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NEW SPECIES IN THE ARACHNOFAUNA OF BOSNIA AND HERZEGOVINA FROM THE PROTECTED HABITAT OF GROMIŽELJ, VELINO SELO

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ABSTRACT:

According to data given by [1], 165 spider species from 27 families and 103 genera are known in the territory of Bosnia and Herzegovina. So far in B&H, according to [1] a total of 11 species have been registered from *Fam.Aranidae* and 2 species from genus *Araneus*; a total of 11 species from *Fam.Thomisidae*; a total of 11 species from *Fam.Lycosidae* and one species from genus *Lycosa*; 15 species from *Fam.Theridiidae* and 3 species from genus *Steatoda*.

In the course of our research on arachnofauna in and around Gromiželj, in the 2008-2015 period, a total of 8 spider species new to Bosnia and Herzegovina were discovered in four families, namely, from *Fam. Aranidae* 4 species; *Fam.Thomisidae* 2 species; and 1 species each from *Fam.Lycosidae* and *Fam. Theridiidae* each.

Most widespread are *Argiope bruennichi* and *Araneus angulatus* that were registered in 20 sites, followed by *Araneus quadratus*, *Synema globosum* and *Runcinia grammica* registered in 6 sites. Sites with the most registered newly discovered species are Gromiželj with 6 species, followed by Velino selo, Laketića vir, Prugnjača, Begov put and other melioration channels with 5 species. By biotope types, the greatest number of species, six of them, were found in vegetation (wetlands, thicket, forest fringe and vegetation on the channel banks and along the roads).

The species *Argiope bruennichi* and *Araneus angulatus* also showed the greatest diversity of habitats, from wet meadows, thicket and reeds around the wetland, through forest fringes and vegetation along the channel banks and roads, to those urban like yards with ornamental shrubs. Of the registered species, only the species from *Fam.Thomisidae* are completely harmless to humans, while the other species belong to slightly poisonous species and have a local character bite. Slightly poisonous species include the species of the genus *Steatoda, Araneus, Argiope* and *Lycosa*.

Ključne riječi: *spiders, new species, habitats, Gromiželj*

INTRODUCTION

The class Arachnida includes the order of spiders (*Araneae*), which is the most numerous order in the whole suborder of spider-like animals (*Chelicerata*) with about 40,000 species described to date. They are very widespread in nature and are found in almost every ecological niche. These are exclusively terrestrial animals, ranging in size from 0.4 mm to over 100 mm. At the end of the abdomen, the spider has an opening with spinneret glands that serve to thread the spider web. Webs can be of different shapes and sizes. Many species have toxic glands, and very few are life-threatening to humans, which is why most people find spiders odious.

The first information on the fauna of Aranidae in Bosnia and Herzegovina is found in the work by [2], who talks about the species *Lycosa tarantala* in the territory of B&H. In the 1873-1931 period, sporadic data on the fauna of spiders from these areas can be found in many works. Among these works, only three [3,4,5] were devoted to the spider fauna of Bosnia and Herzegovina. Then Kratochvíl [6,7,8,9,10,11,12,13], began his research on spiders in the Balkan Peninsula, focusing mainly on spiders in the Balkan caves.

During the modern (contemporary) period beginning after the breakup of former Yugoslavia, the intensity of spider research in Bosnia and Herzegovina has decreased and during this period most studies were based on previously collected museum material. Some information concerning the spiders of Bosnia and Herzegovina can be found in the works [14,15,16,17,18,19,20,21,22,23, 24,25,26,27,28,29,30,31].

According to data from [1] 165 spider species from 27 families and 103 genera are known in the territory of Bosnia and Herzegovina.

Gromiželj was proclaimed in 2019 by the Government of Republika Srpska a Protected Category Habitat IV by IUCN (Habitat and Species Management). The total area of protected habitat amounts to 831.3 ha and in the central part, it is a wetland-peat complex surrounded by various types of floodplain forests, wet meadows, ruderal and sub-agrarian habitats. The area is primarily protected because of the fish *Umbra krameri* for which this is the only contemporary habitat in B&H. So far, 450 species of vascular plants and 55 different plant associations, about 60 species of invertebrates, 7 species of fish, 5 species of amphibians, 9 species of reptiles, 55 species of birds and 23 species of mammals have been registered in the Gromiželj area.

The protected habitat consists in the central part of Gromiželj wetland, Prugnjača channel, Mladenovača, Toborište, Topolik, Pištalovac, Čitluk and Tukar forest complexes. The protected area measures 8.31 km² with I and II degree of protection established with a protection zone. Of the total area, 622 ha is agricultural land, 107 ha are forests, 43 ha are orchards and gardens adjacent to households, while ponds and wetlands occupy about 5 ha, which is about 1% of the protected area.

Due to the dominance of agricultural land, weed and ruderal communities accompanying agriculture are the most prevalent, while those true natural communities are found in rare preserved forest areas, along ponds and wetlands, and we must not forget also secondary or tertiary habitats inhabited by many species, primarily invertebrates [32].

This paper aims to present newly discovered spider species for the arachnofauna of Bosnia and Herzegovina observed in the protected habitat of Gromiželj.

MATERIAL AND METHODS

The material was collected in the 2008-2015 period by standard methods (inspection under stones and trees, under barks, by mowing and shaking from vegetation, placing buried traps in the substrate, etc. and determination was made according to [33,34,35].

RESULTS AND DISCUSSION

Comparing the list given by [1] paper with the determined material, we can see that 8 species of spiders were registered for the first time in the fauna of B&H in the studied area.

The list of newly discovered spider species for Bosnia and Herzegovina:

1. Fam.Araneidae: *Araneus angulatus* Clerck.1757
2. Fam.Araneidae: *Araneus mramoreus* Clerck,1757
3. Fam.Araneidae: *Araneus quadrates* Clerck,1757
4. Fam.Araneidae: *Argiope bruennichi* (Scopoli,1772)
5. Fam.Lycosidae: *Lycosa singoriensis* (Laxmann,1770)
6. Fam.Thomisidae: *Runcinia grammica* (C.L.koch,1837)
7. Fam.Thomisidae: *Synaema globosum* (Fabricius,1775)
8. Fam.Theridiidae: *Steatoda triagulosa* (Walckenaer,1802)

Overview of species with basic data:

Fam. Araneidae

1. Araneus angulatus Clerck.1757

Sites:
Velino selo: yard, 13/11/2008 [1 ind.]; 20/04/2009 [1 ind.]; 09/08/2009 [4 ind.];
Laketića vir: wetland, 30/11/2008 [1 ind.]; 22/05/2009 [2 ind.]; 25/05/2009 [3 ind.]; 09/09/2009 [3 ind.]; 24/07/2011 [2 ind.]; 19/07/2012 [3 ind.]; 13/09/2014 [3 ind.]; 01/06/2015 [2 ind.];
Drina bank: thicket, 19/07/2012 [3 ind.]; 24/07/2011. [2 ind.]; 13/09/2014 [4 ind.];
Gromiželj: forest fringe, 30/11/2008 [1 ind.]; 25/05/2009 [5 ind.]; 09/09/2009 [3 ind.]; 24/07/2011 [2 ind.]; 19/07/2012 [3 ind.]; 13/09/2014 [3 ind.]; 01/06/2015 [3 ind.];
Prugnjača channel: forest fringe, 22/05/2009 [2 ind.]; 13/09/2014 [1 ind.]; 09/08/2009 [1 ind.];
Balatun: hedge, 24/07/2011 [1 ind.];
Donji Brodac: forest fringe, 19/07/2012 [1 ind.];
Drenovački channel: in vegetation, 22/05/2009 [3 ind.];
Međaši: forest fringe, 13/07/2012 [2 ind.];
Dobra voda: forest fringe, 13/09/2014 [1 ind.];
Šljunkara: in vegetation, 19/07/2012 [2 ind.]; 22/05/2009 [3 ind.]; 24/07/2011 [4 ind.]; 01/06/2015 [3 ind.];
Čitluk: in vegetation, 01/06/2015 [1 ind.];
Begov put near Pumping station: in vegetation, 22/05/2009 [2 ind.]; 25/05/2009 [3 ind.]; 09/09/2009 [3 ind.]; 24/07/2011 [2 ind.]; 19/07/2012 [4 ind.]; 13/09/2014 [3 ind.]; 01/06/2015 [2 ind.];
Selište: forest fringe, 24/07/2011 [2 ind.]; 13/09/2014 [1 ind.]; 09/08/2009 [2 ind.];
Travnjak: in vegetation, 13/09/2014 [2 ind.];
Taborište: in vegetation, 19/07/2012 [2 ind.];
Meterizi: in vegetation, 13/09/2014 [1 ind.];
Drinica: forest fringe, 24/07/2011 [2 ind.]; 19/07/2012 [3 ind.];
Baščine: in vegetation, 13/09/2014 [1 ind.];
Other melioration channels: in vegetation, 19/07/2012 [3 ind.]; 24/07/2011 [1 ind.]; 01/06/2015 [2 ind.];

This Palearctic species has been registered in a total of 20 sites and the largest number of individuals was observed at sites Gromiželj, Begov put and Laketića vir (Figure 1.). The data given by Deltshev, et.al., (2003) show that the species inhabits terrains of 100-1113 m a.s.l., while we find it at lower altitudes, at about 60-80 m a.s.l.

Figure 1. Araneus angulatus

When it comes to habitat types, the species inhabits both natural habitats (wetlands, thicket, forest fringe and tall vegetation) as well as anthropogenic habitats such as rural (old fields, in vegetation on channel banks and along the roads) and urban (yards, hedges or fences, on or between buildings, etc.).

We observed the species at the end of April (April 20), while we usually spot it from May to September, but in 2008, due to the prolonged nice and warm weather, it was also found in November. The number of individuals per site ranged from 1 to 3 individuals, with the largest number being 5 in the Gromiželj site on 25 May 2009. When it comes to urban areas, the species has been found both in yards on ornamental shrubs and on the buildings themselves (e.g. around top windows) or between two buildings where they have built fairly large webs, some up to 1.5 m in diameter. In the surrounding area, the species is found in Serbia [36,37,38, 39,40,41,42,43].

2. Argiope bruennichi (Scopoli, 1772)

Sites:
Velino selo: yard, 13/11/2008 [1 ind.]; 20/04/2009 [1 ind.]; 09/08./2009 [3 ind.];
Laketića vir: wetland, 30/11/2008 [1 ind.]; 22/05/2009 [4 ind.]; 25/05/2009 [2 ind.]; 09/09. 2009 [4 ind.]; 24/07/2011 [1 ind.]; 19/07/2012 [7 ind.]; 09/09/2009 [1 ind.]; 01/06/2015 [6 ind.];
Drina bank: thicket, 19/07/2012 [5 ind.]; 24/07/2011 [7 ind.]; 13/09/2014 [1 ind.];
Gromiželj: forest fringe, 30/11/2008 [1 ind.]; 25/05/2009 [7 ind.]; 09/09/2009 [1 ind.]; 24/07/2011 [4 ind.]; 19/07/2012 [5 ind.]; 13/09/2014/ [1 ind.]; 01/06/2015 [7 ind.];
Prugnjača channel: forest fringe, 22/05/2009 [9 ind.]; 13/09/2014 [1 ind.]; 09/09/2009 [1 ind.];
Balatun: hedge, 13/09/2014 [1 ind.];
Donji Brodac: forest fringe, 19/07/2012 [2 ind.];
Drenovački channel: in vegetation, 22/05/2009. [1 ind.];
Međaši: forest fringe, 22/05/2009 [2 ind.];
Dobra voda: forest fringe, 13/09/2014 [1 ind.];
Šljunkara: in vegetation, 22/05/2009 [9 ind.]; 24/07/2011 [8 ind.]; 01/06/2015 [9 ind.];
Čitluk: in vegetation, 01/06/2015 [3 ind.];
Begov put near Pumping station: in vegetation, 24/07/2011 [4 ind.]; 25/05/2009 [8 ind.]; 09/09/2009 [1 ind.]; 24/07/2011 [6 ind.]; 19/07/2012 [5 ind.]; 13/09/2014 [1 ind.]; 01/06/2015 [7 ind.];
Selište: forest fringe, 13/09/2014 [1 ind.]; 01/06/2015 [3 ind.];
Travnjak: in vegetation, 13/09/2014 [1 ind.];
Taborište: in vegetation, 19/07/2012 [6 ind.];
Meterizi: in vegetation, 19/09/2014 [1 ind.];
Drinica: forest fringe, 24/07/2011 [9 ind.]; 01/06/2015 [2 ind.];
Baščine: in vegetation, 13/09/2014 [1 ind.];
Other melioration channels: in vegetation, 24/07/2011 [8 ind.]; 01/06/2015 [3 ind.];

This Palearctic species has been registered in a total of 20 sites and the largest number of individuals was observed at sites Gromiželj, Begov put and Laketića vir (Figure 2.). According to Deltshev, et.al., (2003), the species inhabits terrains of 100-1141 m a.s.l., while we find it at lower altitudes, at about 60-80 m a.s.l.

Figure 2. Argiope bruennichi

When it comes to habitat types, it inhabits both natural habitats (wetlands, thicket, forest fringe and tall vegetation) as well as anthropogenic habitats such as rural (old fields, in vegetation on channel banks and along the roads) and urban (yards, hedges or fences, etc.). The earliest we observed the species was at the end of April (April 20), while we usually spot it from May to September, but in 2008, due to the prolonged nice and warm weather, it was also found in November. The number of individuals per site ranged from 1 to 3 individuals, with the largest number being 9 in the sites Prugnjača and Šljunkara channels on 25 May 2009 and Drinica on 24 July 2011. When it comes to urban areas, the species has been found in yards on ornamental shrubs. In the surrounding area, the species is found in Serbia [36,37,38,39,40,41,42,43].

3. Araneus quadratus Clerck, 1757

Sites:
Laketića vir: wetland, 25/05/2009 [3 ind.]; 24/07/2011 [2 ind.]; 19/07/2012 [3 ind.]; 01/06/2015 [2 ind.];
Drina bank: thicket, 19/07/2012 [3 ind.];
Gromiželj: forest fringe, 25/05/2009 [3 ind.]; 24/07/2011 [2 ind.]; 19/07/2012 [3 ind.]; 01/06/2015 [2 ind.];
Prugnjača channel: forest fringe, 22/05/2009. [2 ind.];
Šljunkara: in vegetation, 22/05/2009 [3 ind.];
Other melioration channels: in vegetation, 24/07/2011 [1 ind.];

This Palearctic species has been registered in a total of 6 sites and the largest number of individuals was observed at sites Gromiželj and Velino selo (Figure 3.). According to the data given by [36] the species inhabits terrains of 200-1043 m a.s.l., while we find it at lower altitudes, at about 60-80 m a.s.l.

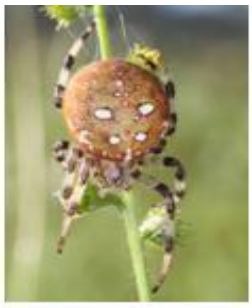

Figure 3. Araneus quadratus

When it comes to habitat types, the species inhabits wetlands, thicket, forest fringe and tall vegetation. We may spot the species from May to July. The number of individuals per site ranged from 1 to 3 individuals. In the surrounding area, the species is found in Serbia [36, 37,39,40,41,42,42].

4. Araneus mramoreus Clerck, 1757

Sites:

Velino selo: yard, 09/08/2009 [1 ind.];
Laketića vir: wetland, 25/05/2009 [2 ind.]; 24/07/2011 [1 ind.]; 19/07/2012 [1 ind.]; 01/06/2015 [1 ind.];
Gromiželj: forest fringe, 25/05/2009 [1 ind.]; 24/07/2011 [4 ind.]; 19/07/2012 [5 ind.]; 01/06/2015 [1 ind.];
Drenovački channel: in vegetation, 22/05/2009 [1 ind.];
Begov put near Pumping station: in vegetation, 25/05/2009 [5 ind.]; 24/07/2011 [6 ind.]; 19/07/2012 [5 ind.]; 01/06/2015 [5 ind.];

This Holarctic species has been registered in a total of 5 sites and the largest number of individuals was observed at sites Gromiželj and Begov put (Figure 4.). According to [36], the species inhabits terrains of 100-700 m a.s.l., while we find it at lower altitudes, at about 60-80 m a.s.l.

Figure 4. Araneus mramoreus

When it comes to habitat types, it inhabits both natural habitats (wetlands, thicket, forest fringe and tall vegetation) as well as anthropogenic habitats such as rural (in vegetation on channel banks and along the roads) and urban (yards). We may spot the species from May to August. The number of individuals per site ranged from 1 to 4 individuals, with the largest number being 6 at Beogv put site on 24 July 2011. When it comes to urban areas, the species has been found in yards on ornamental shrubs. In the surrounding area, the species is found in Serbia [36, 37,39,40,41,42,42].

Fam. Lycosidae

5. Lycosa singoriensis (Laxmann, 1770)

Sites:
Begov put near Pumping station: in vegetation ground hole, 19/07/2012 [1 ind.]; 24/07/2011 [1 ind.]; 01/06/2015 [1 ind.];
Other melioration channels: in vegetation ground hole, 24/07/2011 [1 ind.];

This Palearctic species has been registered in 2 sites with a total of 4 individuals and the largest number of individuals was observed at Begov put site with a total of 3 individuals (Figure 5.). The species prefers open grass or stony habitats with low and sparse vegetation.

Figure 5. Lycosa singoriensis

According to [36] the species inhabits terrains of 200-400 m a.s.l., while we find it at lower altitudes, at about 60-80 m a.s.l. When it comes to habitat types, we have found the species on channel banks and along the roads. We may spot the species during June and July. The presence of this species in the field is ease to notice as it digs holes in the ground with up to 30 cm deep corridor, the entry of which is covered with web, and sometimes closed with a cover made of web and entwined grass, leaves and stones, which is excellent camouflage. During our research, the species was found in the ground in up to 15 cm deep corridors. In the surrounding area, the species is found in Serbia [36, 37,39,40,41,42,42].

Fam.Theridiidae

6. Steatoda triangulosa (Walckenaer, 1802)

Sites:
Velino selo: yard (under brick) and in buildings, 13/11/2008 [3 ind.]; 20/04/2009 [1 ind.]; 09/08/2009 [4 ind.];
Laketića vir: under dry wood bark, 30/11/2008 [2 ind.]; 09/09/2009 [3 ind.]; 01/06/2015 [2 ind.];
Begov put near Pumping station: on building 30/11/2008 [2 ind.]; 09/09/2009 [3 ind.]; 24/07/2011 [3 ind.]; 01/06/2015 [2 ind.];

This Cosmopolitan species has been registered in a total of 3 sites and the largest number of individuals was observed at Velino selo and Begov put near the pumping station (Figure 6.). By habitat types, the species inhabits both natural forest habitats (under dry tree bark) and anthropogenic habitats such as yards under brick and on or in buildings. We find the species throughout the year in buildings.

Figure 6. Steatoda triangulosa

The number per site ranged from 1 to 3 individuals, with the largest number being 4 in Velino selo site (August 9, 2009), in an auxiliary building. According to [36] it inhabits terrains of 100-700 m a.s.l., while we also find it at lower altitudes at about 60-80 m a.s.l. In the surrounding area, the species is found in Serbia [36, 37,39,40,41,42,42].The complete genus *Steatoda*, due to its morphological similarity to poisonous black widow (genus *Latrodectus*), is known by the name false black widow.

Fam.Thomisidae

7. Synaema globosum (Fabricius, 1775)

Sites:
Drina bank: in vegetation by mowing, 19/07/2012 [3 ind.];
Drenovački channel: in vegetation by mowing, 20/04/2009 [3 ind.];
Gromiželj: in vegetation by mowing 25/05/2009 [3ind.]; 24/07/2011 [2 ind.]; 19/07/2012 [3 ind.]; 01/06/2015 [2 ind.];
Prugnjača channel: forest fringe, 22/05/2009 [2 ind.];
Taborište: in vegetation by mowing, 19/07/2012 [1 ind.];

Drinica: in vegetation by mowing, 24/07/2011 [2 ind.];

This Palearctic species has been registered in a total of 6 sites and the largest number of individuals was observed in the Gromiželj locality by mowing vegetation (Figure 7.). [36] state that this species inhabits terrains of 100-2000 m a.s.l., while we also find it at lower altitudes at about 60-80 m a.s.l.

Figure 7. Synaema globosum

By habitat types, the species inhabits vegetation both along wetlands and on channel banks and along roads. We may spot the species from April to July. Numbers per site ranged from 1-3 individuals. In the surrounding, the species is found in Serbia [36,37,39,40,41,42,42,44,45].

8. Runcinia grammica (C.L.Koch, 1837)

Sites:
Laketića vir: in vegetation by mowing, 25/05/2009 [1 ind.]; 24/07/2011 [1 ind.];
Gromiželj: in vegetation by mowing, 25/05/2009 [1 ind.]; 19/07/2012 [1 ind.]; 01/06/2015 [1 ind.];
Prugnjača channel: in vegetation by mowing, 22/05/2009 [1 ind.];
Selište: in vegetation by mowing, 22/05/2009 [1 ind.];
Travnjak: in vegetation by mowing, 09/08/2009 [1 ind.];
Other melioration channel: in vegetation by mowing, 24/07/2011 [2 ind.];

This Palearctic species has been registered in a total of 6 sites. Of all sites, only at Travnjak 2 individuals were observed by vegetation mowing, while at the other sites, one individual was observed at each (Figure 8.) [36] state this species inhabits terrains of 100-500 m a.s.l., while we also find it at lower altitudes at about 60-80 m a.s.l.

Figure 8. Runcinia grammica

By habitat types, the species inhabits vegetation around wetlands and on channel banks or along roads. We may spot the species from May to September.

The number per site ranged from 1-2 individuals. In the surrounding area, the species is found in Serbia [36, 37,39,40,41,42,42,46].

DISCUSSION

According to data given by [1], 165 spider species from 27 families and 103 genera are known in the territory of Bosnia and Herzegovina. So far in B&H, according to [1] a total of 11 species have been

registered from *Fam.Aranidae* and 2 species from genus *Araneus*; a total of 11 species from *Fam.Thomisidae*; a total of 11 species from *Fam.Lycosidae* and one species from genus *Lycosa*; 15 species from *Fam.Theridiidae* and 3 species from genus *Steatoda*.

In the course of our research on arachnofauna in and around Gromiželj, in the 2008-2015 period, a total of 8 spider species new to Bosnia and Herzegovina were discovered in four families, namely, from *Fam. Aranidae* 4 species; *Fam.Thomisidae* 2 species; and 1 species each from *Fam.Lycosidae* and *Fam. Theridiidae* each. Most widespread are *Argiope bruennichi* and *Araneus angulatus* that were registered in 20 sites, followed by *Araneus quadratus*, *Synema globosum* and *Runcinia grammica* registered in 6 sites. Sites with the most registered newly discovered species are Gromiželj with 6 species, followed by Velino selo, Laketića vir, Prugnjača, Begov put and other melioration channels with 5 species. By biotope types, the greatest number of species, six of them, were found in vegetation (wetlands, thicket, forest fringe and vegetation on the channel banks and along the roads).

The species *Argiope bruennichi* and *Araneus angulatus* also showed the greatest diversity of habitats, from wet meadows, thicket and reeds around the wetland, through forest fringes and vegetation along the channel banks, and along roads, to those urban like yards with ornamental shrubs. A complete overview of species with sites is given in Table 1.

Table 1. Overview of species by sites

Sites	S P E C I E S								Legend
	1	2	3	4	5	6	7	8	
Velino selo	■	■	■	■		■			1. Araneus angulatus
Laketića vir	■	■		■		■		■	2. Argiope bruennichi
Drina bank	■	■	■				■		3. Araneus quadratus
Gromiželj	■	■	■	■			■	■	4. Araneus mramoreus
Prugnjača channel	■	■	■				■	■	5. Lycosa singoriensis
Balatun	■	■							6. Steatoda triangulosa
Donji Brodac	■	■							7. Synaema globosum
Drenovača channel	■	■		■			■		8. Runcinia grammica
Međaši	■	■							
Dobra voda	■	■							
Šljunkara	■	■	■						
Čitluk	■	■							
Dranica channel	■	■					■		
Begov put (Pumping station)	■	■		■	■	■			
Selište channel	■	■						■	
Travnjak	■	■						■	
Taborište	■	■					■		
Meterizi	■	■							
Baščine	■	■							
Other melioration channels	■	■	■		■			■	

According to [32], the protected plant habitat of Gromiželj is found to be inhabited by the following plant communities arranged by habitat type with sites:

wetland habitat type: reeds and cattails: *Scirpo-Phragmitetum* (Šljunkara)*; Typhaetum angustifoliae-latifoliae* (Šljunkara, Laketića vir)*; Phragmitetum australis* (Šljunkara, Prugnjača, Čitluk); *Sparganio-Gliceretum fluitans* (Prugnjača) and others.

forest habitat type: The present hydrophilic forests are syntaxonomically belonging to the Central European *Alnion glutinosae*. The forests around the wetland belong to the community of *Frangulo-Alnetum glutinodae* or *Carici remotae-Fraxinetum*, which are found in depressions where water stays until June. Depending on the flooding or movement of groundwater, the following forest communities are observed: *Salicetum cinereae* (Laketića vir), *Salicetum albae-fragilis* (Prugnjača), *Salici-Populetum* (Prugnjača), *Leucojo-Fraxinetum angustifoliae, Alno-Fraxinetum* and *Populeto-Fraxinetum angustifoliae* (Čitluk), and *Genisto elate-Quercetum roboris* community develops on alluvial tumps.

meadow habitat type: this category includes both natural and ruderal and weed communities that inhabit both natural meadows and parts along roads, channels, old fields, along embankments, a settlements, etc. *Polygono hydropiperis-Bidentatum* is found on the slopes of Šljunkara channel, while along the roads and settlements, there are *Urtico-Aegopodietum, Urtico-Sambucetum ebuli, Euparietum cannabini* and *Urtico-Parietarietum* communities. Along the roads in the agricultural district passing by the agricultural land, the following communities are found: *Panico-Galinsogetum, Galeopsi-Calystegietum serpii*. At old fields that used to grow wheat, we have *Erigerono-Setarietum glaucae* community.

Some of the habitats inhabited by the registered spider species are of international importance. Thus, in the Gromiželj protected habitat, newly registered spider species were also found in the following internationally significant habitats bearing the following designations: 3270 (Muddy river banks with *Chenopodimnionor* and *Bidention* p.p. Vegetation), 6430 (Hydrophilus tall-herb fringe communities of plains and of the montane to alpine levels), Reedbeds (tall sedges and vegetation of *Phragmito-Magnocaricetea*), 91E0 (Alluvial forest with Alnus glutinosa and Fraxinus excelsior (*Alno-Padion, Alnion incanae, Salicion albae*)) i 91F0 (Riparian mixed forest of *Quercus robur, Ulmus laevis* and *Fraxinus sp.*, along large rivers (*Ulmenion minoris*) [47].

According to data on the Fauna of Europe, all species except *Lycosa singoriensis* are found in Slovenia, Croatia, Serbia and Montenegro, while the species mentioned is not listed for Croatia but only for Slovenia, Serbia and Montenegro. According to Grbac, et al. (2019), specimens of all eight species are found in the Araneae collection in the Croatian Natural History Museum in Zagreb, which was founded in 1931 and includes material collected between 1884 and 1964. However, the collection contains specimens for all species, except for *Lycosa singoriensis*, from the territory of Croatia, but also from Montenegro (*Runcinia grammica, Araneus angulatus*) and Serbia (*Steatoda triangulosa, Lycosa singoriensis*). It is interesting that the only two specimens of the species *Lycosa singoriensis* in the museum collection originate from Serbia (the vicinity of Vrbas, from 1933).

Of the registered species, only the species from *Fam.Thomisidae* are completely harmless to humans, while the other species belong to slightly poisonous species and have a local character bite. Slightly poisonous species include the species of the genus *Steatoda, Araneus, Argiope* and *Lycosa*.

Since almost all spiders are poisonous in principle, we can roughly divide them into deadly poisonous, poisonous and slightly poisonous. The slightly poisonous species include those of the genus *Steatoda, Araneus, Argiope* and *Lycosa*. The bite of the species *Steatoda triangulosa*, *Lycosa singoriensis*, *Argiope bruennichi* and all species of the genus *Araneus* generally have common clinical symptoms such as: redness and swelling around the bite, followed by slight pain around the bite. The effects of the bite are usually harmless, but there have been cases with stronger reactions. Depending on the condition of the whole body, more severe forms of the clinical condition may occur less often [48].

CONCLUSION

There are 165 known species of spiders in the territory of Bosnia and Herzegovina. During our research on the Gromiželj arachnofauna, in the period 2008-2015, a total of 8 spider species new to Bosnia and Herzegovina were discovered in four families, namely, from *Fam. Aranidae* 4 species; *Fam.Thomisidae* 2 species; and 1 species each from *Fam.Lycosidae* and *Fam. Theridiidae* each.

Most widespread are *Argiope bruennichi* and *Araneus angulatus* that were registered in 20 sites, followed by *Araneus quadratus*, *Synema globosum* and *Runcinia grammica* registered in 6 sites. Sites with the most registered newly discovered species are Gromiželj with 6 species, followed by Velino selo, Laketića vir, Prugnjača, Begov put and other melioration channels with 5 species. By biotope types, the greatest number of species, six of them, were found in vegetation (wetlands, thicket, forest fringe and vegetation on the channel banks and along the roads).

The species *Argiope bruennichi* and *Araneus angulatus* also showed the greatest diversity of habitats, from wet meadows, thicket and reeds around the wetland, through forest fringes and vegetation along the channel banks and roads, to those urban like yards with ornamental shrubs. Species of the genus *Araneus* and *Agriope*, among other habitats, also inhabit the *Alno-Fraxinetum* forest, which is classified as a priority for protection under Annex 1 of the Habitat Directive.

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