Acta Scientifica Balcanica, **2024, 5(1)**
DOI: 10.7251/ASB240501013P **UDC 595.754:712.6(497.6Kozara)**
Original scientific paper

CONTRIBUTION TO KNOWLEDGE OF THE FAUNA OF HETEROPTERA AT THE NATIONAL PARK KOZARA

Ljiljana Protić[1*], Mihajlo Stanković[2]

[1]*Natural History Museum, Njegoševa 51, 11000 Belgrade, Serbia*
[2]*Nature Conservation Movement of Sremska Mitrovica, Svetog Save 19, 22000 Sremska Mitrovica, Serbia*
***Corresponding author:** ljilja.protic@gmail.com

Abstract

This paper includes a list of 104 species of Heteroptera recorded at NP Kozara. This is the first time that data are published on specimens collected in August of 2018, 2022 and 2023. The following seven species were determined to be new for the fauna of Heteroptera of Bosnia and Herzegovina: *Limnoporus rufoscutellatus* (Latreille); *Catoplatus nigriceps* Horváth, 1905; *Deraeocoris* (*Deraeocoris*) *flavilinea* (A. Costa, 1862); *Orthops* (*Orthops*) *basalis* (A. Costa, 1853); *Lygaeus simulans*, Deckert 1985; *Eysarcoris ventralis* (Westwood, 1837); *Sciocoris (Aposciocoris) microphthalmus* Flor, 1860. Five introduced, invasive species were also identified: *Corythucha arcuata* (Say, 1832); *Corythucha ciliata* (Say, 1832), *Deraeocoris* (*Deraeocoris*) *flavilinea* (A. Costa, 1862) *Halyomorpha halys* (Stål, 1855) and *Nezara viridula* (Linnaeus, 1758).

Key words: Heteroptera, Mt. Kozara, Bosnia and Herzegovina

INTRODUCTION

Entomological material has been collected for the last ten years in the summer months (July-August) throughout Bosnia-Herzegovina, except for a break during the pandemic of COVID-19. Out of a significant number of collected specimens, this paper will present the Heteroptera from several localities in NP Kozara.

The previous paper (Protić and Stanković, 2015) presented the data on Heteroptera collected in 2013 and 2014, while data on species collected in the last three years (2018, 2022 and 2023) are presented in this paper.

Before these more recent studies, the only known records of Heteroptera at Mt. Kozara were individual records. For example, the Catalogues (Protić, 1998, 2001) mention the locality of Kozara for just four species: *Carpocoris pudicus* (Poda, 1761), *Dolycoris baccarum* (Linnaeus, 1758), *Chlorochroa juniperina juniperina* (Linnaeus, 1758) and *Anthocoris confusus* Reuter, 1884.

The goal of this paper was to integrate new and previously published data on species of Heteroptera at Mt. Kozara (Table 2). The species data were also compared with data in papers pertaining to the entire territory of Bosnia and Herzegovina according to the available sources (Protić, 2001, 2005; Aukema and Rieger, 1995, 1996, 1999, 2001, 2006; Aukema *et al*., 2013; Protić and Stanković, 2015).

MATERIALS AND METHODS

Mountain Kozara [UTM CODE - XK 38] is situated in the northwestern part of Bosnia and Herzegovina, delimited by the rivers: Sava to the north, Vrbas to the east, Sana to the south and Una to the west. The highest peak is Lisina, at 978 m above sea level. In terms of geography and geomorphology, Kozara represents the Peripannonian area of the Inner Dinarides. This is an island mountain, whose basic tectonic relief was created during the late Cenozoic by uplift of land under the influence of orogenic movements in the Earth's crust and the draining of the Pannonian Sea. The most significant period of tectonic shaping of the Kozara massif took place during the Alpine orogenesis (late Mesozoic and early Tertiary) (Bucalo *et al*. 2007). Although Kozara is an old mountain with a relatively low altitude, it contains many steep slopes, rocky areas and valleys. National Park Kozara was established in 1967. The area of the park is 3520 ha. NP Kozara is a member of the Federation of National Parks of Europe "Europarc".

The latest field studies on Heteroptera fauna in NP Kozara were performed in 2018, 2022 and 2023 at 13 sites, of which the most significant include:

Bijele Vode – Terrain under the forest of *Abieti- Fagetum praepannonicum*, 50-80 years of age, rather sparse forest structure. The ground floor is represented by sparse to grouped herbaceous vegetation. A stream runs through the forest, with sparse herbaceous vegetation at the bank.

Benkovac is situated at 665 m above sea level, on stony ground with sparse grass and bush (shrub) vegetation. Specifically, the sites where heteropterans were collected include rocky meadows with sparse vegetation near the old playground as well as hay meadows with tall herbaceous vegetation and sporadic individual trees of *Juniperus communis* and bushes of *Crategus* sp., *Rosa* sp., *Prunus* sp., *Carpinus* sp., while in smaller depressions and hollows there are some *Salix purpurea, Salix cinerea, Juncus* sp., *Cyperus* sp.

Mt. Gola Planina (868 m): Brezovac Spring, surrounded with a wet meadow belonging to the type *Pteridium aquilinum silicicolum*. Most of Mt. Gola Planina is covered in meadows and pastures of secondary origin (hay meadows) overgrown with mesoxerophilous associations from the suballiance *Mesobromion* and the alliance *Brometalia erecti* (Bucalo *et al*., 2007).

Kotlovača River – stony bank with sparse semiaquatic vegetation. The dominant plants include *Cyperus fuscus* L., *Juncus articulatus* L., *Equisetum arvensis* L. and sparse trees of *Salix* sp. and *Alnus* sp.

Mandžukove Lokve – ponds in a forest – permanently flooded terrain with semiaquatic and immersed vegetation, surrounded by forest of *Abies alba* Miller, *Fagus silvatica* L. The dominant plants include *Juncus articulatus* L., *Alisma plantago-aquatica* L. and *Eupatorium cannabinum* L.

Moštanica – The studied area includes a flood belt along the river, which is irregularly flooded in spring. Along most of the river's course the canopy overhangs the watercourse and creates a strong shadow, so the bank vegetation is composed of semi-sciophytic and sciophytic herbaceous plant species. Most of the riverbank vegetation belongs to association of *Alno-Salicetum*, while in places where the forest structure is interrupted there is some herbaceous ruderal vegetation of riparian habitats.

Mrakovica (804 m), ski slope, meadow – this locality includes a memorial complex around a monument under a mixed forest, as well as the part belonging to the ski resort Kozara with ski

slopes. Heteropterans were collected on ski slopes which belong to the habitat type of meadows, i.e. sunny open surface with meadow and ruderal vegetation, surrounded by a mixed forest of *Abies alba* Miller, *Fagus silvatica* L., *Picea omorika* (Pančić) Purk.

Pašini Konaci - marshland. The marsh is surrounded by ruderal vegetation while the marsh proper has a thick cover of *Glyceria plicata* (Fries), *Scirpus sylvaticus* L., *Juncus* sp. and *Carex* sp., enclosed by *Abieti-Fagetum praepannonicum* forest (Bucalo *et al*., 2007). In addition to the marsh, heteropterans were also collected in the nearby meadows, which may be characterized as moderately humid hay meadows with a strong anthropogenic influence, surrounded by a mixed forest of deciduous and coniferous trees. The dominant plant forms are herbaceous with several bushes or low trees of *Prunus cerasifera* as well as larger bushes of *Rubus* sp.

Starenica, river, (Kozaračka Rijeka) is formed by merging of watercourses Bijele Vode and Jovovac, below Gumline. This is one of the most beautiful localities in NP Kozara, with a rocky lookout point, a cave and the canyon of Bijela Rijeka which is 200 m long and 50 m high. The bank is mostly overgrown in sparse *Alno-Salicetum* forest, while in the places where forest belt is broken there is a dense cover of herbaceous ruderal vegetation.

Table 1 presents the localities with their habitat types and GPS coordinates. The diversity of habitats for heteropterans in the National Park Kozara is presented in photographs in Figure 1.

Table 1. Overview of sampling localities with habitat types and GPS coordinates. MGL - cellphone app My GPS Location; GD - cellphone app GPS data; GEP- Google Earth Pro

Locality	**Biotope**	**GPS**	
		X	Y
Bijele Vode	Forest with meadow and stream	44°59'22.85"N	16°56'04.74"E (GEP)
Benkovac	Rocky meadow	45°00’096" N	16°53’412" E (MGL)
	Wet meadow	45°08’08,820" N	16°53’672" E (MGL)
Mt. Gola Planina	Hay meadows	44°58'58.01"N	16°56'9.29"E (GEP)
	Spring of Brezovac and the surrounding wet meadow	44°59.385' – 44°58.983' N	16°55.186' – (GD) 16°56.110' E,
Kotlovača River	Riverbank with moderately wet ruderal vegetation	45°00’20,568" N	16°52’33,851"E (GD)
Mandžukove Lokve	Ditches	45°01.040" N	16°55’223" E (GD)
Moštanica	Forest	45°05’51,9416" N	16°58’42,410"E (GD)
Mrakovac (ski slopes Kozara)	Hay meadow (ski slope)	45°01’04,934" N	16°54’05,958" E (GD)
Pašini Konaci	Meadow	45°03’03,586" N	16°52’43,169"E (GD)
	Marsh	45°03.132" N	16°52.719' E (MGL)
Starenica River	Riverbank with ruderal vegetation	44°58’720" N	16°54’469" E (MGL)

Figure 1. Characteristic habitats for heteropterans in the National Park Kozara. a – stony meadow, b – wet meadow, c – hay meadow, d – ski slope (anthropogenic meadows), e – rut ditches, f - forest (*Abieti-Fagetum praepannonicum*), g – marsh, h – volcanic terrain, i – riverbank, j – heath with *Calluna vulgaris*

The specimens were collected using the standard methods for sampling Heteroptera: sweep net and individual sampling from the plants. The collected material is stored in ethanol as an integral part of the Study Collection of Heteroptera at the Natural History Museum in Belgrade.

Sources used for species identification include: Stichel, 1955-1962; Wagner and Weber, 1964; Wagner, 1974a, 1974b, 1975; Deither, 1986; Derjanschi and Péricart, 2005; Péricart, 2010; Ribes and Pagola-Carte, 2013; Lupoli, 2014.

RESULTS

I NOTONECTIDAE

1. *Notonecta glauca glauca* Linnaeus, 1758

New data: Mandžukove Lokve 27.08.2018. 2m 1f leg.M. Stanković

Protić and Stanković, 2015: Kozara: Moštanička Vrela, Pašini Konaci

II GERRIDAE

2. *Aquarius najas* (De Geer, 1773)

New data: Crna Reka 27.08.2022. 2m 2 larvae leg. M. Stanković

3. *Aquarius paludum paludum* (Fabricius, 1794)

New data: Starenica, r., riverbank 30.08.2018. larvae L_5 leg. M. Stanković

4. *Gerris costae costae* (Herrich-Schaeffer, 1850)

Protić and Stanković, 2015: Kozara: Pašini Konaci

5. *Gerris lacustris* Linnaeus, 1758

Protić and Stanković, 2015: Kozara: Moštanička Vrela, Mandžukove Lokve

6. *Gerris* (*Gerris*) *thoracicus* Schummel, 1832

New data: Mandžukove Lokve 27.08.2018. 1m leg. M. Stanković

7. *Limnoporus rufoscutellatus* (Latreille)*

New data: Staro pilanište-Kozaračka Rijeka 28.08.2022. 1m leg. M. Stanković

III TINGIDAE

8. *Catoplatus carthusianus* (Goeze, 1778)

New data: Benkovac, stony meadow 24.08.2022. 1f leg. M. Stanković

Protić and Stanković, 2015: Kozara: Mt. Gola Planina: Spring Brezovac

9. *Catoplatus nigriceps* Horváth, 1905*

New data: Benkovac, stony meadow 24.08.2022. 1f leg. M. Stanković

10. *Corythucha arcuata* (Say, 1832)

New data: Vodice, forest and forest gaps 26.08.2018. 2m 2f leg. M. Stanković

11. *Corythucha ciliata* (Say, 1832)

New data: Pašini Konaci meadow 23.08.2022. 3m; Benkovac, stony meadow 24.08.2022. 2m 13f; Mrakovica, ski slope, meadow 25.08.2022. 2m 14f; Mrakovica, ski slope, meadow 25.08.2023. 2m leg. M. Stanković

IV MIRIDAE

12. *Adelphocoris lineolatus* (Goeze, 1778)

New data: Benkovac, playground 23.08.2018. 1f; Benkovac, meadow 30.08.2018. 1m; Benkovac, stony meadow 24.08.2022. 3m 3f; Njivice 29.08.2018. 1m 2f; Mrakovica, ski slope, meadow 25.08.2022. 1f leg. M. Stanković
Protić and Stanković, 2015: Kozara: Benkovac, Jankovića Kamen, Bešića Poljana

13. *Adelphocoris seticornis* (Fabricius, 1775)
New data: Benkovac, playground 23.08.2018. 2f leg. M. Stanković

14. *Adelphocoris vandalicus* (Rossi, 1790)
New data: Benkovac, meadow 30.08.2018. 1f leg. M. Stanković
Protić and Stanković, 2015: Kozara: Mt. Gola Planina: Spring Brezovac

15. *Chargochilus gyllenhalii* (Fallén, 1807)
Protić and Stanković, 2015: Kozara: Mt. Gola Planina: Spring Brezovac

16. *Deraeocoris* (*Deraeocoris*) *flavilinea* (A. Costa, 1862)*
New data: Vodice forest and forest gaps 26.08.2018. 1m 1f leg. M. Stanković

17. *Deraeocoris* (*Deraeocoris*) *ruber* (Linnaeus, 1758)
New data: Starenica r., riverbank 30.08.2018. 1f leg. M. Stanković
Protić and Stanković, 2015: Kozara Gola Mt.: Spring Brezovac

18. *Lygus gemellatus* (Herrich-Schaeffer, 1835)
New data: Benkovac, playground 23.08.2018. 1m leg. M. Stanković
Protić and Stanković, 2015: Kozara: Moštanička Vrela

19. *Lygus pratensis* (Linnaeus, 1758)
New data: Benkovac, playground 23.08.2018. 1f; 30.08.2018. 2m 3f; Mt. Gola planina, meadow 24.08.2018. 1f; Mandžukove Lokve 27.08.2018. 2m 6f; Kotlovača, riverbank 28.08.2018 1f; Njivice 29.08.2018. 1m 1f; Pašini Konaci, meadow 30.08.2022. 4m 4f; Mrakovica, ski slope, meadow 25.08.2023. 1f leg. M. Stanković
Protić and Stanković, 2015: Kozara: Mrakovica, Pašini Konaci, River Mlječanica, Bešića Poljana, Benkovac, Mandžukove Lokve

20. *Lygus rugulipennis* Poppius, 1911
Protić and Stanković, 2015: Kozara: Benkovac

21. *Macrotylus* (*Macrotylus*) *quadrilineatus* (Schrank, 1785)
Protić and Stanković, 2015: Kozara: Pašini Konaci

22. *Myrmecoris gracilis* (Sahlberg, 1848)
New data: Bijele Vode, forest 23.08.2022. 1f + larva leg. M. Stanković

23. *Notostira elongata* (Geoffroy,1785)
Protić and Stanković, 2015: Kozara: Pašini Konaci, Jankovića Kamen, Benkovac, Bešića Poljana (quarry), Mrakovica

24. *Notostira erratica* (Linnaeus, 1758)
New data: Kozara, meadow 24.08.2018. 1m 2f; Benkovac, stony meadow 24.08.2022. 4m leg. M. Stanković

25. *Orthops* (*Orthops*) *basalis* (A. Costa, 1853)*
New data: Mrakovica, ski slope, meadow 25.08.2023. 1f leg. M. Stanković

26. *Orthops campestris* (Linnaeus, 1758)
New data: Benkovac, playground 23.08.2018. 1f leg. M. Stanković
Protić and Stanković, 2015: Kozara: River Kotlovača

27. *Orthops kalmii* (Linnaeus, 1758)
New data: Kozara: Benkovac, stony meadow 24.08.2022. 2m 1f leg. M. Stanković
Protić and Stanković, 2015: Kozara: Mrakovica 15.08.2013, 1♂, leg. M. Stanković

28. *Phytocoris* (*Ktenocoris*) *ulmi* (Linnaeus, 1758)
New data: Bijele Vode, forest 23.08.2022. 1m leg. M. Stanković

29. *Phytocoris* (*Ktenocoris*) *varipes* (Boheman, 1852)
Protić and Stanković, 2015: Kozara: Mt. Gola Planina: Spring Brezovac, Mrakovica, Benkovac

30. *Pithanus maerkelii* (Herrich-Schaeffer, 1839)
Protić and Stanković, 2015: Kozara: River Kotlovača

31. *Stenodema* (*Brachystira*) *calcarata* (Fallén, 1807)
Protić and Stanković, 2015: Kozara: Bešića Poljana, Pašini Konaci, Mrakovica

32. *Stenodema* (*Stenodema*) *holsata* (Fabricius, 1787)
Protić and Stanković, 2015: Kozara: Bešića Poljana

33. *Stenodema* (*Stenodema*) *laevigata* (Linnaeus, 1758)
New data: Vodice, forest and forest gaps 26.08.2018. 1m 1f; Benkovac, stony meadow 24.08.2022. 1f; Mrakovica, ski slope, meadow 25.08.2023. 1f leg. M. Stanković
Protić and Stanković, 2015: Kozara: River Kotlovača, Mrakovica, Jojin Bunar, Benkovac

34. *Stenodema* (*Stenodema*) *virens* (Linnaeus, 1767)
New data: Benkovac, stony meadow 24.08.2022. 1m leg. M. Stanković
Protić and Stanković, 2015: Kozara: Mrakovica

35. *Trigonotylus coelestialium* (Kirkaldy, 1902)
New data: Bijele Vode, forest 23.08.2022. 1f leg. M. Stanković
Protić and Stanković, 2015: Kozara: Pašini Konaci

V NABIDAE

36. *Himacerus* (*Aptus*) *mirmicoides* (O. Costa, 1834)
Protić and Stanković, 2015: Kozara: Mrakovica, Mandžukove Lokve

37. *Himacerus* (*Himacerus*) *apterus* (Fabricius, 1789)
Protić and Stanković, 2015: Kozara: Bešića Poljana

38. *Nabis* (*Dolichonabis*) *limbatus* Dahlbom, 1851
Protić and Stanković, 2015: Kozara: Benkovac, Mandžukove Lokve, Bešića Poljana

39. *Nabis* (*Nabis*) *brevis* Scholtz, 1846
New data: Mt. Gola planina, livade 24.08.2018. 1m leg. M. Stanković
Protić and Stanković, 2015: Kozara: Pašini Konaci, Mrakovica, Benkovac

40. *Nabis* (*Nabis*) *ferus* (Linnaeus, 1758)
New data: Njivice 29.08.2018. 2m 1f 3 larvae; Benkovac, stony meadow 24.08.2022. 4m 3f leg. M. Stanković
Protić and Stanković, 2015: Kozara: Mt. Gola Planina: Spring Brezovac, Benkovac, Mandžukove Lokve, Pašini Konaci, Mrakovica

41. *Nabis* (*Nabis*) *pseudoferus* Remane, 1949
New data: Kozara, Starenica, r., riverbank 30.08.2018. 1m 1f leg. M. Stanković

42. *Nabis* (*Nabis*) *punctatus punctatus* A. Costa, 1847
New data: Benkovac playground 23.08.2018. 1m leg. M. Stanković

43. *Nabis* (*Nabis*) *rugosus* (Linnaeus, 1758)
New data: Mt. Gola planina, meadow, 24.08.2018. 2m 5f; Mandžukove Lokve 27.08.2018. 1m 1f; Mrakovica, ski slope, meadow 25.08.2022. 2f leg. M. Stanković
Protić and Stanković, 2015: Kozara: River Kotlovača, Jankovića Kamen, Jojin Bunar

VI ANTHOCORIDAE

44. *Anthocoris confusus* Reuter, 1884
Protić, 1998: Kozara 1909. leg. V. Apfelbeck (in collection of Land Museum of Bosnia and Herzegovina [Zemaljski muzej Bosne i Hercegovina])

VII PYRRHOCORIDAE

45. *Pyrrhocoris apterus* (Linnaeus, 1758)
New data: Mandžukove Lokve 27.08.2018. 1f; Pašini Konaci, meadow 23.08.2022. larvae of various stages; Benkovac, stony meadow 24.08.2022. larva leg. M. Stanković

VIII REDUVIIDAE

46. *Phymata crassipes* (Fabricius, 1775)
New data: Kozara, meadow 24.08.2018. 1f leg. M. Stanković

47. *Peirates hybridus* (Scopoli, 1763)
New data: Starenica r., riverbank 30.08.2018. 1m leg. M. Stanković

IX LYGAEIDAE

48. *Cymus claviculus* (Fallén, 1807)
New data: Mrakovica, ski slope, meadow 1f 25.08.2022. leg. M. Stanković
Protić and Stanković, 2015: Kozara: Pašini Konaci

49. *Cymus glandicolor* Hahn, 1831
New data: Benkovac, playground 23.08.2018. 1f leg. M. Stanković

50. *Geocoris* (*Piocoris*) *erythrocephalus* (Lepeletier & Serville, 1825)
New data: Benkovac, meadow 30.08.2018. 1f; Bijele Vode, forest 23.08.2022. 1f; Pašini Konaci meadow 23.08.2022.2m; Mt. Gola planina, dry meadow 24.08.2022. 1f; Mrakovica, ski slope, meadow 25.08.2023. 1f; Crna Reka, riverbank 27.08.2022. 1f leg. M. Stanković

51. *Kleidocerys resedae* (Panzer, 1797)
New data: Mrakovica, Hotel „Monument“ meadow near birch groves (*Betula verrucosa*) 25.08.2022. 12 m 18f leg. M. Stanković

52. *Lygaeus equestris* (Linnaeus, 1758)
New data: Pašini Konaci, meadow 30.08.2022. 2f leg. M. Stanković

53. *Lygaeus simulans*, Deckert 1985*
New data: Mrakovica, ski slope, meadow 25.08.2022. 2f leg. M. Stanković

54. *Macroplax preyssleri* (Fieber, 1837)
New data: Mt. Gola Planina, sprig Brezovik 18.08.2013. leg. M. Stanković

55. *Metopoplax ditomoides* (A. Costa, 1843)
New data: Benkovac, stony meadow 24.08.2022. 1m leg. M. Stanković

56. *Nysius senecionis senecionis* (Schilling, 1829)
New data: Mt. Gola Planina 24.08.2022. 1m, + larva; Mrakovica, ski slope, meadow 25.08.2022. 2f leg. M. Stanković

57. *Nysius thymi thymi* (Wolff, 1804)
New data: Mrakovica, ski slope, meadow 25.08.2023. 1m 1f leg. M. Stanković

58. *Oxycarenus* (*Euoxycarenus*) *pallens* (Herrich-Schaeffer, 1850)
New data: Benkovac, playground 23.08.2018. 1f leg. M. Stanković

59. *Rhyparochromus vulgaris* (Schilling, 1829)
New data: Mrakovica 25.08.2023. 1f leg. M. Stanković

X BERYTIDAE

60. *Gampsocoris punctipes* (Germar, 1822)
Protić and Stanković, 2015: NP Kozara: Pašini Konaci

XI STENOCEPHALIDAE

61. *Dicranocephalus albipes* (Fabricius, 1781)
New data: Kotlovača, riverbank 28.08.2018. 1f; Benkovac, meadow 30.08.2018. 1f leg. M. Stanković

XII RHOPALIDAE

62. *Corizus hyoscyami hyoscyami* (Linnaues, 1758)
New data: Kotlovača, riverbank 28.08.2018. 1m; Mandžukove Lokve 27.08.2018. 1f; Benkovac, meadow 30.08.2018. 1m leg. M. Stanković
Protić and Stanković, 2015: Kozara, River Kotlovača

63. *Liorhysus hyalinus* (Fabricius, 1794)
New data: Mrakovica, ski slope, meadow 25.08.2023. 2m 1f leg. M. Stanković

64. *Myrmus miriformis* (Fallén, 1807)
New data: Pašini Konaci, meadow 23.08.2022. 1m; Benkovac, stony meadow 24.08.2022. 3m 3f; Mrakovica, ski slope, meadow 25.08.2022. 1m leg. M. Stanković

65. *Rhopalus* (*Rhopalus*) *distinctus* (Signoret, 1859)
New data: Benkovac, stony meadow 24.08.2022. 3m leg. M. Stanković

66. *Rhopalus* (*Aeschyntelus*) *maculatus* (Fieber, 1836)
New data: Pašini Konaci meadow 23.08.2022. 4m 1f; 30.08.2022. 1m; Benkovac, playground 23.08.2018. 10m 7f; Benkovac, stony meadow 24.08.2022. 2m 1f; Mrakovica, ski slope, meadow 25.08.2022. 2m; Kotlovača, riverbank 28.08.2018. 1m 1f; Benkovac, meadow 30.08.2018. 2m 2f; leg. M. Stanković
Protić and Stanković, 2015: Kozara: Benkovac, Mandžukove Lokve, Bešića Poljana

67. *Rhopalus parumpunctatus* Schilling, 1817
New data: Bijele Vode, forest 23.08.2022. 2m 1f; Mt. Gola Planina, livade 24.08.2018. 6m 3f; Benkovac, stony meadow 24.08.2022. 2m 2f; Mrakovica, ski slope, meadow 25.08.2022. 1m 1f; Njivice 29.08.2018. 6m 3f; Šibovac, ski slope, meadow 29.08.2023. 1m; Benkovac, meadow 30.08.2018. 2m 4f leg. M. Stanković
Protić and Stanković, 2015: Kozara: Bešića Poljana, River Mlječanica, Jankovića Kamen, Pašini Konaci, Mrakovica, Benkovac, River Kotlovača

68. *Rhopalus subrufus* (Gmelin, 1788)
New data: Benkovac, stony meadow 24.08.2022. 2m leg. M. Stanković

69. *Stictopleurus abutilon* (Rossi, 1790)
New data: Benkovac, stony meadow 24.08.2022. 2m 1f; Mrakovica, ski slope, meadow 25.08.2022. 1m leg. M. Stanković
Protić and Stanković, 2015: Kozara: Benkovac

70. *Stictopleurus punctatonervosus* (Goeze, 1778)
New data: Kozara meadow, 24.08.2018. 1m Mrakovica, ski slope, meadow 25.08.2023. 1m 1f leg. M. Stanković
Protić and Stanković, 2015: Kozara: Benkovac

XIII ALYDIDAE

71. *Alydus calcaratus* (Linnaeus, 1758)
New data: Benkovac, stony meadow 24.08.2022. leg. M. Stanković 1m + 3 larvae of various stages

72. *Camptopus lateralis* (Germar, 1817)
New data: stony Benkovac, meadow 24.08.2022. 1m leg. M. Stanković

XIV COREIDAE

73. *Coreus marginatus* (Linnaeus, 1758)
New data: Moštanica, forest 16.08.2012. 1f + larvae of various stages; Mandžukove Lokve 27.08.2018. 1f; Benkovac, stony meadow 24.08.2022. 3 larvae; Pašini Konaci meadow 23.08.2022. 1m 1f i više larvi raznih stuplnjeva; 30.08.2022. 2m 2f + larvae of various stages leg. M. Stanković
Protić and Stanković, 2015: Kozara: Pašini Konaci, River Mlječanica, Moštanička Vrela

74. *Coriomeris denticulatus* (Scopoli, 1763)
New data: Mrakovica, ski slope, meadow 1m i 2 larvae of various stages 25.08.2022. leg. M. Stanković

75. *Syromastus rhombeus* (Linnaeus, 1767)
New data: Pašini konaci 23.08.2022. 2 larvae leg. M. Stanković
Protić and Stanković, 2015: Kozara: Jankovića Kamen

XV SCUTELLERIDAE

76. *Odontotarsus purpureolineatus* (Rossi, 1790)
New data: Mrakovica, meadow 25.08.2022. 1f leg. M. Stanković

77. *Eurygaster maura* (Linnaeus, 1758)
Protić and Stanković, 2015: NP Kozara: Benkovac

XVI PENTATOMIDAE

78. *Aelia acuminata* (Linnaeus, 1775)
New data: NP Kozara, meadow 24.08.2018. 1m 2f; Benkovac, playground 23.08.2018. 1m; Mandžukove Lokve 27.08.2018. 1m; Benkovac, stony meadow 30.08.2018. 1m; Njivice 29.08.2018. 1m 1f; Pašini Konaci, meadow 23.08.2022. 1f; Benkovac, meadow 24.08.2022. 1m 1f; Mrakovica, ski slope, meadow 25.08.2022. 1f leg. M. Stanković
Protić and Stanković, 2015: Kozara: Jankovića Kamen, Mrakovica

79. *Aelia klugii* Hahn, 1831
Protić and Stanković, 2015: NP Kozara: Mt. Gola Planina: Spring Brezovac

80. *Aelia rostrata* Boheman, 1852
New data: Kozara: Njivice 29.08.2018. 1m leg. M. Stanković

81. *Carpocoris pudicus* (Poda, 1761)
New data: Benkovac, stony meadow 30.08.2018. 1m + larvae of various stages; 24.08.2022.; Mrakovica, ski slope, meadow 25.08.2022. 1m; Pašini konaci 26.08.2022. 1m leg. M. Stanković
Protić, 2001: Kozara
Protić and Stanković, 2015: Kozara: Mt. Gola Planina: Spring Brezovac

82. *Carpocoris purpureipennis* (De Geer, 1773)
New data: Benkovac, stony meadow 30.08.2018. larva 1st instar; Starenica r., riverbank 30.08.2018. 1m; Benkovac, meadow 24.08.2022. 1m 1f leg. M. Stanković

83. *Chlorochroa juniperina juniperina* (Linnaeus, 1758
Protić, 2001: Kozara: Mrakovica 06.1959. leg. O. M. (in collection of Land Museum of Bosnia and Herzegovina [Zemaljski muzej Bosne i Hercegovina])

84. *Dolycoris baccarum* (Linnaeus, 1758)
New data: Benkovac, playground 23.08.2018. 1f + larvae of various stages; Benkovac, stony meadow 24.08.2022. 3m 1f; Kozara, meadow 24.08.2018. 1f leg. M. Stanković
Protić, 2001: Kozara: Mala Poljana
Protić and Stanković, 2015: Kozara: Mrakovica, Mt. Gola Planina: Spring Brezovac, Benkovac, River Kotlovača

85. *Eurydema oleracea* (Linnaeus, 1758)
Protić and Stanković, 2015: Kozara: Mt. Gola Planina: Spring Brezovac

86. *Eysarcoris fabricii* Kirkaldy, 1904
New data: Benkovac, stony meadow 24.08.2022. 2m 3f leg. M. Stanković

87. *Eysarcoris ventralis* (Westwood, 1837)*
New data: Benkovac, stony meadow 24.08.2022. 4m 7f leg. M. Stanković

88. *Graphosoma lineatum* (Linnaeus, 1758)
New data: Bijele Vode, forest 23.08.2022. L_5; Benkovac, stony meadow 24.08.2022. 1m leg. M. Stanković
Protić and Stanković, 2015: Kozara: Mt. Gola Planina: Spring Brezovac

89. *Halyomorpha halys* (Stål, 1855)
New data: Mrakovica, 25.08.2023. 1m; Mrakovica, ski slope, meadow 25.08.2022. larva; Njivice 29.08.2018. 2m 2f leg. M. Stanković

90. *Jalla dumosa* (Linnaeus, 1758)
New data: Mrakovica 25.08.2023. larva leg. M. Stanković

91. *Neottiglossa leporina* (Herrich-Schaeffer, 1830)
Protić and Stanković, 2015: Kozara: Mt. Gola Planina: Brezovac

92. *Neottiglossa pusilla* (Gmelin, 1789)
New data: Benkovac, stony meadow 24.08.2022. 6m 8f leg. M. Stanković

93. *Nezara viridula* (Linnaeus, 1758)
New data: Benkovac playground 23.08.2018. larva; Mrakovica, 25.08.2023. 1m leg. M. Stanković

94. *Palomena prasina* (Linnaeus, 1758)
New data: Mandžukove Lokve 27.08.2018. larvae L_{3-5}, Pašini konaci 23.08.2022. 1m; Pašini Konaci, meadow 30.08.2022. 2m; Šibovac, ski slope, meadow 29.08.2023. larva L_5 leg. M. Stanković
Protić and Stanković, 2015: Kozara: Benkovac, Bešića Poljana, Jojin Bunar, Mandžukove Lokve, Mrakovica, Pašini Konaci, River Mlječanica

95. *Pentatoma rufipes* (Linnaeus, 1758)
New data: Bijele Vode 23.08.2022. 1m; Mrakovica, meadow 23.08.2023. 1m leg. M. Stanković
Protić and Stanković, 2015: Kozara: River Mlječanica

96. *Picromerus bidens* (Linnaeus, 1758)
New data: Bijele Vode, forest 23.08.2022. 1m leg. M. Stanković

97. *Piezodorus lituratus* (Fabricius, 1794)
New data: Gola Planina, meadow 24.08.2018. larva leg. M. Stanković
Protić and Stanković, 2015: Kozara: Mt. Gola Planina: Spring Brezovac, Benkovac, Bešića Poljana

98. *Rhacognathus punctatus* (Linnaeus, 1758)
New data: Mrakovica, 25.08.2023. 1m leg. M. Stanković

99. *Rhaphigaster nebulosa* (Poda, 1761)
New data: Mrakovica 25.08.2023. 1m 1f leg. M. Stanković

100. *Sciocoris* (*Aposciocoris*) *microphthalmus* Flor, 1860*
New data: Benkovac, playground 23.08.2018. larva leg. M. Stanković

101. *Stagonomus bipunctatus* (Linnaeus, 1758)
New data: Mrakovica, ski slope, meadow 25.08.2022. 1m 1f leg. M. Stanković

102. *Trolius luridus* (Fabricius 1775)
New data: Mrakovica, meadow 23.08.2023. L_5 leg. M. Stanković

103. *Vilpianus galii* (Wolff, 1802)
Protić and Stanković, 2015: Kozara: Mt. Gola Planina: Spring Brezovac

XVII PLATASPIDAE
104. *Coptosoma scutellatum* (Geoffroy, 1758)
New data: Benkovac, meadow 30.08.2018. 1m 1f leg. M. Stanković

*Species new for Bosnia and Herzegovina

DISCUSSION

This paper is a continuation of studies on fauna of Heteroptera at Mt. Kozara. The previous paper (Protić and Stanković, 2015) presented Heteroptera known from the territory of Bosnia-Herzegovina, including NP Kozara, which was then represented by 49 species of Heteroptera. This paper presents the results of sampling performed in the last several years (2018, 2022 and 2023). Studies of this material have shown the presence of 83 identified species. The total number of determined species is presently 104 (Table 2). Of these, 26 species were recorded in all three stages of the research (I, II and III). The remaining 79 species were recorded either in stages I and III or in II and III (Table 2).

Table 2. List of species of Heteroptera at Mt. Kozara: I - New data, II Protić and Stanković, 2015; III - Protić, 2005 (Heteroptera of Bosnia and Herzegovina); *new for Bosnia and Herzegovina

No.	Taxon	I	II	III
	NOTONECTIDAE			
1.	*Notonecta glauca* Linnaeus, 1758	+	+	+
	GERRIDAE			
2.	*Aquarius najas* (De Geer, 1773)	+		+
3.	*Aquarius paludum paludum* (Fabricius, 1794	+		+
4.	*Gerris costae costae* (Herrich-Schaeffer, 1850)		+	+
5.	*Gerris* (*Gerris*) *lacustris* Linnaeus, 1758		+	+
6.	*Gerris (Gerris*) *thoracicus* Schummel, 1832	+		+

7.	*Limnoporus rufoscutellatus* (Latreille)*	+		
	TINGIDAE			
8.	*Catoplatus carthusianus* (Goeze, 1778)	+	+	+
9.	*Catoplatus nigriceps* Horváth, 1905*	+		
10.	*Corythucha arcuata* (Say, 1832)	+		
11.	*Corythucha ciliata* (Say, 1832)	+		
	MIRIDAE			
12.	*Adelphocoris lineolatus* (Goeze, 1778	+	+	+
13.	*Adelphocoris seticornis* (Fabricius, 1775	+		+
14.	*Adelphocoris vandalicus* (Rossi, 1790)	+	+	+
15.	*Chargochilus gyllenhalii* (Fallén, 1807)		+	+
16.	*Deraeocoris* (*Deraeocoris*) *flavilinea* (A. Costa, 1862)*	+		
17.	*Dereocoris* (*Deraeocoris*) *ruber* (Linnaeus, 1758)	+	+	+
18.	*Lygus gemellatus gemellatus* (Herrich-Schaeffer, 1835)	+	+	+
19.	*Lygus pratensis* (Linnaeus, 1758)	+	+	+
20.	*Lygus rugulipennis* Poppius, 1911		+	+
21.	*Macrotylus* (*Macrotylus*) *quadrilineatus* (Schrank, 1785)		+	+
22.	*Myrmecoris gracilis* (Sahlberg, 1848)	+		
23.	*Notostira elongata* (Geoffroy,1785)		+	+
24.	*Notostira erratica* (Linnaeus, 1758	+		+
25.	*Orthops* (*Orthops*) *basalis* (A. Costa, 1853)*	+		
26.	*Orthops campestris* (Linnaeus, 1758)	+	+	+
27.	*Orthops kalmii* (Linnaeus, 1758)	+	+	+
28.	*Phytocoris* (*Ktenocoris*) *ulmi* (Linnaeus, 1758)	+		+
29.	*Phytocoris* (*Ktenocoris*) *varipes* (Boheman, 1852)		+	+
30.	*Pithanus maerkelii* (Herrich-Schaeffer, 1839		+	
31.	*Stenodema* (*Brachystira*) *calcarata* (Fallén, 1807)		+	+
32.	*Stenodema* (*Stenodema*) *holsata* (Fabricius, 1787		+	+
33.	*Stenodema* (*Stenodema*) *laevigata* (Linnaeus, 1758)	+	+	+
34.	*Stenodema* (*Stenodema*) *virens* (Linnaeus, 1767)	+	+	+
35.	*Trigonotylus coelestialium* (Kirkaldy, 1902)	+	+	+
	NABIDAE			
36.	*Himacerus* (*Aptus*) *mirmicoides* (O. Costa, 1834)		+	+
37.	*Himacerus* (*Himacerus*) *apterus* (Fabricius, 1789		+	+
38.	*Nabis* (*Dolichonabis*) *limbatus* Dahlbom, 1851		+	+
39.	*Nabis* (*Nabis*) *brevis* Scholtz, 1846	+	+	+
40.	*Nabis* (*Nabis*) *ferus* (Linnaeus, 1758)	+	+	+
41.	*Nabis* (*Nabis*) *pseudoferus* Remane, 1949	+		
42.	*Nabis* (*Nabis*) *punctatus punctatus* A. Costa, 1847	+		
43.	*Nabis* (*Nabis*) *rugosus* (Linnaeus, 1758)	+	+	+
	ANTHOCORIDAE			
44.	*Anthocoris confusus* Reuter, 1884	Péricart, 1972; Protić, 1998		
	PYRRHOCORIDAE			
45.	*Pyrrhocoris apterus* (Linnaeus, 1758)	+		+

	REDUVIIDAE			
46.	*Phymata crassipes* (Fabricius, 1775)	+		+
47.	*Peirates hybridus* (Scopoli, 1763	+		+
	LYGAEIDAE			
48.	*Cymus claviculus* (Fallén, 1807)	+	+	+
49.	*Cymus glandicolor* Hahn, 1831	+		+
50.	*Geocoris* (*Piocoris*) *erythrocephalus* (Lepeletier & Serville, 1825)	+		+
51.	*Kleidocerys resedae resedae* (Panzer, 1797)	+		+
52.	*Lygaeus equestris* (Linnaeus, 1758)	+		+
53.	*Lygaeus simulans*, Deckert 1985*	+		
54.	*Macroplax preyssleri* (Fieber, 1837)	+		+
55.	*Metopoplax ditomoides* (A. Costa, 1843)	+		+
56.	*Nysius senecionis senecionis* (Schilling, 1829)	+		+
57.	*Nysius thymi thymi* (Wolff, 1804)	+		+
58.	*Oxycarenus* (*Euoxycarenus*) *pallens* (Herrich-Schaeffer, 1850	+		
59.	*Rhyparochromus vulgaris* (Schilling, 1829)	+		+
	BERYTIDAE			
60.	*Gampsocoris punctipes* (Germar, 1822)		+	+
	STENOCEPHALIDAE			
61.	*Dicranocephalus albipes* (Fabricius, 1781)	+		+
	RHOPALIDAE			
62.	*Corizus hyoscyami* (Linnaeus, 1758)	+	+	+
63.	*Liorhysus hyalinus* (Fabricius, 1794)	+		+
64.	*Myrmus miriformis* (Fallén, 1807)	+		+
65.	*Rhopalus* (*Rhopalus*) *distinctus* (Signoret, 1859	+		+
66.	*Rhopalus* (*Aeschyntelus*) *maculatus* (Fieber, 1836)	+	+	+
67.	*Rhopalus parumpunctatus* Schilling, 1817	+	+	+
68.	*Rhopalus subrufus* (Gmelin, 1788)	+		+
69.	*Stictopleurus abutilon* (Rossi, 1790	+	+	+
70.	*Stictopleurus punctatonervosus* (Goeze, 1778)	+	+	
	ALYDIDAE Amyot & Serville, 1843			
71.	*Alydus calcaratus* (Linnaeus, 1758)	+		+
72.	*Camptopus lateralis* (Germar, 1817)	+		+
	COREIDAE			
73.	*Coreus marginatus* (Linnaeus, 1758)	+	+	+
74.	*Coriomeris denticulatus* (Scopoli, 1763	+		+
75.	*Syromastus rhombeus* (Linnaeus, 1767)	+	+	+
	SCUTELLERIDAE			
76.	*Eurygaster maura* (Linnaeus, 1758)		+	+
77.	*Odontotarsus purpureolineatus* (Rossi, 1790)	+		+
	PENTATOMIDAE			
78.	*Aelia acuminata* (Linnaeus, 1775)	+	+	+
79.	*Aelia klugii* Hahn, 1831		+	+

80.	*Aelia rostrata* Boheman, 1852	+		+
81.	*Carpocoris pudicus* (Poda, 1761)	+	+	+
82.	*Carpocoris purpureipennis* (De Geer, 1773)	+		+
83.	*Chlorochroa juniperina juniperina* (Linnaeus, 1758)			+
84.	*Dolycoris baccarum* (Linnaeus, 1758)	+	+	+
85.	*Eurydema oleracea* (Linnaeus, 1758)		+	+
86.	*Eysarcoris fabricii* Kirkaldy, 1904	+		+
87.	*Eysarcoris ventralis* (Westwood, 1837)*	+		
88.	*Graphosoma lineatum* (Linnaeus, 1758)	+	+	+
89.	*Halyomorpha halys* (Stål, 1855)	+		
90.	*Jalla dumosa* (Linnaeus, 1758)	+		+
91.	*Neottiglossa leporina* (Herrich-Schaeffer, 1830)		+	+
92.	*Neottiglossa pusilla* (Gmelin, 1789	+		+
93.	*Nezara viridula* (Linnaeus, 1758)	+		+
94.	*Palomena prasina* (Linnaeus, 1758)	+	+	+
95.	*Pentatoma rufipes* (Linnaeus, 1758)	+	+	+
96.	*Picromerus bidens* (Linnaeus, 1758	+		+
97.	*Piezodorus lituratus* (Fabricius, 1794)	+	+	+
98.	*Rhacognathus punctatus* (Linnaeus, 1758	+		+
99.	*Rhaphigaster nebulosa* (Poda, 1761	+		+
100.	*Sciocoris (Aposciocoris) microphthalmus* Flor, 1860*	+		
101.	*Stagonomus bipunctatus* (Linnaeus, 1758)	+		+
102.	*Trolius luridus* (Fabricius 1775)	+		+
103.	*Vilpianus galii* (Wolff, 1802)		+	+
	PLATASPIDAE			
104.	*Coptosoma scutellatum* (Geoffroy, 1758)	+		+

New species for fauna of Bosnia and Herzegovina include: *Limnoporus rufoscutellatus* (Latreille); *Catoplatus nigriceps* Horváth, 1905; *Deraeocoris* (*Deraeocoris*) *flavilinea* (A. Costa, 1862); *Orthops* (*Orthops*) *basalis* (A. Costa, 1853); *Lygaeus simulans*, Deckert 1985; *Eysarcoris ventralis* (Westwood, 1837); *Sciocoris* (*Aposciocoris*) *microphthalmus* Flor, 1860.

The research activities in the area of NP Kozara were not based exclusively on collecting Heteroptera, as the second author, as an enthusiast naturalist, collected literally everything. It is also important to note that all field sampling was performed in the second half of August. This is an additional reason for the relatively small number of species, not covering the entire vegetation season.

The largest number of Heteroptera were collected in the localities of Benkovac (41 species) and Pašini Konaci (35 species). These localities are rich in plant diversity as a result of different habitats in a relatively small area.

The largest number of species was found in one or two localities. Twenty species were found in more than three localities. But, *Lygus pratensis* and *Palomena prasina* were collected in eight localities. We noticed that species from the Rhopalidae family *Rhopalus maculatus* and *Rhopalus parumpunctatus* sampled at six and eleven localities, also the number of specimens sampled is significantly higher than for other species. We assume that the reason is

Rhoplaidea are associated with many plants (weeds) and overwinters as an adult, the new generation appearing in August. Also, rhopalids prefer seeds, and in August at Kozara many plants are at the end of flowering and seed production.

The list in the chapter "Results" also includes three species collected in 2012 and 2013: *Coreus marginatus* at the site Moštanica; *Macroplax preyssleri* (Fieber, 1837) from Gola Planina-Brezovik Spring; and *Orthops kalmii* from the locality Mrakovica. Table 2 also includes the species *Chlorochroa juniperina juniperina* from the locality Mrakovica which is stored in the collection of the National Museum in Sarajevo (Protić, 1988, 1998), as well as *Anthocoris confusus* Kozara 1909. leg. V. Apfelbeck (Protić, 1998; Péricart 1972).

The list also includes five introduced invasive species: *Corythucha arcuata* (Say, 1832); *Corythucha ciliata* (Say, 1832), *Deraeocoris* (*Deraeocoris*) *flavilinea* (A. Costa, 1862) *Halyomorpha halys* (Stål, 1855) and *Nezara viridula* (Linnaeus, 1758) (Rabitsch, 2008).

Corythucha arcuata (Say, 1832) was introduced from North America to Europe (Bernardinelli and Zandigiacomo, 2000; Rabisch, 2008). First individuals in Bosnia and Herzegovina were recorded in 2017. These data were preliminarily announced at the Symposium of Entomologists of Serbia (Glavendekić and Vuković Bojanović, 2017), while more details about the records of this species may be found in the paper by Dautbašić *et al*. (2018). At Kozara, it was recorded and collected at the site Vodice in an oak forest.

Corythucha ciliata (Say, 1832) is a Nearctic species which was first introduced to Europe in Italy (Servadei, 1966). Since then, the range of this invasive species has gradually expanded so it is now present throughout Europe. At the Balkan Peninsula it was first recorded in Slovenia and the Kvarner Islands (Maceljski and Balarin 1972), followed by the broader vicinity of Belgrade (Tomić and Mihajlović, 1974), while in the following years it gradually spread southwards. Gavrilović (1980) announced appearance of this species in Bosnia and Herzegovina. In the period 1995-2009 it was recorded throughout the Republic of Srpska in locations with *Platanus* spp. The largest populations were recorded at Banja Luka, Doboj, Bijeljina and Trebinje (Mihalović and Stanivuković, 2009). At Kozara, it was recorded in 2022 at the localities Benkovac, Mrakovica and Pašini Konaci.

Deraeocoris (*Deraeocoris*) *flavilinea* (A. Costa, 1862) is another invasive alien species, new for the fauna of Bosnia and Herzegovina. The male and the female were collected at the locality Vodice. It was first recorded in Sicily (Costa, 1862) and was then considered an endemic species. However, its range gradually spread, first in 1961 to the surrounding islands, Corsica (Péricart 1965), Sardinia (Dioli, 1979), Malta (Schembri, 1993). This Mediterranean species then spread northwards due to increase of average temperatures and today it is present almost throughout Europe (Jerinić-Prodanović and Protić, 2011; Cunev and Kment, 2017; Kıyak, 2020).

Halyomorpha halys (Stål, 1855) is an invasive species, which originated in Asia and has been "conquering" Europe since 2004 (Arnold, 2009). There are numerous papers with first records of this species in each European country, while in the last several years there are also papers of analyses and ways of suppression, especially in agronomy (Wermelinger *et al*., 2008; Arnold, 2009; Wyniger and Kment, 2010; Heckmann, 2012; Callot and Brua, 2013; Haye *et al*., 2015; Milonas and Partsinevelos, 2014; Vétek *et al*., 2014; Macavei *et al*, 2015; Šeat, 2015; Gapon, 2016; Simov, 2016; Bosco *et al*., 2018; Šapina and Šerić Jelaska, 2018; Lazarevska *et al*., 2022; Rot *et al*., 2022). The first record of this species in Bosnia and

Herzegovina was from Mostar in 2018 (Zovko *et al*., 2019). At Kozara it was recorded in 2023 at the locality Mrakovica, while there were no noticeable larger populations.

Myrmecoris gracilis (Sahlberg, 1848) was recorded for the first time in Kozara in this study. The first record of this species in Bosnia and Herzegovina was from Mt. Cincar (Protić and Stanković, 2015). This is a Eurosiberian species. At Balkan Peninsula it was recorded in a relatively small number of localities.

Orthops (*Orthops*) *basalis* (A. Costa, 1853) is widely distributed in Europe, but due to lack of research it was first recorded in Bosnia and Herzegovina only in 2023, at the locality Mrakovac at Mt. Kozara.

Lygaeus simulans, Deckert 1985 is a new species for fauna of Bosnia and Herzegovina. The first record included two females collected at the locality Mrakovica in August 2022. *L. simulans* is very similar to the widely-distributed form *L. equestris*. We assume that some of the specimens labeled as *L. equestris* in the collection of the National Museum in Sarajevo belong to this other species *L. simulans*. This was already noted with the specimens in the Collection of Heteroptera at the Natural History Museum in Belgrade. The correction was published by Protić, 2018.

CONCLUSIONS

This paper is a contribution to better understanding of fauna of Heteroptera at NP "Kozara". Although the number of 104 recorded species of Heteroptera is so far the highest for the NP area, we are convinced that a much greater number of species is actually present in such diverse habitats. Maybe this paper will encourage some young researcher to continue the studies.

ACKNOWLEDGMENTS

The authors are grateful to the Managing Board of the National Park "Kozara" for allowing the multi-year research within the territory of the park, all the employees of the Park for their help during the field research, and our friend Đuro Kos for accommodation and food.

REFERENCES

Arnold, K. (2009). *Halyomorpha halys* (Stål, 1855), eine für die europäische Fauna neu nachgewiesene Wanzenart (Insecta: Heteroptera, Pentatomidae, Cappaeini). *Mitteilungen des Thüringer Entomologenverbandes* e.V, *16*, 19.

Aukema, B., & Rieger, Ch. [Eds.] (1995). *Catalogue of the Heteroptera of the Palaearctic Region*. Vol. 1. Enicocephalomorpha, Dipsocoromorpha, Nepomorpha, Gerromorpha and Leptopodomorpha. Amsterdam: The Netherlands Entomological Society. 222 pp.

Aukema, B., & Rieger, Ch. [Eds.] (1996). *Catalogue of the Heteroptera of the Palaearctic Region*. Vol. 2. Cimicomorpha I. Amsterdam: The Netherlands Entomological Society. 361 pp.

Aukema, B., & Rieger, Ch. [Eds.] (1999). *Catalogue of the Heteroptera of the Palaearctic Region*. Vol. 3. Cimicomorpha II. Amsterdam: The Netherlands Entomological Society. 577 pp.

Aukema, B., & Rieger, Ch. [Eds.] (2001). *Catalogue of the Heteroptera of the Palaearctic Region*. Vol. 4. Pentatomomorpha I. Amsterdam: The Netherlands Entomological Society. 346 pp.

Aukema, B. & Rieger, Ch. [Eds.] (2006). *Catalogue of the Heteroptera of the Palaearctic Region*. Vol. 5. Pentatomomorpha II. Amsterdam: The Netherlands Entomological Society. 550 pp.

Aukema, B., Rieger, C., & Rabitsch, W. (2013). *Catalogue of the Heteroptera of the Palaearctic Region*. Vol. 6. Supplement. Amsterdam: Netherlands Entomological Society, Ponsen & Looijen, Wageningen. 628 pp.

Bernardinelli, I., & Zandigiacomo, P. (2000). Prima segnalazione di Corythucha arcuata (Say) (Heteroptera, Tingidae) in Europa. *Informatore Fitopatologico*, *50*, 47-49.

Bosco, L., Moraglio, S. T., & Tavella, L. (2018). *Halyomorpha halys*, a serious threat for hazelnut in newly invaded areas. *Journal of Pest Science*, *91*, 661-670. https://doi.org/10.1007/s10340-017-0937-x

Bucalo, V., Brujić, J., Travar, J., & Milanović, Đ. (2007). *Flora Nacionalnog parka Kozara*. Šumarski fakultet, Univerziteta u Banjoj Luci i Regionalni zavod za upravljanje šumama i agrikulturom Pokrajine Lombardija. Banja Luka, 383 pp.

Callot, H., & Brua, C. (2013). *Halyomorpha halys* (Stål, 1855), la Punaise diabolique, nouvelle espèce pour la faune de France (Heteroptera Pentatomidae). *L'Entomologiste*, *69*(2), 69-71.

Cunev, J., & Kment, P. (2017). First record of the plant bug *Deraeocoris flavilinea* (Hemiptera: Heteroptera: Miridae) in Slovakia. *Klapalekiana*, *53*, 1-5.

Dautbašić, M., Zahirović, K., Mujezinović, O., & Margaletić, J. (2018). Prvi nalaz hrastove mrežaste stjenice (*Corythucha arcuata*) u Bosni i Hercegovini. *Šumarski list*, *142* (3-4), 179-181. https://doi.org/10.31298/sl.142.3-4.6

Derjanschi, V., & Péricart, J. (2005). *Hémiptères Pentatomoidea euro-méditerranéens*. Volume 1. Généralités. Systématique: Première partie. Faune de France n° 90. Paris: Fédération française des Sociétés de sciences naturelles. 494 pp.

Deither, M. (1986). Hétéroptères aquatiques et ripicoles (genres et principales espèces). Introduction pratique à la systématique des organismes des eaux continentals françaises 6-7. *Extraits du Bulletin mensuel de la Société Linnéenne de Lyon*, 54ème année, *10*, 2-44.

Dioli, P. (1979). Eterotteri nuovi o poco noti della fauna italiana. *Bollettino della Entomologica Italiana*, *111*, 83-86.

Gapon, D. A. (2016): First records of the brown marmorated stink bug Halyomorpha halys (Stål, 1855) (Heteroptera, Pentatomidae) in Russia, Abkhazia, and Georgia. *Entomological Review*, *96*, 1086-1088. https://doi.org/10.1134/S001387381608011X

Gavrilović, D. (1980). First appearance and distribution of the sycamore lace bug (*Corythucha ciliata* (Say)) in Bosnia and Herzegovina. *Narodni šumar 4*(4-6), 137-139.

Glavendekić, M., & Vuković Bojanović, V. (2017). Prvi nalaz hrastove mrežaste stenice *Corythucha arcuata* (Say) (Hemiptera: Tingidae) u Bosni i Hercegovini i novi nalazi u

Srbiji. In: *Book of Abstracts of XI Symposium of Entomologists of Serbia* (pp.70-71), Goč: Serbia.

Haye, T., Gariepy, T., Hoelmer, K., Rossi, J.-P., Streito, J.-C., Tassus, X., & Desneux, N. (2015). Range expansion of the invasive brown marmorated stinkbug, *Halyomorpha halys*: an increasing threat to field, fruit and vegetable crops worldwide. *Journal of Pest Science, 88*, 665-673. https://doi.org/10.1007/s10340-015-0670-2

Heckmann, R. (2012). Erster Nachweis von Halyomorpha halys (Stål, 1855) (Heteroptera: Pentatomidae) für Deutschland. *Heteropteron, 36*, 17-18.

Jerinić-Prodanović, D., & Protić, Lj. (2011). New data on true bug predators (Heteroptera: Miridae) of jumping plant-lice (Sternorrhyncha: Psylloidea) in Serbia. *Acta Entomologica Serbica 16*, 143-146.

Kıyak, S. (2020). The First Record of *Deraeocoris flavilinea* (A. Costa, 1862) (Hemiptera: Heteroptera: Miridae) as an Invasive Alien Species (IAS) in the Anatolian Peninsula (Turkey). *Journal of the Heteroptera of Turkey*, *2*(2), 69-74.

Lazarevska, S., Arsov, T., Hristovski, M., & Nacheski, S. (2022). *Halyomorpha halys* (Stål, 1855) (Pentatomidae: Hemiptera) in North Macedonia. *Journal of Agricultural Food and Environmental Sciences, 76*(7), 1-12. https://doi.org/10.55302/JAFES227670011

Lupoli, R. (2014). Identification des larves du genre *Carpocoris* en France incluant l'espèce valide *Carpocoris mediterraneus* Tamanini, 1958 (Hemiptera Pentatomidae). *L'Entomologiste, 70* (1), 51-55.

Macavei, L. I., Bâeţan, R., Oltean, I., Florian, T., Varga, M., Costi, E., & Maistrello L. (2015). First detection of *Halyomorpha halys* Stål, a new invasive species with a high potential of damage on agricultural crops in Romania. *Lucrări Ştiinţifice*, *58*, 105-108.

Maceljski, M., & Balarin, I. (1972). Novi član štetne entomofaune u Jugoslaviji-*Corythuca ciliata* (Say) -Tingidae Heteroptera. *Zaštita bilja*, *23*, 119/120, 193-205.

Mihajlović, Lj., & Stanivuković, Z. (2009). Alohtone vrste insekata šumskih i dekorativnih drvenastih biljaka u Republici Srpskoj. *Glasnik Šumarskog fakulteta Univerziteta u Banjoj Luci*, *11*, 1-26.

Milonas, P. G., & Partsinevelos, G. K. (2014). First report of brown marmorated stink bug *Halyomorpha halys* Stål (Hemiptera: Pentatomidae) in Greece. *EPPO Bulletin, 44* (2), 183-186. https://doi.org/10.1111/epp.12129

Péricart, J. (1965). Contribution a la faunis-tique de la Corse: Hétéroptères Miridae et Anthocoridae (Hem.). *Bulletin Mensuel de la Société Linnéenne de Lyon*, *34*, 377-384.

Péricart, J. (1972). *Hémipteres Anthocoridae, Cimicidae et Microphysidae del'ouest - palearctique*. Paris: Fauna del'Europe et du Bassin mediterraneen. 402 pp.

Péricart, J. (2010). *Hémiptères Pentatomoidea euroméditerranéens*. Volume 3. Podopinae et Asopinae. Faune de France n° 93. Paris, Fédération française des Sociétés de sciences vaturelles, 290 pp.

Protić, Lj. (1988). Zbirka Hemiptera-Heteroptera u Zemaljskom muzeju Bosne i Herceovine u Sarajevu. In: *Zbornik referata naučnog skupa Minerali, stijene, izumrli i živi svijet BiH* (pp. 503-507) Sarajevo: Zemaljski muzej Bosne i Hercegovine.

Protić, Lj. (1998). *Catalogue of the Heteroptera fauna of Yugoslav countries*. Part one. Belgrade: Natural History Museum. Special issue *38*, 215 pp.

Protić, Lj. (2001). *Catalogue of the Heteroptera fauna of Yugoslav countries*. Part two. Belgrade: Natural History Museum. Special issue *39*, 1-272

Protić, Lj. (2005). Popis Heteroptera Bosne i Hercegovine. *Prilozi Fauni Bosne i Hercegovine, 1*, 33-68.

Protić, Lj. (2018). New Heteroptera in Serbia. *Bulletin of the Natural History Museum, 11*, 215-226. DOI: 10.5937/bnhmb1811215P

Protić, Lj., & Stanković, M. (2015). New research on the fauna of Heteroptera in Bosnia-Herzegovina. *Acta Entomologica Serbica, 20*, 13-28. https://doi.org/10.5281/zenodo.45390

Rabisch, W. (2008). Alien True Bugs of Europe (Insecta: Hemiptera: Heteroptera). *Zootaxa, 1827*, 1-44. DOI: 10.11646/zootaxa.1827.1.1

Ribes, J., & Pagola-Carte, S. (2013). *Hémiptères Pentatomoidea euro-méditerranéens*. Volume 2. Pentatominae (suite et fin). Faune de France n°96. Paris: Fédération française des Sociétés de sciences naturelles. 423 pp.

Rot, M., Maistrello, L., Costi, E., & Trdan, S. (2022). Biological Parameters, Phenology and Temperature Requirements of *Halyomorpha halys* in the Sub-Mediterranean Climate of Western Slovenia. *Insects, 13*(10), *956*, 1-15. https://doi.org/10.3390/insects13100956

Schembri, S. (1993). An annotated catalogue of the heteropteran bugs of the Maltese Islands (Heteroptera). *Memorie della Società Entomologica Italiana, 71* (II), 467-503

Servadei, A. (1966). Un Tingide neartico comparso in Italia (*Corythuca ciliata* Say). *Bollettino della Società entomologica italiana*, *96*, 94-96.

Simov, N. (2016). The invasive brown marmorated stink bug *Halyomorpha halys* (Stål, 1855) Heteroptera: Pentatomidae) already in Bulgaria. *Ecologica Montenegrina, 9*, 51-53. DOI: https://doi.org/10.37828/em.2016.9.8

Stichel, W. (1955-1962). *Illustrierte Bestimmungstabellen der Wanzen. II. Europa* (*Hemiptera-Heteroptera Europae*). Berlin-Hermsdorf, Eigenverlag: Bd. 1-4, 168+907+428+838.

Šapina, I., & Šerić Jelaska, L. (2018). First report of invasive brown marmorated stink bug Halyomorpha halys (Stål, 1855) in Croatia. *EPPO Bulletin, 48*(1), 138-143. https://doi.org/10.1111/epp.12449

Šeat, J. (2015). *Halyomorpha halys* (Stål, 1855) (Heteroptera: Pentatomidae) a new invasive species in Serbia. *Acta Entomologica Serbica*, 20, 167-171. https://doi.org/10.5281/zenodo.45391

Tomić, D., & Mihajlović, Lj. (1974). Američka mrežasta stenica (*Corythucha ciliata* Say - Heteroptera, Tingidae) nov ozbiljan neprijatelj platana u Beogradu. *Šumarstvo, 7/9*, 51-54. Beograd.

Vétek, G., Papp, V., Haltrich, A., & Rédei, D. (2014) First record of the brown marmorated stink bug, *Halyomorpha halys* (Hemiptera: Heteroptera: Pentatomidae), in Hungary, with description of the genitalia of both sexes. *Zootaxa, 3780*, 194-200. DOI: 10.11646/zootaxa.3780.1.8

Wagner, E. (1974a). Die Miridae Hahn, 1831, des Mitelmeerraumes und der Makaronesischen Inseln (Hemiptera, Heteroptera). Teil. 1. *Entomologische Abhandlungen, 37*, 484 pp.

Wagner, E. (1974b). Die Miridae Hahn, 1831, des Mittelmeerraumes und der Makaronesischen Inseln (Hemiptera, Heteroptera). Teil 2. *Entomologische Abhandlungen Staatlichen Museum für Tierkunde in Dresden, 39*, 421pp.

Wagner, E. (1975). Die Miridae Hahn, 1831, des Mittelmeerraumes und der Makaronesischen Inseln (Hemiptera, Heteroptera). Teil 3. *Entomologische Abhandlungen Staatliches Museum für Tierkunde Dresden*, *40*, 483 pp.

Wagner, E., & Weber, H. H. (1964). *Faune de France*: Heteropteres Miridae, Paris, Federation Francaise drs Societes de Sciences Naturelles, *67*, 592 pp.

Wermelinger, B., Wyniger, D. & Forster, B. (2008). First records of an invasive bug in Europe: *Halyomorpha halys* Stål (Heteroptera: Pentatomidae), a new pest on woody ornamentals and fruit trees? *Mitteilungen der Schweizerischen Entomologischen Gesellschaft Bulletin de la Société Entomologique Suisse*, *81*, 1-8. https://doi.org/10.5169/seals-402954

Wyniger, D., & Kment, P. (2010). Key for the separation of *Halyomorpha halys* (Stål) from similar-appearing pentatomids (Insecta: Heteroptera: Pentatomidae) occuring in Central Europe, with new Swiss records. *Mitteilungen der Schweizerischen Entomologischen Gesellschaft*, *83*, 261-270.

Zovko, M., Ostojić, I., Jurković, D., & Karić, N. (2019). First report of the brown marmorated stink bug, *Halyomorpha halys* (Stål, 1855) in Bosnia and Herzegovina. *Radovi Poljoprivredno Prehrambenog Fakulteta Univerziteta u Sarajevu\Works of the Faculty of Agricultural and Food Sciences University of Sarajevo*, *64*(69), 68-78.

PRILOG POZNAVANJU FAUNE HETEROPTERA NACIONALNOG PARKA KOZARA

Ljiljana Protić[1*], Mihajlo Stanković[2]

[1]*Prirodnjački muzej, Njegoševa 51, 11000 Beograd, Srbija*
[2]*Pokret gorana Sremska Mitrovica, Svetog Save 19, 22000 Sremska Mitrovica, Srbija*
***Autor za korespondenciju:** ljilja.protic@gmail.com

Sažetak

Ovaj rad uključuje popis od 104 vrste heteroptera zabilježenih u NP Kozara. Ovo je prvi put da se objavljuju podaci o primjercima prikupljenim u avgustu 2018., 2022. i 2023 godine. Utvrđeno je sedam novih vrsta za faunu Heteroptera Bosne i Hercegovine: *Limnoporus rufoscutellatus* (Latreille); *Catoplatus nigriceps* Horváth, 1905; *Deraeocoris* (*Deraeocoris*) *flavilinea* (A. Costa, 1862); *Orthops* (*Orthops*) *basalis* (A. Costa, 1853); *Lygaeus simulans*, Deckert 1985; *Eysarcoris ventralis* (Westwood, 1837); *Sciocoris* (*Aposciocoris*) *microphthalmus* Flor, 1860. Identifikovano je i pet introdukovanih, invazivnih vrsta: *Corythucha arcuata* (Say, 1832); *Corythucha ciliata* (Say, 1832), *Deraeocoris* (*Deraeocoris*) *flavilinea* (A. Costa, 1862) *Halyomorpha halys* (Stål, 1855) i *Nezara viridula* (Linnaeus, 1758).

Ključne riječi: Heteroptera, planina Kozara, Bosna i Hercegovina

Received June 19, 2024
Accepted August 22, 2024