ERIOCHLOA VILLOSA (THUNB.) KUNTH: A NEW SPECIES FOR THE BANAT FLORA

ERIOCHLOA VILLOSA (THUNB.) KUNTH – O NOUĂ SPECIE PENTRU FLORA BANATULUI

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Abstract: *We notify the presence of Eriochloa villosa in Timis County, which was encountered in maize, soybean and on neighbouring abandoned fields. There is presented: chorology, distribution of woolly cupgrass, its morphological, biological and ecological characteristics and the new and efficient management practices regarding Eriochloa control.*

Rezumat: *Semnalăm prezenţa speciei Eriochloa villosa în judeţul Timiş, care a fost întâlnită atât în culturile de porumb şi soia, cât şi pe terenurile abandonate din vecinătatea lor. Sunt prezentate: aria de răspândire, caracteristicile morfologice, biologice şi ecologice ale speciei, precum şi metodele actuale de combatere eficientă.*

Key words**:** *Eriochloa villosa, weeds, adventive, root crops, Banat.*
Cuvinte cheie: *Eriochloa villosa, buruieni, adventivă, culturi prăşitoare, Banat*.

INTRODUCTION

In spite of phytosanitary custom controls, weeds are introduced trough seeds trade and might become invasive. We assume *Eriochloa villosa* – an aggressive weed in root crops – was introduced in Romania trough soybean imported seeds. From our bibliographical investigation, results no other records of woolly cupgrass in Romania.

Eriochloa villosa belong to *Paniceae* Tribe, *Pooideae* Subfam., *Poaceae* Fam. (R. Brown) Barnhart and has 3 synonyms: *Paspalum villosum* Thunb., *Panicum tuberculiflorum* Steudel and *Helopus villosa* Nees. The specie is originary from sunny hills in Eastern Asia (China, Vietnam, Taiwan, Japan, Korea), South of Ukraine and South-Eastern Russia [17]. The first description of *Eriochloa villosa* was made by THUNBERG (1784) [16] and the valid revise, by KUNTH, in 1829 [7].

Woolly cupgrass has been found for the first time in South America, in 1987, in Surinam Republic, Paramaribo region. In 1989 was encountered in North America (in Iowa is a quarantine weed) and in 2001 in Canada, near Montreal. Since 1998 is on Bulgarian quarantine weeds list [22].

Eriochloa villosa (2n = 54) is an annual grass (sometimes biannual), more competitive than other grass weeds in root crops. Is a prolific seed producer – can produce up to 150 000 seeds with about 90 % viability, which has a very wide germination temperature window (15°C-37,7°C) [12, 14]. *Eriochloa* seed is larger than seed produced by most grassy weeds and because of this, it can emerge from soil depth of 10 cm or more (seeds remaining on the soil surface overcame dormancy sooner than seeds buried) [2, 4, 12]. It germinate ahead of *Setaria* sp. and continue throughout the growing season (3 emerges/growing season) [9, 10], having a significant negative effect on yield in the current crop. Because of the seed dormancy, preemergence herbicide is no reliable method for controlling *Eriochloa*. The seedlings are hardy and usually grow fast. It begins tillering early, at the 2-3 leaf stage and soon produces seed.

Next, we present the botanical description of the species. The stem is a *culm*, usually erect, may reach over 1 m high, with pubescent nodes and internodes in the upper part of the plant. The lower nodes can root themselves. *Leaves* have linear and flat blades, 10-20 cm long and 5-12 mm wide, enlarged at their basis. Adaxial surfaces are hairy and margins are rough, usually one edge displays a crinkled look. Sheaths are sometimes inflated, glabrous or pubescent, with short hair on the edge. Ligules (0.5-1 mm) consist of a fringe of short hairs and auricles are absent. The *inflorescence* is a hairy panicle (3-16 cm long and 1-3 cm wide), with two types of hairs: fine and silky, long and woolly (fig. no 1a). The rachis is villous with 2-8 branches (20-70 mm long and 0.8-1.1 mm wide) with 11-24 solitary spikelets (occasionally paired proximally). Pedicels (0.5-1 mm) are densely villous below, often with long hairs intermixed with short hairs, apices with more than 12 hairs of 1.5-2.5 mm. Covered with shorts hairs (less than 1 mm), large in size (3.9-5.2 mm long and 2-2.5 mm wide), the spikelets are broadly ovate to elliptic, slightly compressed, acute at apex, with a characteristic rigid cup-like *callus* at the base of the spikelet (fig. 1b). Spikelets are in pairs, two-flowered, lacking awns. At first it's greenish, often take a reddish tingle upon maturity. Lower glumes occasionally present as a scale; upper glumes equalling the lower lemmas, ovate to elliptic, glabrous or pubescent, 7-veined; lower lemmas (3.4-5 mm long and 2-2.5 mm wide) is 5-veined, acute to apiculate, unawned; upper lemmas (3.5-5 mm) is ovate to elliptic, acute to apiculate. The *seeds* are cream coloured, round to oval, over 3 mm long, straw-coloured, with a wrinkle surface.

The seedling it resembles *Setaria* sp., but is larger in size and all its parts is covered with dense short hairs (less than 1 mm). Checking the caryopses in the soil is helpful to confirm the identification.

a b

Fig. nr. 1 a. Panicle of *Eriochloa villosa* (original photo) b. The base of one branch with 2 spikelets (original)

Woolly cupgrass is difficult to control. The easiest way to manage is to prevent it from becoming established in a field. Once integrated weed management is implemented, the control of the weed should be achieved within 2 growing seasons. It is recommended sowing as soon as possible after the final tillage pass, to give the crop an even start with the *Eriochloa* seedlings. Crop rotation is very important because the weed is especially difficult to manage in continuous corn. Rotating to soybean permits the use of herbicides that are more effective on woolly cupgrass than are most corn products. With alfalfa and rye as a cover crop, the soil is depleted of *Eriochloa* seeds [8, 14]. Because woolly cupgrass has a high tolerance of most

herbicides, it's very important to rotate herbicides to reduce chances for resistance. The researches proved that nicosulfuron, imazetapyr and dymetenamide herbicides are the most effective for controlling *Eriochloa* [5]. In maize, the best results were obtained at sequential applications or postemergence of nicosulfuron [11]. Already infested fields will be tilled and harvested last for preventing infestation of new fields by machinery. Prevent cupgrass from growing in ruderal zones will reduce the seed bank.

MATERIAL AND METHOD

The work of mapping of segetal flora was carried out in the year 2006, over the territory of 39 localities in Timiş County, studying the weeding over 127 crop parcels, whose location was marked using the GPS system. Fixing the degree of weeding was realized in April, June and August, using the GÖTTINGEN numerical quantitative method, with the sample surface of 0,1 m^2. Thus, on a field there were performed 10 measurements with a 33.3 x 33.3 cm frame, its sum representing the average number of weeds/m^2. Based on the data from the primary charts, for each parcel was arranged a weeding chart. All the weeding charts were comprised in synthetic tables, on types of cultures, analyzing the presence and participation of *Eriochloa villosa.*

For the identification of the species, we used Flora Europaea [17] and electronical editions of China [19], Taiwan [20] and Missouri [21] Floras. The determination of other species was accomplished according to [3].

RESULTS AND DISCUSSIONS

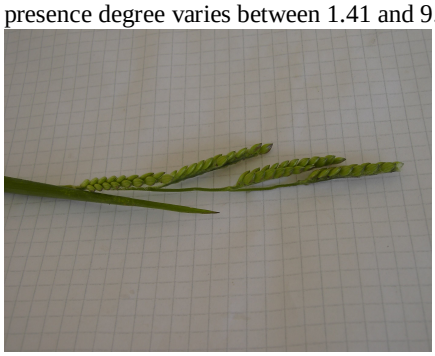
Eriochloa villosa clusters we harvest, have 8-13 tillers, with 1.2 m long and Ø = 0.3-0.4 cm (fig. no 2).

Fig. no.2 – Clusters of *Eriochloa villosa* (original photo)

The leaves are 16-12 cm long and ~ 1 cm wide (fig. no. 3b) and sheaths are 6-9 cm. The panicle have 4-6 branches (3.5 cm long) – each spike with 20-22 spikelets (5 mm long and 3 mm wide) (fig. no. 3a).

The weed was encountered in august, 2006, in 4 parcels cultivated with continuous maize (in Silagiu), in 2 parcels cultivated with soybean (in Gătaia and Pişchia) and in 1 parcel with sunflower (in Gătaia) (table no.1). Localization of *Eriochloa* was confined, the species being absent from fields placed at 1 km distance. The highest degree of presence of woolly cupgrass was at Gătaia, in soybean (35.75%-94 pl/m^2), where it's part of the dominant weeds, together with *Hibiscus trionum.* From this site, it moved nearby, on an abandoned field and further, in sunflower parcel. This explains the very low presence (0.31%-1 pl/m^2) of *Eriochloa* villosa in sunflower. At Pişchia, the weed was encountered just on the soybean field limit,

where, probably, the effect of herbicides was very low. From here, it moved in a paludicolous phythocoenosis, on the lake side. The soybean crop was very weedy with *Echinochloa crus-galli*, which most likely, was not affected by herbicides. In maize, woolly cupgrass is been in various vegetation stages and part of the codominant weeds, together with *Digitaria sanguinalis* (in 2 parcels). The dominant weeds in corn are *Setaria glauca* (in all parcels), *Hibiscus trionum* (in 2 parcels), *Convolvulus arvense* (in 2 parcels), *Echinochloa crus-galli* (in 1 parcel), *Amaranthus retroflexus* (in 1 parcel) and *Cynodon dactylon* (in 1 parcel). The presence degree varies between 1.41 and 9.3%.



a

b

Fig. no. 3a – Inflorescence (original photo) 3b – leaves of *Eriochloa villosa* (original photo)

The segetal flora of studied fields it's composed mainly by Eurasiatic and cosmopolite species, most of its being terophyte. We classify the segetal vegetation in two associations: *Echinochloo crus-galli-Setarietum pumile* Felföldy 1942 corr. Mucina in Mucina *et al.* 1993 and *Hibisco-Eragrostetum paeoidis* Soó et Timár 1957 [6, 13]. The larger populations of *Eriochloa* was observed in advanced stage of vegetation, on nearby abandoned fields (in Gătaia and Silagiu), mostly in conterminous zones (bands 2 – 2.5 m wide). The weed was not found on ruderal meadows from Sialgiu's Hill. The fields were *Eriochloa* was encountered is located at various heights (114-203 m), on luvosols and preluvosols, with pH = 5.5-6.5.

Table. 1

Distribution of *Eriochloa villosa* in Timis County – preliminaries data (2006)

Locality	Altitude (m)	Current crop	Last year crop	Participation/ Cover degree (%)	No. pl/m2	Biodiversity Shannon-Wiener (H)
Birda	114	abandoned field		C 25-75		
Birda	114	limits of maize field	maize			
Gătaia	138	soybean	abandoned field	35.75	94	2.96
Gătaia	138	sunflower	abandoned field	0.31	1	2.37
Gătaia	138	abandoned field		C 40-90		
Pişchia	115	limits of soybean field				
Silagiu	198	maize	maize	1.41	2	2.83
Silagiu	203	maize	maize	2.68	4	3.48
Silagiu	198	maize	maize	6.75	10	3.42
Silagiu	193	maize	maize	9.3	12	2.91

CONCLUSIONS

- The presence of *Eriochloa villosa* in Banat is notified for the first time. The weed was encountered in maize, soybean, sunflower and on abandoned fields;
- Woolly cupgrass was introduced in Romania by imported seeds (corn or soybean);
- The Phythosanitary Police must take official notice of *Eriochloa villosa* in Timis County and begin crop investigation;
- Sizes of the harvested plants corresponds to current descriptions of *Eriochloa villosa*, therefore, the species can develop normally in the Banat's Plain;
- Woolly cupgrass is more competitive then other monocotyledonates and it could become a problematic weed for Romania in just few years. This require a pursuing across country;
- Because *Eriochloa villosa* is difficult to manage in root crops, it's very important to inform the farmers about efficient control methods.

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