

DENSITY OF THE SLUG *ARION LUSITANICUS* MABILLE (GASTROPODA:
PULMONATA: ARIONIDAE) IN DIFFERENT MICROHABITATS

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Abstract. In the years 1997-1999, studies on the intensity of the slug *Arion lusitanicus* occurring in different microhabitats were carried out on the territory of Podkarpackie province. Observations were performed in the environments of vegetable gardens, arable fields and non-crop areas. The intensity of the slug occurrence varied greatly in arable crops of different plant species and in other microhabitats. Vegetable crops and areas adjacent to them were inhabited by the slug most numerously. Considerably less slugs occurred in agricultural plant crops.

Key words: *Arion lusitanicus* Mab., density, microhabitats

I. INTRODUCTION

In Austria, Great Britain, Norway and Sweden, the slug *Arion lusitanicus* occurs in horticultural crops, mainly in vegetables and ornamental plants (Reischütz 1984; Davies 1987; von Proschwitz 1992; 1994). In Poland, this slug occupies similar habitats, which are located on the territory of Podkarpackie province, where it has become a dangerous pest in the last years (Kozłowski 1995). *A. lusitanicus* is an omnivorous species. But though its basic feeding is cultivated plants, the slug readily feeds on naturally occurring herbs and weeds as well as on animal food and on different types of wastes, which are frequently of artificial origin. In this connection, the slug, as a typical synanthropic species, occupies very different habitats degraded by human activities. Available data concerning the occurrence of *A. lusitanicus* indicate that this slug density in particular habitats is greatly varying (Briner and Frank 1998; Frank 1998; Kozłowska and Kozłowski 1998; von Proschwitz 1994). The present paper contains results of the studies on the intensity of *A. lusitanicus* occurrence in arable crops of various plant species as well as in other microhabitats.

II. MATERIAL AND METHODS

Detailed observations of the slug density were conducted in 1997-1999 in places of abundant occurrence of *Arion lusitanicus* on the territory of Podkarpackie province. The observations were carried out in arable crops of different plant species (vegetable, agricultural, horticultural and ornamental), on adjacent areas (scrubs, non-crop lands, baulks, ditches) and in the vicinity of buildings, in parks, cemeteries, on the river banks, waste sites and dumping grounds. In the period from June to October, the occurring *A. lusitanicus* slugs

were counted on randomly selected 1 m² plots. Part of adult slugs were collected from each place and identified with the use of keys (Riedel and Wiktor 1974; Wiktor 1996) to confirm that they belong to certain species. The intensity of *A. lusitanicus* occurrence was determined on 15-20 plots for each type of microhabitats occupied by slugs. The observations were conducted after the emergence of slugs from their shelter places, chiefly at night and during the day, when the weather was dull and rainy.

III. RESULTS AND DISCUSSION

Studies on the intensity of the slug occurrence showed, that it varies greatly in arable crops of various plant species and also in other different microhabitats (Table). Among vegetable crops, the most abundantly inhabited were: cabbage (on average, 27.2 individuals per 1 m²), lettuce (19.6) and beans (17.4). Conversely, celery was the least inhabited by the slug (on average, 2.5 specimens per 1 m²). Abundantly inhabited by this slug were flowers and perennials (on average, 17.5 individuals per 1 m²). On the other hand, significantly less slugs occurred in agricultural crop plants. The average number of slugs per 1m² in these crops in the marginal portions of fields ranged from 8.7 individuals on rape to 1.2 individuals in wheat. Among horticultural plants the abundantly inhabited were raspberries (on average 18.3 individuals per 1 m²). Also in Austria and Sweden, *A. lusitanicus* occurs most numerously on vegetable and ornamental plant crops (Reischütz 1984; von Proschwitz 1994). As

Table

Intensity of *Arion lusitanicus* Mab. occurrence in crops of selected plant species and in non-crop habitats

Place of occurrence	No. of individuals/ 1 m ² surface area
vegetable plants	
bean	17.4
cabbage	27.2
carrots	12.1
celery	2.5
cucumber	9.5
lettuce	19.6
parsley	11.8
raddish	7.2
red beet	11.2
tomato	9.5
agricultural plants	
faba bean	7.2
fodder beet	3.7
mustard	1.2
potato	6.7
rape	8.7
wheat	2.1
ornamental plants	
flowers and perennials	17.5
horticultural plants	
currants	10.1
raspberries	18.3
strawberries	8.7
areas adjacent to arable fields	
baulks	12.0
composts	28.0
non-crop lands	11.3
swards	10.5
non-crop areas	
cementeries	4.6
ditches	4.7
parks	3.1
scrubs	6.7
waste sites	7.3

reported by von Proschwitz (1994), the slug density in some agricultural crops in Sweden is from 5 to 7 individuals per m² of crops. In habitats of agricultural and ornamental crops on the territory of Podkarpacie province the largest slug numbers occurred on composts – on

average, 28 individuals per 1 m² (from 15 to 78). Abundantly inhabited were swards, baulks and field edges as well as weedy fields and non-crop areas (on average, from 10.5 to 12.0 slugs per 1 m²). Considerably less slugs were encountered in scrubs (6.7 individuals per m²) and in ditches by the road sides (4.7). In non-crop habitats, such as parks, cemeteries, waste sites, scrubs on the river banks, cellars, the slug occurred in different numbers, from 7.3 individuals per 1 m² on waste sites to 3.1 individuals per 1 m² on grassy surfaces in parks. In some places, slugs got together especially numerous. That was associated with slug hiding into shelters, for example, under plant residues, where up to 100 individuals per 1 m² were encountered. Besides that, after nightfall and rainfalls or after the occurrence of dew, *A. lusitanicus* slugs emerged in masses from their shelters to grassy field roads, sward, molehills or moved to moist leaves of growing plants to supplement their water reserve. From 60 to 150 slugs per 1 m² were encountered in such places. Slugs numerously gathered together on ploughed out roots and bulbs of cultivated plants, on sheded fruits, plant residues, communal wastes, animals faeces and on dead animals, where they fed on. The intensity of *A. lusitanicus* occurrence and spread in particular habitats depends first of all on the presence of feed, water and shelters. As shown by studies on the spread of *A. lusitanicus* in arable crops of different plant species (Kozłowska and Kozłowski 1998), slugs occur more abundantly and their occurrence is more uniform in dense crop stands. Such crops ensure shelters and feed for slugs. Conversely, in crops with a low plant density, slugs occur more numerously in marginal belts, in the vicinity of places ensuring shelter during the day. In Switzerland, Franks (1988) observed a more numerous occurrence of that slug at the edges of fields of sprouting rape, in the vicinity of belts sown with herb mixtures (from 1 to 3 slugs per 1 m² of rape plantation at a distance of one meter from the herb belt), whereas this slug was not found to occur in the depth of the fields. The above observations show that *A. lusitanicus* displays definite preferences for certain microhabitats, which determines its varying density.

IV. LITERATURE

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ZAGĘSZCZENIE ŚLIMAKA *ARION LUSITANICUS* MAB.
(*GASTROPODA: PULMONATA: ARIONIDAE*)
W RÓŻNYCH MIKROSIEDLISKACH

STRESZCZENIE

W latach 1997-1999 na terenie województwa podkarpackiego przeprowadzono badania nad nasileniem występowania ślimaka *Arion lusitanicus* w różnych mikrosiedliskach. Obserwacje wykonano w środowiskach ogrodów, pól uprawnych oraz na terenach nieuprawnych. W miejscach licznej obecności ślimaka (uprawy roślin, parki, cmentarze, brzegi rzek, nieużytki, śmietniska) obserwowano jego zagęszczenia w przeliczeniu na m² powierzchni. Nasilenie występowania ślimaka było silnie zróżnicowane w uprawach różnych gatunków roślin oraz w innych mikrosiedliskach. Najliczniej zasiedlane przez ślimaka były uprawy warzyw i tereny do nich przyległe. Licznie zasiedlane były także uprawy kwiatów oraz bylin, łąki i zachwaszczone pola. Natomiast znacznie mniej ślimaków stwierdzono w uprawach roślin rolniczych.