

THE CONTRIBUTION OF ALIEN WEEDS IN CROP INFESTATION, AT EZĂRENI FARM, IAȘI COUNTY

CONTRIBUȚIA BURUIENILOR ADVENTIVE LA INFESTAREA CULTURILOR AGRICOLE DE LA FERMA EZĂRENI, JUDEȚUL IAȘI

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Abstract. *The segetal flora of agricultural crops from Ezăreni farm, Iași County, includes a total number of 107 weed species. Only 10% of these species are alien weeds, but they contribute to a significant degree of weeds infestation, especially in row crops. *Amaranthus retroflexus*, *A. powellii*, *Xanthium orientale* ssp. *italicum*, *Sorghum halepense*, *Conyza canadensis*, and *Panicum miliaceum* are the most important alien weeds in the studied crops.*

Key words: alien weeds, segetal flora, weed infestation level

Rezumat. *În culturile agricole ale fermei Ezăreni, județul Iași, au fost identificate 107 specii de buruieni segetale. Doar o zecime dintre specii sunt adventive, dar acestea contribuie într-un grad însemnat la infestarea cu buruieni, mai ales în culturile de prășitoare. Cele mai importante buruieni adventive sunt: *Amaranthus retroflexus*, *A. powellii*, *Xanthium orientale* ssp. *italicum*, *Sorghum halepense*, *Conyza canadensis* și *Panicum miliaceum*.*

Cuvinte cheie: buruieni adventive, flora segetală, grad de îmburuienare

INTRODUCTION

The damages caused by weeds in agricultural crops depend on the segetal flora type, the biological features and propagation way of weeds, as well as the quality of applied agro-technical works (Canțar et al. 1955). Therefore, the knowledge of segetal flora structure is particularly important for effectively weeds control, in accordance with the principles of integrated pest management. Some of the most important components of segetal flora are alien species, they causing significant damage to agricultural crops worldwide (Pimentel et al., 2000). In general, spontaneous and sub-spontaneous plant species whose presence in a certain area is due to accidental or deliberate introduction, as a result of human activity, are considered alien plants (Richardson et al., 2000). According to Sîrbu (2004), the alien flora of the Moldavia territory includes a total number of 249 species, and almost 24% of these species invade agricultural crops, as segetal weeds. The objectives of this paper were: a) to record the structure of segetal flora from a representative agricultural area of Moldavian Plain; b) to determine the frequency of these species and their share in weed infestation to the different types of crops; c) to identify the main alien and native weed species which infest these agricultural crops.

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MATERIAL AND METHOD

The research has been performed on the Ezăreni farm (Iași County), in June 2009 and 2010, in sunflower, corn, beet, soybean, wheat and barley crops. For each agricultural plot, a number of 10 determinations were performed, using a frame of 0.5 × 0.5 m. Within each frame, individuals of weeds species were counted, and their projective coverage (%) were estimated. The degree of weed infestation level was determined based on the average number of individuals/m² and their medium coverage. The frequency of each species is expressed by the ratio between the number of determinations in which the species occurs and the total number of determinations. Within each crop type, the participation of each species in weed infestation is expressed by the ratio between its average number of individuals / m², and the average number of individuals/m² of all weed species (Anghel et al., 1972).

RESULTS AND DISCUSSIONS

The segetal flora from investigated agricultural crops includes a total number of 107 weed species, which are listed below, in alphabetical order: *Adonis aestivalis*, *Amaranthus powellii*, *A. retroflexus*, *Anagallis arvensis*, *Anchusa ochroleuca*, *Aristolochia clematitis*, *Artemisia vulgaris*, *Asperugo procumbens*, *Atriplex tatarica*, *Bromus arvensis*, *B. japonicus*, *B. tectorum*, *Camelina microcarpa*, *Capsella bursa-pastoris*, *Cardaria draba*, *Centaurea cyanus*, *Chenopodium album*, *Ch. hybridum*, *Chondrilla juncea*, *Cichorium intybus*, *Cirsium arvense*, *Conium maculatum*, *Consolida regalis*, *Convolvulus arvensis*, *Conyza canadensis*, *Crepis biennis*, *C. foetida* ssp. *rhoeadifolia*, *C. setosa*, *Cynodon dactylon*, *Datura stramonium*, *Daucus carota*, *Descurainia sophia*, *Digitaria sanguinalis*, *Echinochloa crus-galli*, *Echium vulgare*, *Elymus repens*, *Eragrostis minor*, *Erigeron annuus* ssp. *annuus*, *Erysimum repandum*, *Euphorbia agraria*, *E. falcata* ssp. *acuminata*, *E. helioscopia*, *E. platyphyllos*, *Falcaria vulgaris*, *Fumaria schleicheri*, *Galinsoga parviflora*, *Galium aparine*, *Hibiscus trionum*, *Hordeum murinum*, *Iva xanthifolia*, *Kickxia elatine*, *Lactuca seriolla*, *Lamium purpureum*, *L. amplexicaule*, *Lappula squarrosa*, *Lathyrus tuberosus*, *Lepidium ruderalis*, *Linaria vulgaris*, *Lithospermum arvensis*, *Lolium perenne*, *Malva neglecta*, *Matricaria perforata*, *Medicago lupulina*, *Melilotus officinalis*, *Neslia paniculata*, *Nonea pulla*, *Panicum miliaceum*, *Papaver dubium*, *P. rhoeas* ssp. *rhoeas*, *Phragmites australis*, *Plantago lanceolata*, *P. media*, *Polygonum aviculare*, *P. convolvulus*, *P. lapathifolium*, *P. persicaria*, *Portulaca oleracea*, *Raphanus raphanistrum* ssp. *raphanistrum*, *Reseda lutea*, *Rubus caesius*, *Sambucus ebulus*, *Senecio vernalis*, *S. vulgaris*, *Setaria pumila*, *S. verticillata*, *S. viridis*, *Sinapis arvensis*, *Solanum nigrum*, *Sonchus arvensis* ssp. *arvensis*, *S. asper* ssp. *asper*, *S. oleraceus*, *Sorghum halepense*, *Stachys annua*, *Stellaria media*, *Tanacetum vulgare*, *Taraxacum officinale*, *Thlaspi arvense*, *Th. perfoliatum*, *Torilis arvensis*, *Tragopogon dubius*, *Trifolium arvense*, *T. repens*, *Veronica hederifolia*, *V. polita*, *V. persica*, *Vicia cracca*, *Viola arvensis*, *Xanthium orientale* ssp. *italicum*.

The weed infestation level varies depending on the crop type (fig. 1), soy and beet crops being most heavily infested (mean coverage of 43.3%, respectively 34%; mean number of ind. / m² of 54.8, respectively 47.5), while cereal crops are less infested. The frequency, and degree of participation in weed infestation of

alien weeds and major native weed species from the crops on the Ezăreni farm, are shown in table 1.

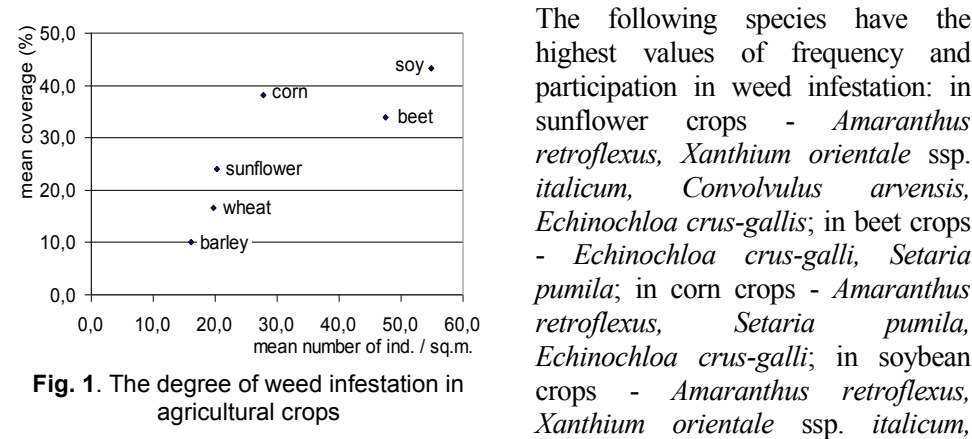


Fig. 1. The degree of weed infestation in agricultural crops

Convolvulus arvensis, *Setaria pumila*; in wheat crops - *Phragmites australis*, *Cirsium arvense*, *Consolida regalis*; in barley crops - *Cirsium arvense*, *Polygonum convolvulus*, *Consolida regalis*.

Therophytes are dominant in the biological spectrum of segetal flora (fig. 2). Hemitherophytes, hemicryptophytes, phanerophytes, and geophytes are less represented. However, geophytes include some of the most important weeds in the investigated crops, such as *Sorghum halepense*, *Cirsium arvense*, *Convolvulus*

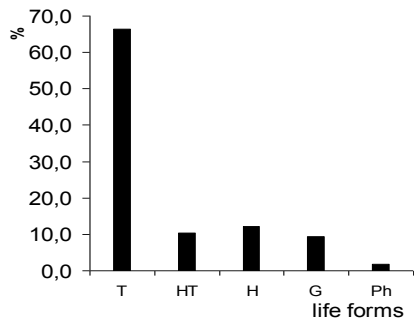


Fig. 2 - Biological spectrum of segetal flora (T-therophytes; HT-hemitherophytes; H-hemicryptophytes; G-geophytes; Ph-phanerophytes)

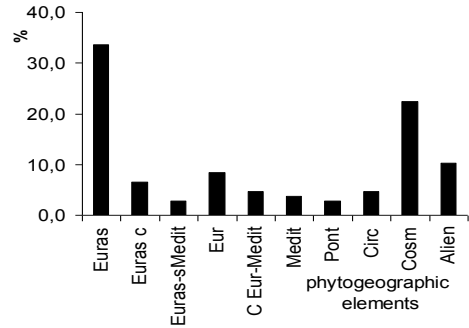


Fig. 3 - Phytogeographic spectrum of segetal flora (Euras-Eurasian; Medit-Mediterranean; Eur-European; Pont-Pontic; Circ-Circumpolar; Cosm-Cosmopolitan; c-continental)

arvensis, *Phragmites australis* etc. Of the phytogeographic elements, the most numerous in the structure of segetal flora are the Eurasian ones. Cosmopolitan, alien, European and other elements are less represented (fig. 3). The alien element is represented by a relatively small number of species (10.3%), but it contributes to a significant degree of weed infestation on sunflower (40.6%), soybean (39.7%) and corn (29.1%) crops. The beet crops and those of cereals are mainly infested by native weeds, the alien ones having a contribution of only

Table 1

The contribution of alien and native plant species in weed infestation of crops (Ezăreni farm, Iași County)

Weed species	Average frequency (%)						Participation of mean weed infestation (Wm%)					
	Sunfl.	Beet	Corn	Soy	Wheat	Barley	Sunfl.	Beet	Corn	Soy	Wheat	Barley
Alien weeds:												
<i>Amaranthus retroflexus</i>	80.0	80.0	94.0	96.7	46.7	5.5	15.2	4.2	14.4	14.2	2.2	0.1
<i>Xanthium orientale</i> ssp. <i>italicum</i>	76.7	50.0	84.0	66.7	-	-	10.0	3.0	5.0	13.1	-	-
<i>Amaranthus powellii</i>	76.7	10.0	40.0	45.0	-	40.0	4.7	0.3	3.8	6.8	-	3.8
<i>Sorghum halepense</i>	40.5	30.0	28.0	23.3	43.3	20.0	4.1	1.0	1.5	2.5	4.8	1.0
<i>Galinsoga parviflora</i>	40.5	40.0	44.0	30.0	-	-	3.8	0.8	2.0	2.1	-	-
<i>Panicum miliaceum</i>	36.7	30.0	12.0	10.0	13.3	20.2	2.6	1.5	0.8	0.4	1.7	1.0
<i>Conyza canadensis</i>	6.7	40.0	28.0	3.3	60.0	40.0	0.1	1.5	1.3	0.5	4.7	2.1
<i>Iva xanthifolia</i>	6.7	-	-	-	-	-	0.1	-	-	-	-	-
<i>Veronica persica</i>	-	10.0	12.0	-	20.0	-	-	0.1	0.1	-	1.1	-
<i>Datura stramonium</i>	-	-	6.0	-	-	-	-	-	0.1	-	-	-
<i>Erigeron annuus</i> ssp. <i>annuus</i>	-	-	6.0	10.0	-	5.5	-	-	0.1	0.1	-	0.1
Total alien weeds (10 species)							40.6	14.4	29.1	39.7	14.5	8.1
<i>Echinochloa crus-galli</i>	70.0	100.0	80.0	50.0	6.7	10.0	8.7	26.7	11.1	2.2	0.1	0.2
<i>Convolvulus arvensis</i>	86.9	70.0	64.0	96.7	66.7	50.0	9.8	6.9	8.3	13.1	2.8	3.7
<i>Cirsium arvense</i>	80.0	40.0	80.0	66.7	56.7	50.0	7.5	3.9	8.3	7.3	13.2	10.3
<i>Setaria pumila</i>	53.3	100.0	80.0	86.9	6.7	15.0	4.4	17.6	12.5	11.6	0.4	1.5
<i>Sonchus arvensis</i>	53.3	10.0	28.0	23.3	6.7	-	5.7	0.3	1.2	2.0	0.4	.
<i>Setaria viridis</i>	30.0	40.0	60.0	66.7	-	10.0	1.5	5.9	6.1	3.0	-	0.1
<i>Chenopodium album</i>	33.3	70.0	62.0	50.0	20.0	30.0	3.7	5.2	5.3	4.0	1.7	2.9
<i>Phragmites australis</i>	20.0	20.0	28.0	26.7	43.3	50.0	1.2	2.7	4.0	2.1	16.3	7.7
<i>Hibiscus trionum</i>	30.0	50.0	22.0	66.7	-	-	2.6	3.7	1.3	5.0	-	-
<i>Matricaria perforata</i>	3.3	-	20.0	-	60.0	50.0	0.2	-	0.5	-	7.2	4.7
<i>Consolida regalis</i>	-	-	2.0	-	56.7	50.0	-	-	0.1	-	6.1	8.0
<i>Polygonum convolvulus</i>	3.3	40.0	20.0	10.0	66.7	60.0	0.1	2.6	1.2	1.2	7.1	8.3
<i>Lathyrus tuberosus</i>	3.3	-	20.0	26.7	46.7	60.0	0.1	-	1.2	1.2	2.9	5.8
Other native species							13.9	10.1	9.8	7.6	27.3	38.7
Total native weeds (97 species)							59.4	85.6	70.9	60.3	85.5	91.9

14.4% (beet), 14.5% (wheat) and 8.1% (barley) (table 1). Of the 11 alien weed species identified at the Ezăreni farm, the most important are the following:

Amaranthus retroflexus is very common especially in row crops, the average number of ind./m² ranging from 0.1 (barley crops) and 34 (soybean crops); it ranks first place in crop infestation of sunflower, corn and soybean crops. It is a weed originating from North America (Ciocărlan, 2009), recognized as one of the most common and harmful weeds worldwide (Anghel et al., 1972, Weaver & Williams, 1980, Costea et al., 2004).

Amaranthus powellii is less common than *A. retroflexus*, which is normally associated, infesting mainly soybean and sunflower crops, but also those of corn or barley, on the Ezăreni farm. It is native from North America, but it is now almost a cosmopolitan weed (Costea et al., 2004). In our country, it is a common weed, widespread from steppe zone, to sessile oak floor (Ciocărlan et al., 2004).

Sorghum halepense is a weed booming in the in agricultural crops from the Moldavian Plain. It spreads both by seed and vegetatively through rhizomes, forming dense populations at the Ezăreni farm, both in row crops (mainly sunflower and soybean) and in cereals (wheat). It is a native species to Mediterranean regions, known in our country since the nineteenth century, and in Moldavia since the first half of the last century (Răvăruț, 1941). It is one of the most aggressive weed species in the world, causing serious losses in agricultural crops (Howard, 2004).

Conyza canadensis forms dense, often monodominant communities on fallows or at the heads of agricultural plots, wherefrom they often extend in the crops. At the Ezăreni farm, it invades in a more important measure less successful wheat crops. It is a weed originating from North America (Ciocărlan, 2009), more ruderal, but with a very high capacity for reproduction and dispersion and a high tolerance to environmental factors, often invading the poorly maintained crops (Weaver, 2001).

Xanthium orientale ssp. *italicum* is frequent (more than 50%) in row crops, being on second place in weed infestation of sunflower and soybean crops, on the Ezăreni farm, also heavily infesting corn crops. It often forms dense and monodominant clumps, completely stifling the crop plants. The number of individual / m² ranges from 0.1 (in beet crops) and 68 (in soybean crops). Currently, its invasive area includes actually the entire country, from steppe zone, to the sessile oak floor (Ciocărlan et al., 2004).

Another alien weed, currently with a lower degree of crops infestation at the Ezăreni farm, but with a clear trend of expansion, is *Panicum miliaceum*. It forms dense populations, with high coverage, mainly at the heads of the plots. It is a Central Asian species (Ciocărlan, 2009), which was much cultivated in the past in our country. As a sub-spontaneous plant, it was first mentioned by Răvăruț (1941), from Mârzești (Iași County). It is one of the most drought-resistant plants (Emendack et al. 2005), reason why this species is expected to spread more and more in the future in agricultural crops from arid regions of Moldavia.

CONCLUSIONS

1. The segetal flora of agricultural crops from Ezăreni (Iași County) includes a number of 107 species of vascular plants;
2. Although the alien plants represent only one tenth of the segetal flora, they contribute significantly to weeds infestation, especially in row crops;
3. *Amaranthus retroflexus*, *A. powellii*, *Xanthium orientale* ssp. *italicum*, *Sorghum halepense*, *Conyza canadensis* and *Panicum miliaceum* are the most important alien weeds in the studied crops.

Acknowledgements. This work was supported by CNCSIS - UEFISCDI, project number PNII-IDEI_1227/2008.

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