

New records of two grass species of the tribe *Andropogoneae* (*Poaceae*) in Bosnia and Herzegovina

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Abstract. The vicinity of Neum in South Bosnia and Herzegovina is the only Mediterranean part of the country with about 24 km of coastline. Although the area has been floristically studied in the past, two grass species have been recently registered as new to the flora of the country: *Heteropogon contortus* (L.) Roem. & Schult. and *Hyparrhenia hirta* (L.) Stapf. Although both species are relatively common in the Mediterranean region of Europe, here they are quite rare due to the lack of suitable habitats. New localities of *H. contortus* and *H. hirta* in Bosnia and Herzegovina are reported.

Key words: Bosnia and Herzegovina, *Heteropogon contortus*, *Hyparrhenia hirta*, Neum area, new floristic records

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Introduction

The tribe *Andropogoneae* (*Poaceae*) includes about 87 genera and 1060 species (Barkworth 2003). In the Euro-Mediterranean region, 24 genera and 55 species have been recorded so far (Valdés & Scholz 2009). In the flora of Bosnia and Herzegovina (BiH), only ten species of the tribe *Andropogoneae* are known: *Andropogon distachyos* L., *Bothriochloa ischaemum* (L.) Keng, *Chrysopogon gryllus* (L.) Trin., *Heteropogon contortus* (L.) Roem. & Schult., *Hyparrhenia hirta* (L.) Stapf, *Miscanthus sinensis* Andersson, *Sorghum bicolor* (L.) Moench, *Sorghum halepense* (L.) Pers., *Tripidium strictum* (Host) H. Scholz, and *Zea mays* L. (Beck-Mannagetta

1903, Kutleša & Lakušić 1964, Maslo 2016, Maslo & al. 2019, Sarajlić, 218/219, Milanović, 2019).

Although the area is quite small, the Mediterranean part of BiH is very important for the plant biodiversity of the country, because truly Mediterranean plants and their vegetation can be found only here in BiH. Even under these circumstances, the area has not been systematically studied after Kutleša & Lakušić (1964), who dealt with the flora and vegetation of the Klek Peninsula, and Jovančević (1964), who presented the dendroflora of the evergreen part of Herzegovina. After these works, only a few articles contributing to the flora of the region were published (Šilić 1973, Milanović 2019, Milanović & al. 2022, Stešević & al. 2022).

This paper presents new localities for two species of the tribe *Andropogoneae* (*Heteropogon contortus* (L.) Roem. & Schult. and *Hyparrhenia hirta* (L.) Stapf) in the flora of BiH.

Material and methods

The material is based on the study of literature data and on data collected in the field in the vicinity of the town of Neum, in the coastal zone of BiH, in the period 1999-2019. The specimens were collected and stored in the Herbarium of the National Museum of Bosnia and Herzegovina, in the private collection of Đ. Milanović and the Herbarium of the Faculty of Forestry of the University of Banja Luka. Identification is based on Tutin & al. (2002), while nomenclature follows Valdés & Scholz (2009).

All records of the target species are presented as follows: name of locality with WGS1984 coordinates recorded in the field by GPS device, label of MGRS 10×10 km square modified for mapping of the *Flora of Europe* (Kurto & al. 2004), designation and numeration of the available herbarium material with date of collection, name of legator, elevation, as well as population size observed in the field. Maps were created using QGIS software, with localities represented by different symbols and numbers corresponding to numeration of the records within the text.

Results and discussion

Heteropogon contortus (L.) Roem. & Schult. (Synonyms: *Andropogon contortus* L.; *Heteropogon allionii* (DC.) Roem. & Schult.). The species is recorded in the following localities (Figure 1):

1. *Locality*: Prisoje under Marin Vijenac near Neum, near the western border crossing to Croatia (42.934711°N, 17.5882°E), MGRS YH15. *Material*: SARA 51974, 28 July 1999, 20 m, leg. S. Maslo. *Population*: only two individuals have been recorded. The habitat was subsequently destroyed during the construction of border cottages in the same year.
2. *Locality*: Tanko Sedlo on the Klek Peninsula, along

the path to Feral Beach in the southern part of the Peninsula (42.917835°N, 17.594343°E), MGRS YH15. *Material*: ĐM 21/01-008/001, 13 October 2017, 40 m, leg. Đ. Milanović. *Population*: ca 50 individuals scattered along the path.

3. *Locality*: below Orlov Kuk on the Klek Peninsula, in semi-open arborescent matorral with *Juiperus* sp. (42.909882°N, 17.61403°E), MGRS YH15. *Material*: observation by Đ. Milanović, 15 June 2018, 50 m. *Population*: ca 30 recorded individuals scattered across the stand.
4. *Locality*: below Debeli Brijeg on the Klek Peninsula, in fragmented former pastures with domination of tall grasses *Heteropogon contortus*, *Hyparrhenia hirta* and *Chrysopogon gryllus* (42.903043°N, 17.635048°E), MGRS YH15. *Material*: ĐM 21/01-008/002, 15 June 2018, 50 m, leg. Đ. Milanović. *Population*: several hundred individuals dominating the pasture.

Heteropogon contortus (Fig. 2) is easily recognizable due to flattened culms, solitary or few spike-like racemes awned only in the upper part, with long (5-10 cm) dark brown awns, often twisted together (Clayton & al. 2006).

Heteropogon contortus is probably native to the Eastern Hemisphere but is now found in tropical and subtropical grassland across the world (Barkworth 2003). According to Valdés & Scholz (2009), the species has been recorded in most West Mediterranean countries, extending locally to Switzerland, but its absence in the East Mediterranean region is noticeable. In the West European region, *H. contortus* is known from France (Tison & de Foucault 2014), Spain (Paunero 1958), Italy (Pignatti 1982), and Switzerland (Hess & al. 1976). In the Balkans, *H. contortus* has been known only from Croatia (Nikolić 2000) and was very recently found in Montenegro (Hadžiablahović 2010) and Albania (Barina & al. 2018).

The species was mentioned earlier as new to BiH only in the Book of Abstracts of 13th SFSES Symposium (Symposium on the Flora of Southeast Serbia and Neighbouring Regions) (Milanović 2019). *Heter-*

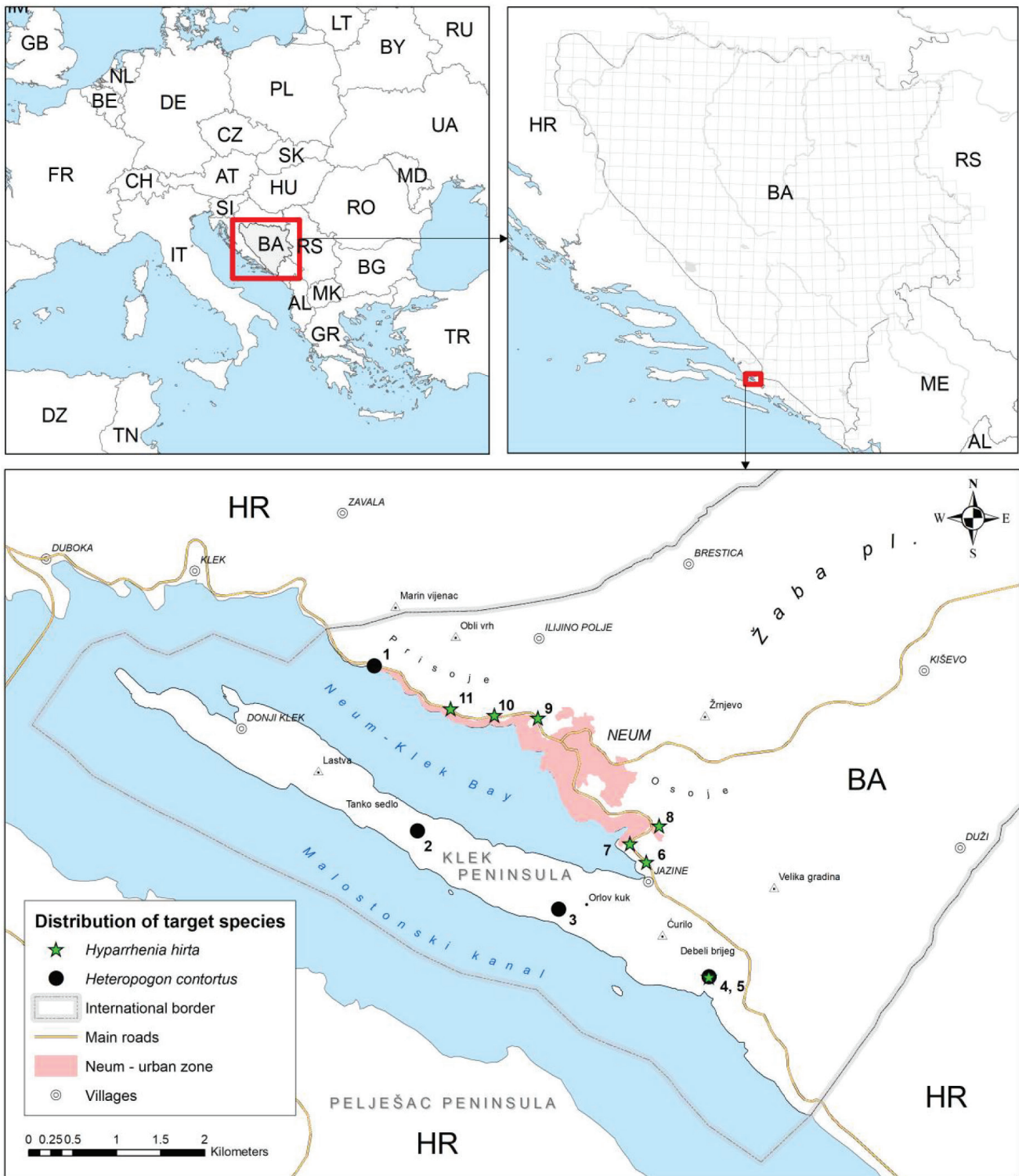


Fig. 1. Distribution of *Heteropogon contortus* and *Hyparrhenia hirta* in the Mediterranean part of Bosnia and Herzegovina. The international border is shown only provisionally, as it is the subject of dispute between BiH and Croatia.



Fig. 2. *Heteropogon contortus* from Klek Peninsula: upper part of stem with inflorescence and spikelet (Photograph: Đ. Milanović).

opogon contortus grows in tall rocky Mediterranean perennial grasslands, on slopes and in semi-ruderal places along roads (rocky grasslands on cuts and embankments), which are now very restricted and fragmented, and are in succession towards zonal arborescent matorral with *Juniperus* sp. and/or evergreen macchia of *Quercus ilex*. This indicates that the species is under severe pressure in the area due to overgrowth and urbanisation.

Hyparrhenia hirta (L.) Stapf, (Synonyms: *Andropogon hirtus* L.; *Cymbopogon hirtus* (L.) Thomson) is a widespread species along the Adriatic coast from Italy to Albania, and was very recently found in Bosnia and Herzegovina (Sarajlić, 2018/219). Near the town of Neum, the species is not rare and along the main road Dubrovnik-Opuzen it is almost continuously distributed in a linear distance of about 8 km. Some confirmed micro-localities are listed here (Fig. 1):

Locality: below Debeli Brijeg on the Klek Peninsula, fragmented former pastures with domination of tall grasses *Heteropogon contortus*, *Hyparrhenia hirta* and *Chrysopogon gryllus* (42.903043°N, 17.635048°E), MGRS YH15. *Material*: observation by Đ. Milanović, 15 June 2018, 40 m. *Population*: only a few individuals along a path.

Locality: Jazine, on the rock surfaces and road cuts on the booth side of the main road E 65 (42.914772°N, 17.626251°E), MGRS YH15. *Material*: ĐM 21/01-009/002, 09 May 2010, 40 m, leg. Đ. Milanović. *Population*: several hundred individuals.

Locality: between Neum and Klek, along the road (42.916655°N, 17.623969°E), MGRS YH15. *Material*: SARA 50479, 01 August 1999, ca 50 m, leg./det. Č. Šilić. *Population*: no data.

Locality: under Crkvice near Neum, on the booth side of the main road (42.918515°N, 17.628019°E),

MGRS YH15. *Material*: observation by S. Maslo, 29 June 2018, 40 m, leg. S. Maslo. *Population*: only a few individuals.

Locality: above Polače near Neum, above the road (42.929494°N, 17.611067°E), MGRS YH15. *Material*: observation by S. Maslo, 29 June 2018, 40 m, leg. S. Maslo. *Population*: several hundred individuals.

Locality: below Prisoje, above the road (42.929722°N, 17.604995°E), MGRS YH15. *Material*: observation by S. Maslo, 29 June 2018, 40 m, leg. S. Maslo. *Population*: only a few individuals.

Locality: below Prisoje, above the road (42.930374°N, 17.598922°E), MGRS YH15. *Material*: SARA 51975, 28 July 1999, 30 m, leg. S. Maslo. *Population*: only a few individuals.

Hyparrhenia hirta is a tall caespitose perennial, with usually branched stems which can be recognized by paired racemes, 2-4 cm long, and awned spikelets (Clayton 1969) (Fig. 3).

Hyparrhenia hirta is native and widespread in the Mediterranean area and E&S Africa, extending across the Middle East to Afghanistan and Pakistan. It is introduced in Australia and America (Clayton 1969, McArdle & al. 2004). According to Valdés & Scholz (2009), the species has been recorded in most Mediterranean countries. In the West European region, *H. hirta* is known from France (Tison & de Foucault 2014), Spain (Paunero 1958), Italy (Pignatti 1982), and Portugal (Díez-Garretas & Asensi 2002). So far, *H. hirta* has been reported in the Balkans from Montenegro (Pulević 2005), Albania (Barina & al. 2018), Greece (Dimopoulos & al. 2013), Croatia (Nikolić 2000), Bosnia and Herzegovina (Sarajlić, 218/219), and Turkey (Mill 1985).

H. hirta grows along the roads and possibly in other ruderal places in the area, and there are no declines nor extreme fluctuations in its populations in the vicinity of Neum.



Fig. 3. *Hyparrhenia hirta* from the vicinity of Neum: stem and inflorescence (Photograph: S. Maslo).

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