Scientific Papers. Series B, Horticulture. Vol. LXVI, No. 1, 2022
Print ISSN 2285-5653, CD-ROM ISSN 2285-5661, Online ISSN 2286-1580, ISSN-L 2285-5653

VEGETATION DAMAGE TO AGRICULTURAL CROPS IN OLTENIA, ROMANIA

Daniel RĂDUȚOIU, Ion STAN

University of Craiova, 13 A.I. Cuza Street, Craiova, Romania

Corresponding author email: radutoiu02daniel@gmail.com

Abstract

The agricultural crops within Oltenia occupy significant areas, especially at the level of the Oltenia Plain and of the Piedmont Hills. The rest of the areas where agricultural crops are located account for less extensive surfaces (at the top of the Getic Piedmont and of the Sub-Carpathian hills). In recent years, much of the agricultural land in this part of the country has been cultivated with precision agriculture, but in some areas conventional agriculture is still maintained. The comparative analysis of the lands where conventional versus precision agriculture is practiced highlights the existence of a different spontaneous vegetation, which on certain surfaces is harmful to agricultural crops. If we add to these the increasing recent expansion of invasive alien species, we can say that the production of these surfaces is significantly affected. Vegetation harmful to agricultural crops in Oltenia is included in 12 associations. The phytocenoses of the association Stellarietum mediae Hadac 1969 have the largest distribution, but the phytocenoses of the association Setario-Sorghetum halepensis Ștefan et Oprea 1997 cause significant damage.

Key words*: agricultural crops, Oltenia, Romania, vegetation.*

INTRODUCTION

The crops within Oltenia are of major importance in the regional economy, as they cover representative surfaces, especially in the plain region, where favorable soils are located (e.g. chernozem). Studies on the soils on which this type of vegetation develops are present in various specialized works (e.g. Călina & Călina, 2019). At the level of the Getic Piedmont, of the hills and of the Sub-Carpathian depressions within Oltenia, the agricultural surfaces are less represented.

In recent years, precision farming has been practiced in almost all agricultural lands in this part of Romania, but there remain certain areas where conventional agriculture is still maintained. On these surfaces, there has been noticed the installation of a spontaneous vegetation that competes with crop plants for the main factors: water, air, light, heat, etc. (Chirilă et al., 2002). Sometimes, the competition is so powerful that it can lead to a decline in the agricultural production or it can even compromise it. There can be stated that in such situations we are dealing with a "harmful vegetation".

Studies on this category of vegetation can be found in several specialized works (Bujorean et al., 1956; Păun, 1966; Păun et al., 1975, 1979; Răduțoiu et al., 2009). The plant species that give the physiognomy of the phytocenoses included in the associations that the present paper analyzes have been studied by numerous researchers; they have realized floristic inventories of these plants from different areas of Oltenia (Anghel et al., 1972; Popescu, 1975; Chirilă et al., 1998; Chirilă, 2001; Chirilă et al., 2002; Ciocârlan et al., 2004; Răduțoiu, 2009), or they have conducted observations on the degree of weed development within crops (Păun & Pop, 1970; Păun & Popescu, 1983). Most of them are classified as "segetal weeds".

Both spontaneous and cultivated plants are affected by various biotic or abiotic stress factors that make them more vulnerable to present climate changes (Durău et al., 2021; Paraschivu et al., 2020, 2021; Paraschivu & Cotuna, 2021; Velea et al., 2021).

Globally, around 30,000 plant species are known to cause damage to the crops in which they grow; out of these, 2,000 bring actual economic damage - which represents about 6.6% (Chirilă et al., 2002). In Romania, of the total number of species that cause damage to agricultural crops, about 16-23% (132 weeds) induce significant damage from an economic point of view (Chirilă et al., 2002).

MATERIALS AND METHODS

The data presented in this paper are the result of an extensive field and laboratory work that took place over a period of about 15 years. The information gathered over the years has allowed us to observe the syndynamics of this type of vegetation.

The different pedo-climatic conditions within the Oltenia Plain, the Getic Piedmont and the Sub-Carpathian Depressions, enabled the installation of a various vegetation in the cultivated lands characterized by conventional agricultural practices. The cultivated areas where precision farming is practiced lack spontaneous plants or they are characterized by the presence of rare specimens, which do not affect the crop plants.

Field trips were conducted in order to identify those phytocoenosis that belong to the spontaneous vegetation within crops and cause crop damage. The field trips enabled us to seize all vegetation phases, which, in turn, allowed us to correctly identify plants, as well as to observe all vegetation stages that are necessary for a correct classification in the superior cenotaxonomic systems.

During our field trips, we followed as much as possible the stage of the vegetation, its dynamics in time and space, as well as the successional directions of phytocoenosis within some territories.

Various bibliographic sources have been used for the cenotaxonomic classification of the analyzed vegetation (Sanda et al., 2001; Sanda, 2002; Sanda et al., 2007). The description of the associations that we included in this type of harmful vegetation was conducted on the basis of the collected field data, corroborated with the existing information in the specialized literature. The following information is presented for each association: the local characteristics, the differences observed between the information identified in the field and that present in the specialized literature, as well as the crops that have been affected in the framework of each type of vegetation.

RESULTS AND DISCUSSIONS

The vegetation characterized as "harmful" for the crops within Oltenia is included in the following cenotaxonomic system:

Cl. Artemisietea vulgaris Lohmeyer, Preising. et R. Tüxen ex von Rochow 1951; Ord. Onopordetalia acanthii Br.-Bl. et R. Tüxen ex Klika et Hadač 1944; Al. Brachyaction ciliatae Pop I. et Vițalariu Gh. 1971: *Ambrosietum artemisiifoliae* Vițalariu 1973; Cl. Stellarietea mediae R. Tüxen, Lohmeyer et Preising ex von Rochow 1951, Ord. Centauretalia cyani R. Tüxen, Lohmeyer et Preising. in R. Tüxen 1950 Al. Caucalidion lappulae (R. Tüxen 1950) von Rochow 1951: *Adonido-Delphinietum consolidae* Br.-Bl. 1970, Al. Veronico-Euphorbion Sissingh ex Passarge 1964: *Lamio-Veronicetum politae* Prodan 1939, Kruseman et Vlieger 1939, *Lathyro-Avenetum fatuae* Passarge in Passarge et Jurko 1975; Ord. Chenopodietalia albi R. Tüxen (1937) 1950, Al. Panico - Setarion Sissingh in Westhoff et al. 1946: *Digitario-Setarietum pumilae* Felföldy 1942 corr. Borhidi 1996, *Echinochloo-Setarietum pumilae* Felföldy 1942 corr. Mucina in Mucina et al. 1993, *Setario-Galinsogetum parviflorae* R. Tüxen 1950 em. T. Müller et Oderdorfer in Oberdorfer 1983, *Setario-Sorghetum halepensis* Ștefan et Oprea 1997, *Stellarietum mediae* Prodan 1939, Hadač 1969; Ord. Eragrostietalia J. Tüxen ex Poli 1966, Al. Amarantho – Chenopodion albi Morariu 1943: *Digitario-Portulacetum oleracei* (Felföldy 1942) Timar et Bodrogk 1955, *Tribulo-Tragetum* Soó et Timar in Timar 1954; Cl. Artemisietea vulgaris Lohmeyer, Preising. et R. Tüxen 1950, Ord. Agropyretalia repentis Oberdorfer et al. 1967, Al. Convolvulo-Agropyrion repentis Görs 1966: *Convolvulo-Agropyretum repentis* Felföldy 1943.

Based on the data collected from the field and corroborated with information from the specialized literature, the analysis of the vegetation included in the associations presented above highlights the following aspects (for each association):

Ambrosietum artemisiifoliae Vițalariu 1973

The presence of the *Ambrosia artemisiifolia* species on the Romanian territory was first reported at the beginning of the 20th century (1908), in Orșova (after Vițalariu, 1973 in Țopa & Boșcaiu, 1965) and the high risk of spreading that this plant may present was intuited since 1971 (Vicol, 1971); two years later, the above-mentioned association was described. At the beginning, the phytocenosis of this association

were known only near the railways, but now they are found in different crops within Oltenia (e.g. watermelon, Figure 1, corn, sunflower). The floristic composition of the areas dominated by *Ambrosia artemisiifolia* always includes: *Erigeron canadensis*, *Galinsoga parviflora*, *Setaria pumila*, *Convolvulus arvensis*, *Digitaria sanguinalis*, *Cirsium arvense*, *Cynodon dactylon*, *Eragrostis minor* and *Plantago scabra*. Ruderal species are found only on the edges of crops. Although in terms of floristic composition, the common ragweed-dominated phytocenosis within crops are much poorer in species than those described in ruderal sites (56 species), they still cause significant damage to crops because of the aggressiveness mainly shown by the nucleus of allogeneic species. On these surfaces, the coverage values are around 95-100%.

Figure 1. *Ambrosietum artemisiifoliae* from watermelon culture

Adonido-Delphinietum consolidae Br.-Bl. 1970
It is mainly found within cereal crops (wheat, barley, oats, and rye) (Pedrotti, 2021). Numerous annual species are present in the composition of these phytocenosis (over 75%). This vegetation is harmful within crops that grow on leached, dry chernozems and which are characterized by conventional agricultural practices. The following species register high abundance-dominance: *Consolida regalis*, *Centaurea cyanus*, *Agrostemma githago*, *Anthemis arvensis*, *Myosotis arvensis*, *Viola arvensis*, *Cirsium arvense*, *Sonchus arvensis, Ranunculus arvensis, Lithospermum arvense, Papaver rhoeas*. It also develops well on the fallow lands that have been cultivated with corn in the past. Most of the species in these phytocenosis belong to the "segetal weeds" category. The area characteristic for the association is located in the south of Olt, Dolj and Mehedinți counties.

Lamio-Veronicetum politae Prodan 1939, Kruseman et Vlieger 1939
It is a pioneer association found in poorly maintained or unmaintained vegetable gardens, fallow lands and vineyards (Sanda et al., 2001, 2002, Huțanu, 2004, Răduțoiu et al., 2009). At the national level, it is known from different regions (Mititelu, D., 1970; Mititelu L. 1974; Burduja & Diaconescu, 1976; Diaconescu, 1978; Sîrbu, 2004; Răduțoiu, 2008). During the vernal season and sometimes at the beginning of the summer, it is harmful for the crops in which it settles (Răduțoiu, 2008).

Lathyro-Avenetum fatuae Passarge in Passarge et Jurko 1975
It is frequently found within the cereal crops from certain settlements located in the western part of Dolj County (Figure 2) and Mehedinți County, where conventional agriculture is still practiced. With the change of the crop type, the physiognomy of these phytocenosis also changes, being replaced by those dominated by species of the genus Veronica (e.g. *Veronica hederifolia*, *V. persica*, *V. polita*). Along with the species characteristic of the association, there are also found: *Vicia cracca*, *Valerianella locusta*, *Lathyrus tuberosus*, *Senecio vulgaris*, *Veronica polita*, *Centaurea cyanus*, *Fallopia convolvulus*, *Polygonum aviculare*, *Myosotis arvensis*, *Anagallis arvensis*, *Veronica persica*, *Convolvulus arvensis*, *Cirsium arvense*, *Sonchus arvensis*, *Sinapis arvensis*, *Veronica arvensis*. In very rare cases, we have also encountered: *Viola arvensis*, *Vicia angustifolia*, *Galium aparine*, *Lapsana communis*).

Digitario-Setarietum pumilae Felföldy 1942 corr. Borhidi 1996
The phytocenosis of this association are harmful to the crops cultivated on permeable sandy-clayey soils within the Oltenia Plain. They are found in vineyards, especially on the lanes between the vine rows (Oprea, 1998; Sîrbu, 2004; Răduțoiu, 2009), or in other crops that are present on this type of soil within the eastern part of Romania (Ștefan et al., 1987; Mititelu & Huțanu, 1996). The physiognomy of these places is given by *Digitaria sanguinalis,* which occupies the largest area of these lands along

with *Setaria pumila* and *Portulaca oleracea*. Besides these species, there are also encountered: *Sonchus arvensis*, *Amaranthus retroflexus*, *Cirsium arvense*, *Convolvulus arvensis*. In the rainy years, these phytocenosis account for a coverage of almost 100%.

Figure 2. *Lathyro-Avenetum fatuae* from Dolj county

Echinochloo-Setarietum pumilae Felföldy 1942 corr. Mucina in Mucina et al. 1993

It is a common association in almost all Romanian regions, including in Oltenia (Soó, 1947; Păun et al., 1975; Coroi, 2001), namely in gardens and crops that allow for hoe handling (especially corn) and are neglected; it causes significant damage in these ecosystems. It prefers nutrient-rich soils. A certain stratification is also noticed within the phytocenosis of this association: the first layer consists of the species *Amaranthus powellii*, *Cirsium arvense*, *Echinochloa crus-galli* and *Chenopodium album*, the second layer is represented by *Mentha arvensis*, *Digitaria sanguinalis*, *Papaver rhoeas*, *Anthemis arvensis*, *Thlaspi arvense*, *Gypsophila muralis*, while the third layer includes representatives of the species: *Plantago major*, *Trifolium repens*, *Fallopia convolvulus* and *Convolvulus arvensis*.

Setario-Galinsogetum parviflorae R. Tüxen 1950 em. T. Müller et Oderdorfer in Oberdorfer 1983

It is frequently encountered in the Oltenia Plain, in potato or watermelon crops, on dry soils with a high content of sand or gravel, where it causes considerable damage. Although the floristic composition of these phytocenosis does not include many species, the coverage is very high because of the significant abundance-dominance of the species (Figure 3): *Galinsoga parviflora*, *Oxalis fontana*, *Polygonum persicaria*, *Veronica persica*, *Chenopodium album* and *Bassia scoparia*.

Figure 3. *Setario-Galinsogetum parviflorae* from the plain of Oltenia

Setario-Sorghetum halepensis Ștefan et Oprea 1997

Although the dominant species in the phytocenosis of this association is perennial, from a cenotaxonomic viewpoint it is characteristic of the annual vegetation types (Biondi et al., 2014; Mucina et al., 2016). It is harmful to corn and vegetable crops within the Oltenia Plain and the Getic Piedmont. *Sorghum halepense* does not form compact phytocenosis in the Sub-Carpathian depression and hills within this part of the country.

It is important to monitor the vegetation edified by *Sorghum halepense*, because on certain areas located in Oltenia it negatively affects Natura 2000 habitats (Figure 4).

Figure 4. *Setario-Sorghetum halepensis* from the Jiu Corridor (ROSCI0045)

Stellarietum mediae Prodan 1939, Hadač 1969

It is an association described by Prodan from the Transylvanian gardens (Prodan, 1939). At

present, it is known from almost all areas of the country (Popescu et al., 1984; Viţălariu & Horeanu, 1989; Sanda et al., 2001; Sanda, 2002; Răduţoiu, 2008), especially from ruderal places. In certain areas, it is mentioned within vineyards (Sîrbu, 2004; Răduţoiu, 2008). It is especially harmful during springtime, in the crops where conventional agriculture is practiced. It competes with crop plants for nutrients and soil water supply. Along with species of the genus Veronica (*V. polita*, *V. persica*), *Lamium amplexicaule*, *L. purpureum*, and *Capsella bursa-pastoris*, it sometimes accounts for coverage values of 100% (Figure 5).

Figure 5. *Stellarietum mediae*
from the level of the Getic Piedmont

Digitario-Portulacetum oleracei (Felföldy 1942) Timar et Bodrogk 1955
Phytocenosis belonging to this association have been identified in gardens located in the main river floodplains within the Oltenia Plain and within the Getic Piedmont - to a lesser extent, as well as in vineyards (Grigore, 1968; Spiridon, 1970; Păun et al., 1975; Burduja & Horeanu, 1976; Coste, 1998; Coroi, 2001). It grows on nutrient-rich soils with a high content of sand or gravel. It prefers well-lighted and irrigated places.
Along with the dominant species (*Portulaca oleracea*), which accounts for a coverage of over 75% (Figure 6), there are encountered: *Veronica persica*, *Polygonum aviculare*, *Hibiscus trionum*, *Sinapis arvensis*, *Setaria pumila*, *S. viridis*, *Chenopodium album*, *Anagallis foemina*, *Solanum nigrum*, *Cynodon dactylon*. The annual species predominate, while the perennials are present in small number (e.g. *Cirsium arvense*, *Convolvulus arvensis*, *Chondrilla juncea*). It causes considerable damage to crops grown in conventional agriculture.

Figure 6. *Digitario-Portulacetum oleracei*

Tribulo-Tragetum Soó et Timar in Timar 1954
The phytocenosis of this association prefer places with high temperatures and increased light conditions (Figure 7).

Figure 7. *Tribulo-Tragetum*
from the Jiu meadow

It is found in the southern part of Oltenia, in various agricultural crops grown on sandy soils (Simeanu et al., 2019), or in abandoned vineyards (Bagi, 1990). It causes crop damage especially during dry years. The floristic composition of the association highlights the presence of species resistant to water stress (*Anthemis arvensis*, *Arenaria serpyllifolia*, *Crepis tectorum*, *Cynodon dactylon*, *Digitaria sanguinalis*). *Sedum caespitosum* (Cav.) DC., a rare Mediterranean species in Oltenia, was mentioned from some phytocenosis located in the Ciupercenii Vechi area (Simion, 2017).

Convolvulo-Agropyretum repentis Felföldy 1943

This association is present in abandoned vineyards, or in those that were neglected for a long period of time. After several years, there is to be noticed an evolution towards the floristic composition of the neighboring meadows, edified by *Poa pratensis* or *Agrostis stolonifera*. Once it has been settled, it is very difficult to control this type of vegetation because of the well-developed rhizome system of the dominant species and of the root buds that are characteristic for *Convolvulus arvensis*. Along with the two species that give the name of the association (Figure 8), there are also encountered: *Cynodon dactylon*, *Cirsium arvense*, *Polygonum aviculare*, *Cardaria draba*, and *Setaria pumila*.

Figure 8. Physiognomy of phytocenosis of the *Convolvulo-Agropyretum repentis* association

CONCLUSIONS

The analyzed associations, which were included in the commonly called "harmful vegetation", are largely dominated by annual species. Some of them are present in various agricultural crops: *Digitario-Portulacetum oleracei* (Felföldy 1942) Timar et Bodrogk 1955, *Digitario-Setarietum pumilae* Felföldy 1942 corr. Borhidi 1996, *Echinochloo-Setarietum pumilae* Felföldy 1942 corr. Mucina in Mucina et al. 1993, *Lamio-Veronicetum politae* Kruseman et Vlieger 1939; other associations are mainly present in certain crops: *Ambrosietum artemisiifoliae* Vițalariu 1973 (in watermelon, corn crops); *Convolvulo-Agropyretum repentis* Felföldy 1943 (in vineyards); *Lathyro-Avenetum fatuae* Passarge 1975 (in cereal crops); *Setario-Sorghetum halepensis* Ștefan et Oprea 1997 (in maize crops); *Stellarietum mediae* Hadac 1969 (in crops that allow hoe handling and in vineyards); some associations are characteristic of a certain soil type: *Tribulo-Tragetum* Soó et Timar in Timar 1954 - on sandy soils.

This type of vegetation is an important source of "weeds" for the neighboring crops, where precision farming is practiced, as well as for other types of natural vegetation located nearby.

REFERENCES

Anghel, Gh., Chirilă, C., Ciocârlan, V., Ulinici, A. (1972). *Buruienile din culturile agricole şi combaterea lor*. 347 pag. Edit. Ceres. Bucureşti.

Bagi, I. (1990). The vegetation map of the Szappan-Szék UNESCO biosphere reserve core area, Kiskunság National Park Hungary. *Acta Biol. Szeged*. 36: 27-112.

Biondi, E., Blasi, C., Allegrezza, M., Anzellotti, I., Azzella, M.M., Carli, E., Casavecchia, S., Copiz, R., Del Vico, E., Facioni, L., Galdenzi, D., Gasparri, R., Lasen, C., Pesaresi, S., Poldini, L., Sburlino, G., Taffetani, F., Vagge, I., Zitti, S., Zivkovic, L. (2014). Plant communities of Italy: the vegetation Prodrome. *Plant Biosyst* 148(4):728–814.

Bujorean, G., Popescu, I., Popescu, P. (1956). Contribuţii la studiul geobotanic al buruienilor de pe cernoziomurile din vestul R.P.R. *Stud. şi Cercet. Şt. Tom III*: 3-4.

Burduja, C., Diaconescu, F. (1976). Contribuţie la studiul asociaţiilor segetale din culturile de păioase şi prăşitoare din bazinul Bahluiului (Iaşi). *Muz. Deltei Dunării*, Tulcea, Peuce, 5 : 391-415.

Burduja, C., Horeanu, C. (1976). Contribuţii la vegetaţia spaţiilor terasate din Dobrogea. *Muz. Deltei Dunării*, Tulcea, Peuce, 5 : 321-334.

Călina, J., Călina, A. (2019). Evolution of the mollic reddish preluvisol in a romanian riverine region and the assessment of its agro-productive properties in farms and agro-touristic households. *Environmental Engineering and Management Journal*: Vol.18, No. 12, 2729-2738.

Chirilă, C., Ciocârlan, V., Popescu, Gh. et al. (1998). Cartarea buruienilor din culturile agricole, realizări şi perspective. *Lucr. Şt. Univ. de Şt. Agronomice şi Medicină Veterinară Buc., Ses. Omagială ²50 ani de la înfiinţarea Fac. de Horticultură din Bucureşti 1948-1998²:* 117-118.

Chirilă, C. (2001). *Biologia buruienilor. Organografie, Corologie, Dinamică, Importanţă*. Editura Ceres, Bucureşti. 303 pp.

Chirilă, C., Ciocârlan, V., Berca, M. (2002). *Atlasul principalelor buruieni din România • Atlas of the main weeds in Romania*. Bucureşti: Edit. Ceres, 296 pp.

Ciocârlan, V., Chirilă, C. (1982). *Determinatorul buruienilor din culturile agricole*. 133 pag. şi 80 planşe. Edit. Ceres. Bucureşti.

Ciocârlan, V. Berca, M., Chirilă, C., Coste, I. & Popescu, Gh. (2004). *Flora segetală a României*. 351 pag. Edit. Ceres, Bucureşti.

Coroi, A.M. (2001). *Flora şi vegetaţia bazinului râului Milcov*, Edit. Tehnopress, Iaşi: 412 pp.

Coste, I. (1998). Îmburuienarea plantaţiilor de viţă de vie în Sud-Vestul României (Banat), *Lucr. celui de-al XI-lea Simp. Naţ. de Herbologie*, Sinaia: 117-122.

Diaconescu, F. (1978). Cercetări taxonomice, biologice şi fitocenologice asupra plantelor antropofile din bazinul Bahluiului (jud. Iaşi).,Teză doctorat, Univ. "Al. I. Cuza" Iaşi.

Durău, C.C., Sărățeanu, V., Cotuna, O., Paraschivu, M., (2021). Impact of the grassland management planning application on some features of the grassland vegetation from Western Romania – Case Study. *Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development*, Vol. 21, Issue 3: 325-331.

Grigore, St. (1968). Vegetaţia nitrofilă din zona de interfluviu Timiş-Bega, *Lucr. Şt. Inst. Agr. Timişoara, Ser. Agr*., 11: 471-489.

Huţanu Mariana (2004). *Diversitatea florei vasculare, a vegetaţiei şi a macromicetelor din Bazinul Jijiei (Jud. Botoşani)*. Edit. "Gh. Asachi" Iaşi. 354 pag.

Mititelu, D. (1970). Contribuţii la cunoaşterea răspândirii asociaţiilor de buruieni ruderale şi segetale în Depresiunea Elan., jud. Vaslui, *Lucr. Şt. Inst. Agr. Iaşi, Ser. Agr.-Hort*.: 223-232.

Mititelu, L. (1974). Contribuţii la studiul vegetaţiei de pe Valea Lungă – Iaşi, *Stud. Comunic. Muz. Şt. Na*t.: 359-376. Bacău.

Mititelu, D., Huţanu, M. (1996). Noi contribuţii la flora şi vegetaţia jud. Vaslui, Stud. Cerc. Muz. Şt. Nat. Piatra Neamţ, 8:193-211.

Mucina, L., Bültmann, H., Dierßen, K., Theurillat, J.P., Raus, T., Čarni, A., Sumberová, K., Willner, W., Dengler, J., Gavilán García, R., Chytrý, M., Hájek, M., Di Pietro, R., Iakushenko, D., Pallas, J., Daniëls, F.J.A., Bergmeier, E., Santos Guerra, A., Ermakov, N., Valachovič, M., Schaminée, J.H.J., Lysenko, T., Didukh, Y.P., Pignatti, S., Rodwell, J.S., Capelo J., Weber H.E., Solomeshch, A., Dimopoulos, P., Aguiar, C., Hennekens, S.M., Tichý, L. (2016). Vegetation of Europe: hierarchical floristic classification system of vascular plant, bryophyte, lichen, and algal communities. *Appl. Veg. Sci*., 19:3–264.

Oprea, Ad. (1998). Flora şi vegetaţia din Câmpia Tecuciului şi bazinul inferior al Siretului (jud. Galaţi), Teză doctorat. Univ. "Al. I. Cuza" Iaşi.

Paraschivu, M., Ciobanu A., Cotuna O., Paraschivu M. (2020). Assessment of the bacterium Erwinia amylovora attack on several pear varieties (Pyrus communis L.) and the influence on fruits sugar content. *Scientific Papers. Series B. Horticulture*, vol LXIV, no.1: 163-168.

Paraschivu, M., Cotuna, O., Paraschivu, M., Ciobanu A., Oltenacu, C.V. (2021). Infection of Erwinia amylovora on different apple varieties and the impact on fruits quality. *Scientific Papers. Series B, Horticulture*. Vol. LXV, No. 1: 219-227.

Paraschivu, M., Cotuna, O. (2021). Considerations on COVID 19 impact on Agriculture and Food Security and forward-looking statements. *Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development*, Vol. 21, Issue 1: 573-581.

Păun, M. (1966). Asociaţiile de buruieni (buruienăriile) din culturile, pajiştile, şi locurile ruderale din Raionul Balş. Regiunea Oltenia. *Bul. Ştiinţific Vol. VIII. Institutul Agronomic "T. Vladimirescu"*: 27-41. Craiova.

Păun, M., Pop, L. (1970). Cercetări privind dinamica îmburuienării la porumbul cultivat în monoculture cu aplicarea de atrazine şi folosirea unui număr diferit de lucrări ale solului. *Anal. Univ. Craiova, Seria a III-a. Biologie-Ştiinţe Agricole. Vol. II (XII)*: 363-377. Craiova.

Păun, M., Popescu, Gh., Cârţu, D., Cârţu, M., Maloş, C. (1975). Asociaţiile de buruieni identificate în culturile agricole din sudul Olteniei. *Anal. Univ. din Craiova Vol. VI (XVI*): 49-53. Craiova.

Păun, M., Popescu, Gh., Dumbrăvescu, I. (1979). Cercetări asupra asociaţiilor de buruieni din culturile agricole din lunca Oltului între Călimăneşti şi Drăgăşani, jud. Vâlcea. *Anal. Univ. Craiova, Vol. X (XX)*: 21-26. Craiova.

Păun, M., Popescu, Gh. (1983). Observaţii asupra gradului de îmburuienare a culturilor din zona colinară a Olteniei. *Analele Univ. din Craiova, XIV (XXIV)*: 15-19.

Pedrotti, F. (2021). Vegetation geoseries of the Ortles-Cevedale massif (central Alps, Italy) and their phytogeographic significance. *Bocconea* 29: 245-261.

Popescu, Elena. (1975). Cercetări asupra buruienilor din culturile agricole din zona Rm. Vâlcea-Drăgăşani. *Stud. Şi Cercet., C.C.E.S. Mehedinţi*: 151-155.

Popescu, A., Sanda, V., Doltu, M.I., Nedelcu, G.A. (1984). Vegetaţia Câmpiei Munteniei, Stud. Comunic., *Muz. Şt. Nat. "Brukenthal"* Sibiu, 26: 173-241.

Prodan, I. (1939). *Flora pentru determinarea şi descrierea plantelor ce cresc în România*. *Vol. II. Noţiuni generale de Fitogeografie*. *Fiziografia generală a României*. *Fitogeografia României*. 713 pag. Tipografia "Cartea Românească" Cluj.

Răduţoiu, D. (2009). Data about the segetal flora from Calafat-Bechet area. *Stud. Com. Ştiinţele Naturii. Muzeul Olteniei. Oltenia Journal for Studies in Natural Sciences*. Vol. XXV: 37-40.

Răduţoiu, D. (2008). *Flora şi vegetaţia Bazinului Cernei de Olteţ*. Edit. Sitech. Craiova. 407 pag.

Răduţoiu, D., Simeanu, C.G., Cichi, M. (2009). Phytocenological studies in orchard from SDE. Banu Mărăcine - Dolj. *Lucrări Ştiinţifice, Seria Horticultură*. Anul LII - Vol. 52. pp. 89-94.

Sanda, V., Popescu, A., Stancu, D. I. (2001). *Structura cenotică şi caracterizarea ecologică a fitocenozelor din România*. 359 pag. Edit. CONPHIS, Bucureşti.

Sanda, V. (2002). *Vademecum cenostructural privind covorul vegetal din România*. 331 pag. Edit. Vergiliu. Bucureşti.

Sanda,V., Răduţoiu, D., Barabaş, N., Biţă-Nicolae, C., Blaj-Irimia I. 2007. *Breviar fitocenologic* (partea III-a). 286 pag. Edit. Sitech. Craiova.

Simeanu, C. G., Măceşeanu D.M., Răduţoiu, D. (2019). The actual state of psamophilic flora and vegetation in

Oltenia region (Romania). *Oltenia. Studii şi comunicări. Ştiinţele Naturii*. Tom. 35, No. 2: 78-83.
Simion, I. (2017). Sedum caespitosum (Cav.) DC. – a study concerning the presence of this plant in Oltenia. *AAB Bioflux*, Volume 9, Issue 3: 146-153.
Sîrbu, C. (2004). Segetal vegetation from Cotnari, Iaşi and Huşi vineyards. A*nalele ştiinţifice ale Universităţii "Al. I. Cuza" Iaşi*.Tomul L, s. II a. Biologie vegetală: 99-112.
Soó, R. (1947). Revue systématique des associations végétales des environs de Kolosvár, *Acta Geob. Hung*. (Ser. nov. 1), 6(1): 1-50.
Spiridon, L. (1970). Asociaţii de buruieni specifice culturilor de prăşitoare din împrejurimile oraşului Bucureşti, *Acta. Bot. Horti Bucurestiensis*: 215-227.
Ştefan, N., Horeanu, C., Ilaş, C. (1987). Contribuţii la cunoaşterea vegetaţiei segetale din judeţul Neamţ, *An. Şt. Univ. "Al. I. Cuza" Iaşi, Secţ. II-a. Biol*., 33 : 31-33.
Țopa, E., Boșcaiu, N. (1965). O buruiană periculoasă: Ambrosia artemisiifolia L. În România. *Com. Bot*. III: 131-136. București.
Velea, L., Bojariu, R., Burada, C., Udristioiu, M.T., Paraschivu, M., Burce, R.D. (2021). Characteristics of extreme temperatures relevant for agriculture in the near future (2021-2040) in Romania. *Scientific Papers. Series E. Land Reclamation, Earth Observation & Surveying, Environmental Engineering*. Vol. X: 70-75.
Vicol, EC. (1971). Un alergen periculos pe cale de răspandire: Ambrosia artemisiifolia L. *Stud. Cerc. Biol, Ser. Bot*. 23(5): 461-466.
Vițalariu, Gh. (1973). Contribuții la cunoașterea vegetației ruderale din Moldova. *Stud. și Com. Muz. Șt. Naturii*, Bacău: 333-342.
Viţălariu, G., Horeanu, C. (1989). Contribuţii la cunoaşterea vegetaţiei antropofile din România. *Anuarul St. Comunic. Muz*. Suceava, 165-178.