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SADRŽAJ CONTENTS
TOM 61-62

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Original scientific paper

FAUNA OF PREDATORY MITES (ACARI: *PHYTOSEIIDAE*) IN THE ARTIFICIALLY ESTABLISHED STANDS ON THE RECLAIMED MINE SOILS

Katarina MLADENOVIĆ[1], Bojan STOJNIĆ[2], Zlatan RADULOVIĆ[1]

Abstract: *The fauna of predatory mites was researched in the artificially established stands of Alnus glutinoas (L.) Gaertn., Pinus nigra Arn., P. silvestris L. And Larix leptolepis (S. et Z.) Gard. on the reclaimed mine soils of Mining Energy Industrial Complex Kolubara, in the territory of Lazarevac, Central Serbia, over the period 2006-2010. Fifteen different plant species from thirteen gena were studied: Acer L., Alnus Hill., Amorpha L., Cerasus Juss., Crataegus L., Fragaria L, Juglans L., Morus L., Populus L., Quercus L., Robinia L., Rubus L i Salix L.. The representatives of family Phytoseiidae were found on almost all observed plant species. The presence of nine phytoseiidae species was determined on this occasion.*

Key words: Phytoseiidae, predatory mites, reclaimed mine soils.

1. INTRODUCTION

The representatives of family Phytoseiidae are the subject of numerous studies in the world as a result of their increasing role in the integral protection. Phytoseiidae are the natural enemies of microarthropods. They most frequently feed on phytophagous mites from the superfamilies Tetranychoidea and Eriophyoidea, but also on small insects from the orders *Thysanoptera* and *Homoptera.* More than 2,250 species from this family (Moraes et al., 2004) have

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been described in the world so far, out of which 20 species are used in the biological control of the phytophagous mites and some insects.

In Serbia over the last twenty years or so the most significant researches of this group have been done mainly within the agrobiocenoses. Only 28 species of Phytoseiidae have been reported in Serbia so far (Kropczynska & Petanovic, 1987; Radivojević and Petanović, 1984; Petanovic & Stojnic, 1994; Stojnić, 2001; Stojnic et al., 2002; Mladenović at al., 2010). The previous faunistic researches of Phytoseiidae in the natural, mainly forest and unexplored anthropogenic sites are neglected. The future researches in Serbia should be directed towards the study of diversity of mites on the forest plant species.

2. METHOD

The researches were done in the artificially established stands of *Alnus glutinosa, Pinus nigra, P. silvestris* and *Larix leptolepis* on the reclaimed mine soils of Mining Energy Industrial Complex Kolubara, in the territory of Lazarevac, Central Serbia, over the period 2006-2010.

Mining-energy industrial complex Kolubara in the administrative sense belongs to the Municipality Lazarevac. It is located some 50 kilometers southwest of Belgrade. Kolubara mining basin is the greatest lignite basin in Serbia. The terrain is wave-like, intersected by numerous river valleys (Tamnava, Kolubara, Turija and their tributaries). The whole area of Mining Energy Industrial Complex Kolubara belongs to the Kolubara River basin, which divides this site into eastern and western parts, i.e. fields. The samples from which the samples of the plant materials were taken are located on the eastern field of the open-pit mine.

In Mining Energy Industrial Complex Kolubara, due to the mining activities and waste rock disposal from the open-pit mines, the mine soils (tailings ponds), which were reclaimed by reforestation, were formed .

The samples were collected in the following four sites of the eastern fields of Mining Energy Industrial Complex Kolubara:

Site 1: Experimental plot 5.1 Twenty-four-year-old black alder plantation

Site 2: Experimental plot 6.1 Twenty-six Japanese larch plantation with some maples

Site 3: Lazarevac, Mirosaljci – lake (from 35/b): The artificially established stand of *Larix leptolepis* and *Pinus nigra* in which the naturally regenerated black locust, *Robinia pseudoacacia* is dominant.

Site 4: Lazarevac, Baroševac Nursery, lake (from 43/a): Artificially established stand *Larix leptolepis.*

The leaf samples were collected during the growing season from the ligneous, bushy and herbaceous plants. The collected samples encompass fifteen different plant species from thirteen gena: *Acer, Alnus, Amorpha, Cerasus, Crataegus, Fragaria, Juglans, Morus, Populus, Quercus, Robinia, Rubus* and *Salix.*

The samples contain from 50 to 400 leaves, depending on the plant species. Phytoseiidae were extracted in the laboratory by exposing the leaves to the effect of ethyl acetate for 20 minutes, which was followed by the shaking and extraction

of mites under the stereo microscope. The extracted Phytoseiidae individuals were soaked in the ethyl alcohol and lactic acid solution (Evans & Browing, 1955). After the exposure to light the permanent preparations by using Hoyer's medium were made (Baker & Wharton, 1964). The suitable keys were used for the identification of Phytoseiidae (Begljarov,1981; Karg 1993). The permanent preparations are preserved in the depot of the Department of Entomology and Agricultural Zoology of the Faculty of Agriculture of the University of Belgrade.

3. RESULTS

By examining the samples, the presence of predatory mites from the family Phytoseiidae was determined on the following plant species: *Acer platanoides, A. pseudoplatanus, Quercus frainetto, Q. robur, Alnus glutinosa, Prunus avium, Juglans regia, Morus alba, Salix alba, Crataegus monogyna, Amorpha fruticosa, Robinia pseudoacacia, Rubus caesius, R. fructicosus* and *Fragaria vesca.*

Nine different species of Phytoseiidae were determined on the observed material.

Euseius finlandicus (Oudemans 1915)
The species which is the outstanding cosmopolite. Its range encompasses Europe, Asia, Africa, North and South America. It was reported in this country (Radivojević and Petanović, 1984; Kropczynska and Petanović, 1987; Stojnić, 1993; Stojnić and Petanović, 1994; Stojnić, 2001). It can be said that this species is dominant of Phytoseiidae sites. It is present on numerous plants. In this instance it was identified on thirteen plant species: *Acer platanoides, A. pseudoplatanus, Quercus frainetto, Q. robu , Robinia pseudoacacia, Juglans regia, Rubus caesius, R. fructicosus, Crataegus monogyna, Alnus glutinosa, Prunus avium, Morus alba* and *Salix alba*

Kampimodromus aberrans (Oudemans 1930)
The species which occurs in Europe, Algeria, Iran, Canada, USA, and the Commonwealth of the Independent States. It was also reported in this country (Radivojević and Petanović, 1984; Kropczynska and Petanović, 1987; Stojnić, 1993; Stojnić and Petanović, 1994). This species is present on many ligneous and herbaceous plants. During this research it was determined on three plant species: *Quercus frainetto, Amorpha fruticosa* and *Crataegus monogyna.*

Typhlodromus pyri Scheuten 1857
The species which is present in the greatest part of Europe, the Commonwealth of the Independent States, Israel, Egypt, USA, Canada and New Zealand. It is a rare species in this country, and was determined on *Prunus avium* and *Ulmus glabra* (Kropczynska and Petanović, 1987; Stojnić, 1993; Stojnić and Petanović, 1994). In this instance it has been reported on *Acer pseudoplatanus* for the first time.

Seiulus aceri (Collyer 1957)
The species which has been so far reported in England, Czech Republic, Azerbeijan, USA and in this country. It was reported only on *Acer spp., Prunus spp., Corylus spp.*, and in this country on *Juglans regia* (Radivojević and Petanović, 1984; Stojnić, 1993). During this research it has been reported on *Quercus frainetto* for the first time.

Seiulus tiliarum (Oudemans 1930)
The species which is present in almost all parts of Europe, the Commonwealth of the Independent States, Turkey, Algeria, Canada, and USA on numerous wild and cultivated plant species. In this country it was reported on *Ribes sp., Juglans regia, Corylus avellana, Cydonia oblonga, Mespilus germanica, Morus nigra, Prunus avium, P. domestica, Salix alba* and *Tilia spp.* (Radivojević and Petanović, 1984; Kropczynska and Petanović, 1987; Stojnić, 1993; Stojnić and Petanović, 1994). During this research it was found on *Rubus caesius* and has been determined on *Alnus glutinosa* and *Morus alba* for the first time.

Amblyseius (Amblyseius) andersoni (Chant 1957)
The species which is present in the greatest part of Europe, Algeria, Canada, USA, the Commonwealth of the Independent States. It was also reported in this country Radivojević and Petanović, 1984; Kropczynska and Petanović, 1987). It was found on many ligneous and herbaceous plants. During this research it was reported only on *Quercus frainetto.*

Dubininellus ribagai (Athias-Henriot 1960)
The rare species. It was first reported in Italy on *Urtica sp.* (Ribaga, 1902), then in Algeria on *Rubus ulmifolius* (Athias-Henriot, 1957) and *Vitis vinifera* (Denmark, 1966), and in Germany (Prpić, 2008), where no data on the host plant were reported. This species has been identified in this country for the first time (Mladenović at al., 2010) and in this instance found on *Fragaria vesca.*

Dubininellus maltshenkovae (Wainstein 1973)
The rare species which was first reported in Moldova on *Rubus sp.* (Wainstein, 1973), and was also found in Germany (Prpić, 2008), on *Rubus idaeus.* This species has been identified in this country for the first time (Mladenović at al., 2010) and in this instance found on *Rubus caesius* and *R. fructicosus.*

Dubininellus juvenis (Wainstein & Arutunjan 1970)
The frequent species (DeMoraes et al., 1986), found in Armenia on *Corylus, Salix sp,* Crimea (*Rubus, Urtica sp.*), Kazakhstan (grass vegetation, *Agrimonia, Malus, Salix* spp.), Moldova (*Cydonia, Rubus spp.*), Russia (*Rubus sp.*), Ukraine *Acer negundo, Arctium sp., Ballota nigra, Leonurus sp., Malus sp., Populus alba, Rubus caesius, Rubus sp., Salix caprea, Salix sp., Urtica sp.*), Finland (*Malus sp.*) and Serbia *Corylus avelana, C. colurna, Rubus idaeus*) (Stojnić and Petanović, 1994). During this research it was determined on *Rubus caesius.*

4. CONCLUSION

This paper presents the preliminary researches of the diversity of the predatory group of mites from the family Phytoseiidae in the anthropogenically conditioned forest ecosystems.

By examining fifteen species of ligneous, bushy and herbaceous plants on the reclaimed mine soils on Mining Energy Industrial Complex Kolubara, the presence of nine species of predatory mites from the family Phytoseiidae was determined.

The reseaches of Phytoseiidae fauna which have started in agrobiocenoses in Serbia is extended by this study to the range of the natural, mainly forest and unexplored anthropogenic sites.

The results of this research will serve as the complement to the faunistic and zoo-geograhic data on phytoseiidae in Serbia.

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