STUDY RESULTS OF THE PRESENCE OF Culicoides spp. IN SERBIA DURING 2017

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Abstract

During 2017, 784 insect samples were examined and the presence of Culicoides spp. was established in 25.51% of samples. Earlier research has found that the dominant population of Culicoides spp in Serbia belongs to Obsoletus complexes, established in 60.05% of analyzed samples. Out of the entire insect population analyzed, males were found in 22.84%, unpigmented (young) females in 67.97%, females who took blood in 7.39%, whereas 1.35% were gravid females. Culicoides spp. from the Pulicaris complex was established in 38.85% of examined samples. Males were found in 18.91%, unpigmented (young) females in 71.72%, females who took blood in 9.09%, and 1.11% were gravid females. Other types of culicoids have been established in less than 10% of the examined samples. During examination, the most prevalent species were Culicoides obsoletus, C. picturalis, C. lupicaris, C. scoticus and C. fascipennis.

Keywords: Culicoides spp., epizootiology, Serbia

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REZULTATI ISPITIVANJA PRISUSTVA
*Culicoides* spp. U SRBIJI TOKOM 2017. GODINE

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Kratak sadržaj

Tokom 2017. pregledano je 784 uzorka insekata a prisustvo *Culicoides* spp. je ustanovljeno u 25,51%. Dosadašnja istraživanja potvrdila su da je u Srbiji dominantna populacija *Culicoides* spp. iz Obsoletus kompleksa koji su ustanovljeni u 60,05% analiziranih uzoraka. Mužjaci su nađeni u 22.84% ispitanih uzoraka insekata, nepigmentisane (mlade) ženke u 67,97%, ženke koje su uzele krv u 7,39%, a 1,35% su bile gravidne ženke. *Culicoides* spp. iz Pulicaris kompleksa ustanovljeni su 38.85%. Mužjaci su nađeni u 18.91%, nepigmentisane (mlade) ženke u 71,72%, ženke koje su uzele krv u 9,09%, a 1,11% su bile gravidne ženke. Ostale vrste kulikoida su ustanovljene u manje od 10% pregledanih uzoraka. Tokom ovih pregleda dominantne su bile sledeće vrste: *Culicoides obsoletus, C. picturalis, C. lupicaris, C. scoticus* i *C. fascipennis.*

Ključne reči: *Culicoides* spp., epizootiologija, Srbija

INTRODUCTION

Entomofauna of Serbia is rich and diverse. Among this abundance of arthropods and insects, some species were not a topic of interest of the experts since they did not stand out as potential vectors, or simply did not come to the point that experts were dealing with them (Krunić, 1986). This was the case with the family of Ceratopogonidae, which belongs to the family Culicodina. Insects of the genus *Culicoides* spp. have not been studied in Serbia, so there were contradictory opinions about their persistence in our area (Pavlović et al., 2002). Only with the outbreak of bluetongue disease in 2006, the study of this kind of insects became important and the first research was started in order to determine the presence and extent of these insects (Pavlović et al., 2002).
research carried out during 2006-2007 confirmed their presence throughout the territory of Serbia. Research in the period 2011-2012 was focused on the study of *Culicoides* species that are present in Serbia (Pavlović et al., 2009). Finally, in 2014, the re-emergence of bluetongue disease emphasized the need for continuous control of the presence of these insects (Maksimović Zorić et al., 2016). Since then, continuous annual monitoring of these insects has been conducted that gave an insight into their seasonal dynamics as well as the most dominant species (Pavlović et al., 2014; 2016a; 2016b; 2017).

**MATERIAL AND METHODS**

Based on the instructions of Veterinary Directorate on performing entomological and virological tests for the monitoring and surveillance of bluetongue disease (BTD) in the Republic of Serbia No. 323323-02-10787/2016-05 dated 12/02/2016 in the period from 01/01/2017 to 31/12/2017 entomological tests were carried out in order to control bluetongue disease.

In that period, a total of 784 entomological check-ups were made. *Culicoides* spp. samples were collected from all epizootic areas in Serbia. Determination of *Culicoides* spp insects was made by morphometric method recommended by the Italian National Reference Centre for Exotic Diseases (National Reference Centre for the study of Exotic Animal Diseases (CESME)) and OIE Reference Laboratory for Bluetongue Istituto Sperimentale Zooprofilattico dell’Abruzzo e del Molise “G. Caporale” (IZSAM) from Teramo, Italy. Species definition of *Culicoides* spp. has traditionally been based on the morphology of adult insects (Goffredo and Meiswinkel, 2004). Adult individuals of *Culicoides* spp. are notable for their characteristic wing pigmentation pattern and distribution of wing microtrichia, which in certain species can be used as the principle diagnostic feature. In practice, however, the requirement is that specimens should be slide mounted, image-captured, measured and analysed, which is time consuming and therefore the use of morphometries for identification purposes in high-throughput systems such as surveillance programs is recommended (Weeks et al., 1999; Mathieu et al., 2012).

**RESULTS**

Of the total number of insect samples, the presence of *Culicoides* spp. was established in 25.51% (200/784).

In the epizootic area of Belgrade, *Culicoides* spp. was found in 24.39% (10/41) samples, while in Central Serbia, *Culicoides* spp. was detected in
Požarevac in 28.57% (24/84) samples, Kraljevo in 45.75% (70/153), Niš in 47.64% (81/170), Zaječar in 28.42% (27/95) and in Šabac in 78.84% (41/52) of tested samples. No presence of Culicoides spp. (0/0) was detected in the epizootic area of Jagodina.

In the Vojvodina Province, the presence of Culicoides spp was found in 38.46% (10/26) samples in Novi Sad, in Pančevo in 44.18% (19/43), Subotica in 59.25% (32/54) and in Sombor in 40.90% (9/22) of tested samples. We did not detect the presence of Culicoides spp. in the epizootic area of Zrenjanin (Central Banat District) (0/0).

Earlier research has found that the dominant population of Culicoides spp in Serbia belongs to Obsoletus complexes, which was established in 60.05% of samples. Males were found in 22.84% samples, non-pigmented (young) females in 67.97%, females taking the blood at 7.39%, while 1.35% were pregnant females.

Culicoides spp. from Pulicaris complexes were found in 38.85% samples. Among tested samples, males were found in 18.91% samples, non-pigmented (young) females in 71.72%, females who took blood in 9.09% and 1.11% were pregnant females.

Other types of Culicoides are set up in less than 10% of the examined samples.

DISCUSSION

During the previous examinations, 22 species of Culicoides were found and the following species were dominant in 2017: Culicoides obsoletus, C. picturalis, C. lupicaris, C. scoticus and C. fascipennis. As compared with the period 2015-2016, a change in a faunistic sense since the dominant species in the previous period included C. obsoletus, C. pulicaris, C. parrots and C. nubeculosus (Pavlović et al., 2017).

Increasing spread of Culicoides, the emergence of new genera in some areas and the large number of these insects is a consequence of climate change. In the last century, the mean air temperature in the world increased by 0.5 °C (Blackwell, 2001; Wilson and Mellor, 2008). The temperature and relative humidity of the air have the most important influence on the short-term fluctuations of Culicoides (sudden increase in number) and then on their long-term spread. World-wide studies have established that majority of these insects do not appear when the average air temperature is below 13 °C and above 35 °C (Mehlhorn et al., 2007; Purse et al., 2015; Pavlović et al., 2016b). This is also reflected on the biodiversity of present species in certain regions. Thus, C. imicola appeared and soon it was the dominant species of eastern Spain, southern...
France, northern Italy, northern and southern Greece, the coastal part of Albania, Montenegro, Bosnia and Herzegovina and Croatia (Patakakis et al., 2009; Omeragić et al., 2009; Bosnić, 2011). On the other hand, the Culicoides species from Obsoletus Complex and Pulicaris Complex dominate in the western Balkans (Serbia, Bulgaria, and Romania) (Ioniţă et al., 2009; Bobeva et al., 2013; Pavlović et al., 2016a).

Culicoides’s seasonal dynamic is directly correlated with temperature and humidity. *Culicoides* from both groups - Obsoletus and Pulicaris complex, were reaching maximum abundance in spring and autumn, which is normal for this species (Conte et al., 2007; Pavlović et al., 2016a). High temperatures favour their development, while very high temperatures can reduce the survival of adult insects. This correlation was observed during the monitoring of the seasonal dynamic of *Culicoides* in Serbia in the period 2006-2007, 2011-2012 and from 2015 until today (Pavlović et al., 2017). The average season for the appearance of these insects is from March to October, depending on the area being tested. Seasonal dynamics of the presence of *Culicoides* spp. were monitored during one year.

During January, February and November 2017, *Culicoides* spp. were not found in any of the tested samples. During March, their prevalence was 1.58% (1/63), during April 31.73% (27/85), in May it was 49.29% (35/71), June 66.66% (60/90), July 77.89% (74/95), August 66.21% (49/74), September 66.66% (35/71), October 49.29% (35/71) and December 3.44% (2/58).

*Culicoides* are also subjected to molecular assays (RT-PCR) to analyze the presence of blue tongue viral genome. The genome of blue tongue disease virus was identified in one sample from the territory of the Mionica municipality in September 2016, which is an expected finding considering the outbreak of this disease just in the month of September.

**CONCLUSION**

During 2017, a total of 784 entomological check-ups were made. Of the total number of insect samples, the presence of *Culicoides* spp. was established in 25.51% (200/784). During the examination period, there was a change in view of dominant species of Culicoides species. In our examination dated 2017, the dominant species were *Culicoides obsoletus*, *C. picturalis*, *C. lupicaris*, *C. scoticus* and *C. fascipennis*. As compared with the period 2015-2016 there was a change in the faunistic sense, that is, the dominant species in the previous period were *C. obsoletus*, *C. pulicaris*, *C. parrots* and *C. nubeculosus*. This was influenced by microclimatic and other biotic factors.
REFERENCES


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