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Usage value of weeds of the city of Mostar (Bosnia and Herzegovina)

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SUMMARY

Plants that are not intentionally cultivated by humansare called weeds, and they have existed alongside agriculture since prehistoric times. Despite many negative effects attributed to weeds, in the past they were important for surviving famine and were also used for medicinal purposes. Weed species also provide nectar for bees and serve as a food source for birds and domestic animals. A floristic survey of weed species was conducted in the area of the city of Mostar (Federation of Bosnia and Herzegovina, Bosnia and Herzegovina) during the vegetation period of 2022 and 2023. The survey recorded 85 weed species growing in this area,classified into 21 families. A taxonomic analysis of weed species recorded in the area of the city of Mostar shows a dominance of the Poaceae family with 31 weed species (36%). This is followed by the Asteraceae family with 15 weed species (18%), the Polygonaceae family with eight weed species (9%) and the Amaranthaceae family with seven weed species (8%), while other families are less represented. Annual plants dominate, and the spectrum of life forms is dominated by therophytes, with 50 weed species (59%). Based on their usege value, the most numerous weed species are those used for food (25%) and medicinal purposes (24%), followed by weeds used as fodder, ornamental, and honey-bearing species. Many weed species have multiple uses.

Keywords: weeds, usage value, medicinal properties, nutrition, city of Mostar.

INTRODUCTION

The European Weed Research Society (EWRS) defines a weed as "a plant or vegetation that is in conflict with human interests" in the way that it competes with cultivated plants for space, nutrients, water, light and other factors of growth and development. The concept of weeds can be defined in several ways, and it can be said that the definition of weeds is the result of subjective human standards. Hulina (1998) defines weeds as ubiquitous, and that beyond their global distribution, they have a pronounced ability to self-maintain. They are able to sprout under different pedo-climatic conditions, progress rapidly through growth and development phases, and produce seeds similar in mass and shape to those of cultivated plants. Additionally, their seeds are able to control their sprouting periods through dormancy.

In addition to their numerous negative effects, weeds also possess many positive values, such as their medicinal properties, as the medicinal properties of many weed species are used to combat health problems (*Stellaria media, Arctium lappa, Rumex acetosa, Artemisia* spp.*, Equisetum arvense* and others). They can also be very good soil indicators because some species grow only on soils of certain characteristics, thereby indicating fertility, soil structure, pH and quality in general. Emerson (1836) states that a weed is a plant whose virtues have not yet been discovered.

Weeds can serve as food and medicine, as well as bee pasture, fodder, litter, and more. They can be industrial raw materials and a source of natural dyes, they can be used as bio-opesticides, they can affect the uptake of water and nutrients. Also, they can influence the prevention of crusting, influence the increase of organic matter and microbiological activity in the soil, they can serve as mulch and compost. Weeds are food for numerous insects, and contribute to the wealth of flora and fauna. By observing the production area and assessing the most widespread weeds, we can determine soil pH, soil fertility and soil structure. The aim of this work was to investigate the flora of weeds in the area of the City of Mostar and to examine their utility values.

MATERIAL AND METHODS

During the growing seasons of 2022 and 2023, field research was conducted across the territorry of the City of Mostar. The material collected through floristic research of weed species growing in this area was herbarized, photo-documented and determined at the Faculty of Agriculture and Food Technology of the University of Mostar. Common keys and iconographies were used to determine the observed plant species: Bonnier (1962), Domac (1994), Javorka and Csapody (1934), Keble Martin (1972), Knežević (2006), Kojić (1986), Kovačević (1976). Plant species, genera and families are listed in the list of flora in alphabetical order within higher systematic categories.

The nomenclature of plant taxa is harmonized according to the Flora Croatica Database (Nikolić, 2017). For each plant species, the life form, duration of life and categories of its

usage value are listed. Life forms were determined according to Garck (1972), Pignatti (2002) and FCD (Nikolić, 2017). Abbreviations for life forms were used: H – Hemicryptophyta; T – Therophyta; G – Geophyta; P – Phanerophyta; Ch – Chamaephyta; Hy – Hydrophyta. For their life span, four categories have been distinguished, which are indicated by the following abbreviations: a – annual plant taxa, b – biennial plant taxa, herb. p – herbaceous perennials, p – perennial species.

RESULTS AND DISCUSSION

In the area of the city of Mostar (Federation of Bosnia and Herzegovina, Bosnia and Herzegovina) during the vegetation period of 2022 and 2023, a floristic survey of weed species was conducted. The research recorded 85 weed species that grow in this area and are classified into 21 families (Table 1).

Table 1. Weeds of the city of Mostar

	Usage value									
Family	**Life form**	**Duration of life**	**Nutrition**	**Medicinal**	**Spice**	**Honey-bearing**	**Decorative**	**Poisonous**	**Forage**	**Other usage values**
AMARANTHACEAE										
Amaranthus albus L.	T	a.	+						+	- obtaining yellow and white color
Amaranthus caudatus L.	T	a.	+	+					+	- obtaining a red color
Amaranthus deflexus L.	T	a.		+			+	+		
Amaranthus hybridus L.	T	a.	+	+			+			
Amaranthus graecizans L.	T	a.	+	+					+	- plant ash can be used as a substitute for salt
Amaranthus retroflexus L.	T	a	+	+	+		+			- composting and green manure - indicator of nitrogen in the soil
Atriplex patula L.	T	a	+	+				+		
APIACEAE										
Bifora radians M.Bieb	T	herb. p.	+	+		+				- insecticide
Daucus carota L. ssp. *carota*	H	b.	+	+	+	+			+	
ASTERACEAE										
Anthemis arvensis L.	T	a/b		+		+	+			

Ambrosia artemisiifolia L.	H	a.					+		+	- biocide against snails - means for phytoremediation - bird food
Arctium lappa L.	H	b.	+	+		+				- cosmetics
Artemisia vulgaris L.	H	herb. p.		+	+	+				- biocidal action against insects, fungi and nematodes - indicator of potassium in the soil
Bellis perennis L.	H	herb. p.	+	+	+	+	+			- cosmetics
Cirsium arvense (L) Scop.	G	herb. p.		+		+				- to alleviate compacted soils
Erigeron annuus (L.) Pers.	H	herb. p.		+		+	+			- indicator of nitrogen in the soil
Erigeron bonariensis L.	H	a.		+			+		+	
Erigeron canadensis L.	H	a.	+	+						- repellent
Galinsoga parviflora Cav.	T	a.	+	+	+					- soil fertility indicator
Matricaria chamomilla L.	T	a.	+	+						- cosmetic industry
Senecio vulgaris L.	T	a.	+	+		+	+	+		- bird food
Solidago gigantea Ait.	H	p.				+	+			- fabric dye
Sonchus arvensis L.	T	p.	+			+				
Taraxacum officinale F. H. Wigg	H	herb. p.	+	+	+	+				- substitute for coffee
BORAGINACEAE										
Myosotis sylvatica Ehrh.	H	a./b.		+		+	+			- cosmetic industry - antierosive effect
Symphytum officinale L.	H	herb. p.		+		+			+	- veterinary medicine - homeopathic treatment
BRASSICACEAE										
Capsella bursa-pastoris L.	T	a.	+	+	+					- bird food - mosquito bait
Raphanus raphanistrum L.	T	a.				+		+		- source of genes
Sinapis arvensis L.	T	a.	+		+		+	+	+	- oil for machine lubrication - soap making
CARYOPHYLLACEAE										
Stellaria media (L) Vill	T	a.	+	+	+		+			- fertilizer - improvement of mulch
CHENOPODIACEAE										
Chenopodium album L.	T	a.	+	+				+	+	- food for wild animals
Chenopodium polyspermum L.	T	a.	+	+				+		

CONVOLVULACEAE										
Convolvulus arvensis L.	H	herb. p.	+	+		+	+	+	+	- obtaining color
EQUISETACEAE										
Equisetum arvense L.	G	a.	+	+						- polishing pewter items and wood - insecticide against moths, mites and red spider mite
FABACEAE										
Vicia sativa L.	T	a/b	+	+					+	
LAMIACEAE										
Lamium purpureum L.	T	a/b	+	+		+				- soil cover
Mentha arvensis L.	H	p.		+	+	+				- cosmetic industry - repellent
MALVACEAE										
Abutilon theophrasti Medik.	T	a.	+			+				- textile industry
PAPAVERACEAE										
Papaver rhoeas L.	T	a.	+	+		+	+	+		- coloring of liquor
PLANTAGINACEAE										
Plantago lanceolata L.	H	herb. p.	+	+		+				- natural laxative - indicates low calcium levels
POACEAE										
Agrostis stolonifera L.	H	p.					+		+	- shading the golf course
Alopecurus myosuroides Huds.	T	a.							+	
Alopecurus rendlei Eig.	T	a.					+		+	- soil stabilizer
Anthoxanthum odoratum L.	T	p.	+	+			+			- aromatization of tobacco, drinks, perfumes and laundry - rat poison
Arrhenatherum elatius (L.) P.Beauv.	H	p.		+					+	
Avena fatua L.	T	a.	+						+	- genetic resource - substitute for coffee
Avena sterilis L.	T	a.	+						+	- substitute for coffee - mulch
Bromus arvensis L.	T	a.							+	- antierosive effect - indicator of soil fertility
Bromus erectus Hudson	H	p.							+	- genetic resource
Bromus commutatus Sch.	T	a/b					+			

Bromus inermis Less.	H	a.					+	- antierosive effect
Bromus madritensis L.	T	a.			+		+	- antierosive effect
Cynodon dactylon (L.) Pers.	G	herb. p.		+			+	- antierosive effect - shading of decorative and golf courses
Digitaria ciliaris (Retz.) Koeler	T	a.	+	+			+	- antierosive effect
Digitaria sanguinalis (L.) Scop	T	a.	+	+			+	- antierosive action - raw material for obtaining cellulose
Echinochloa crus-galli (L.) P.Beauv.	T	a.	+					- indicator of soil fertility with nitrogen
Elymus caninus (L.) L.	H	herb. p.	+	+				- source of genes
Elymus hispidus (Opiz.) Melderis	H	p.			+			- antierosive effect - bird food
Eleusine indica (L.) Gaertn.	T	a.	+					- for obtaining cellulose - covering lawns and golf courses
Elymus repens (L.) Gould	G	p.	+	+			+	- coffee substitute - stabilization of steep slopes and sandy soil areas
Lolium perenne L.	H	p.			+		+	- prevention of soil erosion
Lolium spp.						+	+	- prevention of soil erosion
Panicum capillare L.	T	a.	+	+	+	+		- natural laxative - antierosive effect
Poa annua L.	T	a/b					+	- indicates a low content of calcium and humus in the soil
Poa bulbosa L.	H	p.					+	- food for small mammals and birds - erosion control
Paspalum dilatatum Poiret in Lam.	T	p.				+	+	- bird food - erosion control
Paspalum paspalodes (Michx.) Scribn.	G	p.					+	- mulch - bird food - erosion control
Setaria glauca L. P. Beauv	T	a.	+					- the seeds are used to make flour
Setaria viridis L.	T	a.	+					
Setaria italica L.	T	a.	+				+	- bird food - green fertilization
Sorghum halepense (L.) Pers.	H	p.	+	+			+	- making sorghum brooms - indicator of nitrogen in the soil
POLYGONACEAE								

Fallopia convolvulus (L.) Á.	T	a.	+	+						- addition of flour - bird food
Polygonum aviculare L.	T	a.	+	+				+		- greening - bird food - biocide for fleas
Polygonum persicaria L.	T	a.	+	+		+		+	+	- getting a yellow color
Rumex acetosa L.	H	herb. p.	+	+	+			+		- stain remover - obtaining color
Rumex crispus L.	H	p.	+	+				+		- obtaining colors for fabric (yellow, dark green, brown, gray) - insecticide
Rumex conglomeratus Murray	H	a/b	+	+						- getting dark green to brown and dark gray color
Rumex obtusifolius L.	H	herb. p.	+	+				+	+	- getting color (yellow, green, brown)
Rumex pulcher L.	T	p.	+						+	
RANUNCULACEAE										
Ranunculus arvensis	T	a.						+		
RUBIACEAE										
Galium aparine L.	T	a.	+	+						- substitute for coffee or tea - to obtain a red color - in the past it was used to make milk strainers and mattress fillings
SCROPHULARIACEAE										
Veronica persica Poir.	T	a.	+	+		+	+			
SOLANACEAE										
Solanum nigrum L.	T	a.	+	+				+		- Soil nitrogen indicator
URTICACEAE										
Urtica dioica L.	H	herb. p.	+	+				+		- dyeing - compost - textile industry - insecticide and repellent
Urtica urens L.	T	a.	+	+						- production of fabrics, paper and paints

Accorvding to the number of species, the most represented family is Poaceae with 31 weed species (36%). Holm et al. (1997) claim that of the 76 most problematic weeds in the world, 36 of them, i.e. 40%, belong to the Poaceae family. Next comes the Asteraceae family with 15 weed plants (18%), the Polygonaceae family with eight weed species (9%), and the Amaranthaceae family with seven weed species (8%). Other families are less represented (Figure 1). Dujmović

Purgar (2010) stated that 81 weed species from 27 families were recorded in the Plešivica Hills. According to the number of species, the most abundant were the Asteraceae family (11 species) and the Poaceae family (10 species), which reflects the influence of the indigenous flora and the biological and ecological characteristics of the families themselves (flower and fruit structure, widespread distribution, high seed production, growth that facilitates space conquest, widespread distributed species). Dujmović Purgar (2010) states that the most numerous genera are *Poa*, *Polygonum* and *Ranunculus*, with three species each.

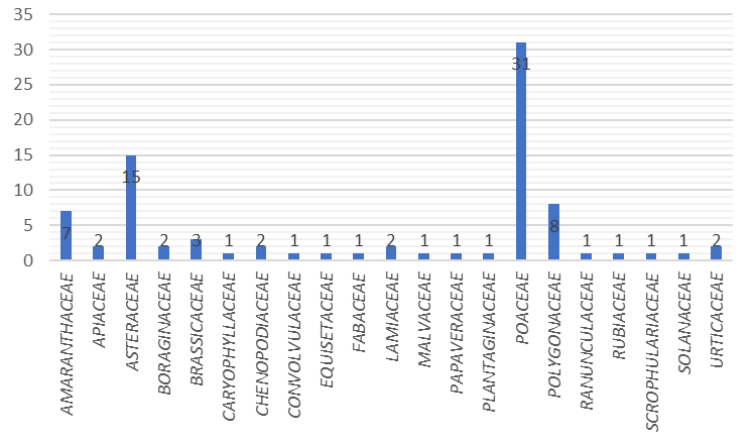

Figure 1. Representation of families of weed species in the city of Mostar.

According to the life form of the weed species, in the area of the city of Mostar (Figure 2), therophytes dominate with 50 weed species, while hemicryptophytes are represented with 29 weeds (35%). Geophytes have the lowest representation with five weed species (6%). A

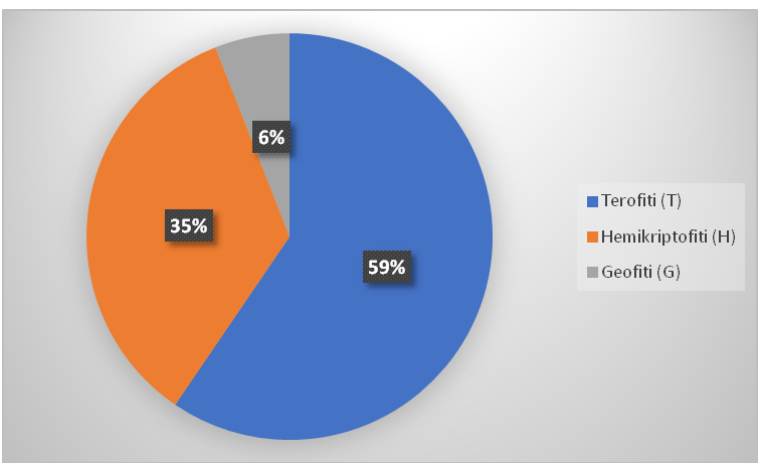

Figure 2. Spectrum of life form of weed species in the city of Mostar.

similar high proportion of therophytes is also shown by research on pastures in the area of Istria (Šugar et al., 2005), as they are an indicator of the thermophilic habitats.

The dominance of therophytes indicates that annual weeds dominate. Based onlifespan data of weed species recorded in the city of Mostar, annual weeds are represented by 45 plant species, followed by perennial weeds with 16 weed species and herbaceous perennials with 14 weed species. The lowest representation is observed in biennial weeds and in weeds that are either annual or biennial (Figure 3).

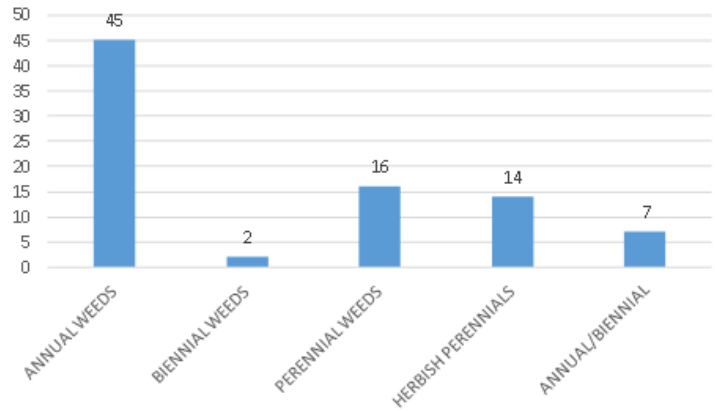

Figure 3. Lifespan of recorded weed species.

According to their usage values, weeds can be used for various purposes, as food, medicinal planta, fodder, decorative, honey-bearing, but also poisonous plants. In the area of the city of Mostar, weed species that are used for food (25%) and as medicinal plants (24%) are the most prevalent, followed by weeds that are used as fodder (16%), ornamental species (11%) and honey-bearing species (10%) (Figure 4).

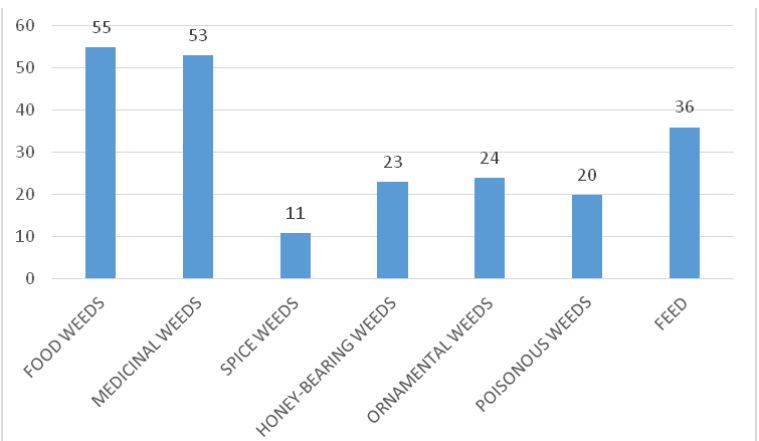

Figure 4. Usage values of weed species.

Many weed species have multiple additional uses and are used in the textile, cosmetic, and pharmaceutical industries. They also serve as indicators of soil fertility, act as insecticides, and contribute to erosion prevention (Table 1).

CONCLUSION

During this research, 85 weeds were recorded in the city of Mostar, and classified into 21 families. As expected, Poaceae family had the highest representation with 31 weed species, followed by Asteraceae family with 15 weed species. The dominance of therophytes indicates the dominance of annual weeds. In the area of the city of Mostar, weed species that are used for food (25%) and as medicinal plants (24%) are the most represented, followed by weeds that are used as fodder (16%), ornamental species (11%) and honey-bearing species (10%). This work can provide information about the useful value of weed plants in the city of Mostar and encourage additional interest among the local population in their utilization.

REFERENCES

Bonnier, G.: Flore comleete illustree en Couleurs de France. Suisse et Belgique 1-12. Paris. Neuchatel et Bruxelles, 1962.

Domac, R.: Flora of Croatia: a manual for determining plants. School Book, Zagreb, 1994.

Dujmović Purgar, D.: Weed flora of the gardens of the Plešivica Prigorje (NW Croatia). Agronomic newsletter 2-3, 2010.

Emerson, R. W.: Nature. James Munroe and Company, Boston, 1836.

Garcke, A.: Illustrierte Flora. Deutschland und angrenzende Gebite. Gefasskryptogamen und Blutenpflanzen. Verlag Paul Parey, Berlin – Hamburg, 1972.

Holm, L. G., Pancho, J. V., Herberger, J. P., Plunknett, D. L.: A geographical atlas of world weeds. Krieger Publishing Company, Malabar, 1991.

Hulina, N.: Weeds. School book, Zagreb, 1998.

Javorika, S., Csapody, V.: A magyar flora Kepekben (Iconographia Flore Hungaricae. Studium Budapest, 1934.

Keble Martin, W.: The Concise British flora in colour. Book Club Associates, London, 1972.

Knežević, M.: Atlas of weedy, ruderal and grassland flora. University of Osijek. Faculty of Agriculture, Osijek, 2006.

Kojić, M.: Small weed flora, manual for determining weedy and ruderal plants. Scientific book, Belgrade, 1986.

Kovačević, J.: Weeds in agriculture. Publishing House Zjoden, Zagreb, 1976.

Nikolić, T.: Flora Croatica Database, URL http://hirc.botanic.hr/fcd (July 2024)

Pignatti, S.: Flora d'Italia I-III. Edagricole, Bologna, 2002.

European weed research society: URL https://ewrs.org/en/ (October 2024)

Šugar, I., Britvec, M., Vitasović Kosić, I.: Floristic characteristics of pastures in Punters (Istria). Agronomski glasnik 6, 469-479, 2005.

Upotrebna vrijednost korova grada Mostara (Bosna i Hercegovina)

REZIME

Biljke koje čovjeku nisu cilj uzgoja nazivaju se korovima, a te biljke pojavile su se zajedno s razvojem poljoprivrede još u pretpovijesnom razdoblju. Osim brojnih negativnosti koje su pripisane korovima, tijekom prošlosti korovi su bili važni za preživljavanje gladi na ovim područjima, kao i za liječenje određenih bolesti. Također, korovne vrste služe pčelama za skupljanje nektara te pticama i domaćim životinjama kao izvorište hrane. Na području grada Mostara (Federacija Bosne i Hercegovine, Bosna i Hercegovina) tijekom vegetacijskog razdoblja 2022. i 2023. godine provedeno je floristično istraživanje korovnih vrsta. Istraživanjem je zabilježeno 85 korovnih vrsta koje rastu na ovom području i koje su razvrstane u 21 porodicu.

Taksonomskom analizom korovnih vrsta zabilježenih na području grada Mostara uočava se dominacija pripadnika iz porodice Poaceae sa 31 korovnom vrstom (36%). Zatim slijedi porodica Asteraceae s 15 korovnih vrsta (18%), porodica Polygonaceae s osam korovnih vrsta (9%) i porodica Amaranthaceae sa sedam korovnih vrsta (8%), dok su ostale porodice slabije zastupljene. Dominiraju jednogodišnje biljke, a u spektru životnih oblika dominiraju terofiti s 50 korovnih vrsta (59%). Prema uporabnoj vrijednosti, najbrojnije su korovne vrste koje se koriste za prehranu (25%) i kao ljekovito bilje (24%), zatim slijede korovi koji se koriste kao krma, ukrasne i medonosne vrste. Veći broj korovnih vrsta ima više uporabnih vrijednosti.

Ključne riječi: korovi, upotrebna vrijednost, ljekovitost, prehrana, grad Mostar.