consequent burial by sand somehow imitates natural processes. But no connection with bug density and anthropogenic influence was stated. Species diversity and cover

of flowering plants did not significantly influence populations of epigeic species or any particular species. It follows that this is not connected with the feeding preference of individuals, but moss-lichen cover serves as a shelter for epigeic species. Species with higher density in dunes and receding towards inland could be possible indicators of natural condition of dunes.

Table 9. Species and total numbers of grass-dwelling bugs collected in the Ziemupe and Pape sample plots in 2001, 2002 and 2004, respectively.

| **Family** | **Species** | **Sampling site and date** | | |
|---|---|---|---|---|
| | | Ziemupe 24.07.2001 | Pape 15.07.2002 | Ziemupe 25.07.2004 |
| Cydnidae | *Legnotus picipes* (FALLEN) | | | 2 |
| Lygaeidae | *Kleitocerys resedae* (PANZER) | | 2 | |
| Lygaeidae | *Nithecus jacobeae* (SCHILLING) | 3 | | |
| Lygaeidae | *Nysius* sp. | | 2 | |
| Lygaeidae | *Nysius thymi* (WOLFF) | 1715 | 162 | 488 |
| Miridae | Miridae gen. spp. | 27 | 36 | 51 |
| Rhopalidae | *Chorosoma schillingi* (SCHILLING) | 8 | 13 | 1 |
| Rhopalidae | *Myrmus miriformis* (FALLEN) | | | 5 |
| Rhopalidae | *Stictopleurus* sp. | 1 | | |
| Tingitidae | *Acalypta parvula* (FALLEN) | 2 | 2 | |
| Tingitidae | *Derephysia cristata* (PANZER) | 1 | | |

Table 10. Relative density (ind./sample) of *Nysius thymi* in the Ziemupe sample plots (24.07.2001). Explanations: upper numbers in cells – a sequence of sample plots; below – numbers of bugs in sample. Cell shading: no shading – not recorded, light grey – up to 50 (ind./sample); moderate grey – 50-100 (ind./sample); dark grey – more than 100 (ind./sample). Cell in bold – strongly influenced by human activities.

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Grey dune near white dune** | 1:<br>0 | 4:<br>11 | 7:<br>42 | 10:<br>12 | 13:<br>46 | 16:<br>29 | 19:<br>8 | 22:<br>12 | 25:<br>17 | 28:<br>53 |
| **Typical grey dune** | 2:<br>32 | 5:<br>82 | 8:<br>25 | 11:<br>29 | 14:<br>19 | 17:<br>68 | 20:<br>221 | 23:<br>90 | 26:<br>63 | 29:<br>75 |
| **Grey dune near forest** | 3:<br>132 | 6:<br>74 | 9:<br>24 | 12:<br>10 | **15:<br>5** | 18:<br>17 | 21:<br>59 | 24:<br>191 | 27:<br>119 | 30:<br>150 |

The cover of flowering plants influenced the populations of grass-dwelling bugs positively, but a connection with species diversity of these plants was stated in one case only. The dominant species *Nysius thymi* is obviously opportunistic in its selection of food plants. Species diversity and population density of grass-dwelling bugs increased along the gradient white dune - inland habitats (Scotch pine forest, dune meadows). This gradient reflected the natural succession of dunes. Recorded species mostly are characteristic for dry, sandy meadows and cannot be used as good indicators of the natural condition of dunes. Anthropogenic factors as the destruction of the grass cover, probably affected, bug communities negatively.

A complexity of relief, combined with high vegetation cover enhanced species diversity and population density of both epigeic and grass-dwelling bugs.

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## Kopsavilkums

Blaktis tika pētītas sešos pelēko kāpu biotopos Latvijas rietumu piekrastē. Epigeisko blakšu ievākšanai tika izmantotas augsnes lamatas, zālaugu stāva blakšu - entomoloģiskais tīkliņš. Epigeisko sugu populācijas blīvums bija zems. Šo blakšu sadalījumu kāpās noteica sūnu-ķērpju projektīvais segums. Zemesblaktij *Nysius thymi* un mīkstblaktīm Miridae bija augsts populācijas blīvums un tās dominēja starp zālaugu stāva blaktīm. Šo blakšu sugu sadalījumu kāpās galvenokārt noteica ziedaugu projektīvais segums.

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Table 8. Numbers and mean density (ind./trap) of epigeic bugs at different distance from white dune in the Ziemupe sample plots (22.05-19.06.2004). Numbers of individuals at every distance from white dune aggregated from three sample plots. Mean density calculated for all sample plots.

| Family | Species | Distance from white dune (m) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | 26 | 28 | 30 | 32 | 34 | 36 | 38 | 40 | 42 | 44 | 46 | 48 | 50 | 52 | 54 | 56 | 58 | 60 | | |
| Aradidae | *Aradus cinnamomeus* (PANZER) | | | | | | | | | | | | 1 | | | | | | | | | | | | | | | | | | | | 0.01 |
| Cydnidae | *Legnotus picipes* (FALLEN) | | | | | | | | | | | | | | | 1 | | | | 3 | | | | 1 | | | | 1 | 1 | 4 | | | 0.12 |
| Lygaeidae | *Geocoris ater* (F.) | | | | | | | | | | | | | | | | | | | | 1 | | | | | | | | | | | | 0.01 |
| Lygaeidae | *Gonianotus marginepunctatus* (WOLFF) | | | | | | 1 | 2 | 2 | | 2 | 1 | | | | | 1 | 1 | 1 | | | | | | | | 1 | 2 | | | | | 0.16 |
| Lygaeidae | *Kleitocerys resedae* (PANZER) | | | | | 1 | 1 | | | 1 | | | | | | | | 1 | | | | | | | | | | | | | | | 0.04 |
| Lygaeidae | *Nysius thymi* (WOLFF) | | | | | | | | | | | 1 | | | | | 1 | | | | | | | | | | | 1 | | | | | 0.03 |
| Lygaeidae | *Pionosomus varius* (WOLFF) | | | 1 | 1 | | 3 | 4 | | | 1 | | 1 | 1 | | 24 | 12 | 5 | 3 | 2 | 1 | 3 | 1 | 1 | 2 | 2 | | 3 | | 1 | 5 | 0.86 |
| Lygaeidae | *Rhyparochromus pini* (L.) | | | | | | | | | | | | | | | | | | | | | | | | | | 1 | | | | 1 | 0.02 |
| Lygaeidae | *Trapezonotus arenarius* (L.) | | | | | | | | | | | | | 1 | | 1 | 2 | | | | | | | | | | | 1 | | | | 0.06 |
| Lygaeidae | *T. desertus* SEIDENSTÜCKER | | | | | | | | | | | | | | | 1 | | | | | | | | | | | 1 | | | | | 0.02 |
| Pentatomidae | *Aelia acuminata* (L.) | | | | | | | | | | | | | | | | | | 1 | | | | | | | | | | | | | 0.01 |
| Pentatomidae | *Jalla dumosa* (L.) | | | | | | | | | | | | | | | | | | | 2 | | | | | | | | | | | | 0.02 |
| Pentatomidae | *Sciocoris cursitans* (F.) | | | | | | | | | | | 1 | 1 | | 2 | 6 | 4 | 3 | 3 | | 1 | | | 2 | 1 | 2 | 2 | 2 | 1 | 7 | 9 | 0.52 |
| Scutelleridae | *Phimodera humeralis* (DALMAN) | 1 | | | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.03 |
| Tingitidae | *Derephysia cristata* (PANZER) | 1 | 1 | 4 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 6 | 4 | 2 | 4 | 14 | 2 | 6 | 5 | 6 | 12 | 3 | 14 | 8 | 15 | 15 | 12 | 16 | 6 | 11 | 7 | 2.03 |
| | In total | 2 | 1 | 5 | 6 | 2 | 6 | 7 | 3 | 2 | 4 | 9 | 7 | 4 | 6 | 47 | 22 | 16 | 13 | 13 | 15 | 6 | 15 | 12 | 18 | 19 | 17 | 26 | 8 | 23 | 22 | 3.96 |