



DE GRUYTER
OPEN

DOI 10.1515/pesd-2015-0033

PESD, VOL. 9, no. 2, 2015

ASPECTS REGARDING THE ANTHROPIC INFLUENCE ON THE “MOVILA LUI BURCEL” PROTECTED AREA (VASLUI COUNTY)

Irimia Irina¹, Ambrono Valentina¹, Stratu Anișoara¹

Key words: anthropic influence, protected area, rare species

Abstract: This paper underlines some aspects regarding the anthropic influence on the “Movila lui Burcel” protected area. There were done some periodical displacement and observations in the field (2012-2014); there were identified anthropic factors with negative influence on the protected area; there were described the effects of the action of these factors. The anthropic factors with negative influence identified on the territory of the protected area are: the existence of the plantations of black locust (*Robinia pseudoacacia*) and Russian olive (*Elaeagnus angustifolia*); unreasonable grazing; presence of wastes and some fire hearths. The effects of the anthropic factors identified are represented by: modifications of the habitat with serious consequences on the existence and perpetuation of rare and vulnerable species included on the red lists; degrading of landscape.

Introduction

A known way to preserve *in situ* the biodiversity is to create the system of protected areas. The network Nature 2000 combines the objectives to preserve the biodiversity with those of durable social and economic development (Mănoiu et Brânzan, 2013).

At European and also national level, biodiversity is affected by a series of anthropic factors (urban expansion, development of the infrastructure, over-exploiting of the ecosystems, changes in the use of fields, etc.) and natural (climatic changes). Among the consequences of these factors are mentioned: destruction, degrading and fragmenting of the habitats; modification of landscape; reduction in number and disappearance of some species (Planul de acțiune al UE privind biodiversitatea, 2010; Raport național privind starea mediului – anul 2012).

¹ Faculty of Biology, “Alexandru Ioan Cuza” University of Iași, Romania

According to the Plan of action of the European Union regarding bio-diversity (2010), the majority of the natural areas existent in Europe, including the areas within the network Nature 2000, are exposed to threats (pollution, intensification of using the fields, etc.). Currently, it is considered that the majority of the ecosystems in Europe are in a degraded state.

It is known that the maintaining the structural and functional integrity of the ecosystems within the protected areas allows them to face the anthropic and natural pressure, thus influencing favourably also the ecosystems in the not protected areas.

Among the types of protected areas at natural level, the natural reserves are the most numerous. The "Movila lui Burcel" hill has been declared botanical natural reserve in 1973; it is unique or one of the few steppe reserves in Romania, protecting and preserving thermophilic floristic elements of special scientific importance (Dobrescu et Leocov, 1982).

"Movila lui Burcel" is a protected area of national interest (natural reserve of botanical interest); it occupies a surface of 12 ha (Anexa I a Legii nr. 5/2000, poziția 2775). It is located on the territory of the commune Miclești in Vaslui County. According to the classification I.U.C.N., the natural reserves belong to the category IV – area of habitat/species administration (OUG 57/2007; Primack et al., 2002).

Since 2007, the protected area "Movila lui Burcel" has been declared site of community importance (**ROSCI0117**) within the network Nature 2000 (OM MMDD nr. 1964/2007), for three species of community interest: two species of cormophytes (*Echium russicum* and *Iris aphylla* ssp. *hungarica*), a species of mammals (*Spermophilus citellus*); the type of habitat 62C0* (Ponto-Sarmatic steppes). The geographic coordinates of the SCI are: 46°50'59"N and 27°48'12"E (Mănoiu et Brânzan, 2013).

Apart from the type of habitat and the species protected at European level, within the reserve there are many species of rare plants from Moldavia's flora; these species there are currently included on the red lists in Romania. The rare taxa found on the territory of the reserve are: *Adonis vernalis* L., *Adonis volgensis* Steven ex DC., *Adonis x hybrida* C. F. Wolff ex Nyman, *Allium moschatum* L., *Astragalus dasyanthus* Pall., *Astragalus glaucus* M. Bieb., *Astragalus pubiflorus* DC., *Centaurea marschalliana* Spreng., *Cirsium serrulatum* (M. Bieb.) Fisch., *Kengia bulgarica* (Bornm.) Packer, *Crocus reticulatus* Steven ex Adams, *Dianthus capitatus* Balb. ex DC., *Galium volhynicum* Pobed., *Goniolimon besserianum* (Schult. ex Rchb.) Kusn. *Hyacinthella leucophaea* (K. Koch) Schur, *Iris aphylla* L., *Iris pontica* Zapal., *Salvia aethiopis* L. and *Salvia nutans* L. (Horeanu et Cogean, 1981, Dobrescu et Leocov, 1982, Irimia et Mânzu, 2013). The taxa are classified in one of the sozologic categories on the national red lists elaborated by:

Oltean et al., 1994; Boșcaiu et al., 1994; Dihoru et Dihoru, 1994; Negrean, 2001; Sârbu et Chifu, 2003; Oprea, 2005; Dihoru et Negrean, 2009.

On the territory of the protected area, on the top of the “Movila lui Burcel” hill, there is a statuary group which fragmented/reduced the surface occupied by its characteristic vegetation. Also, on the slopes with the steppe vegetation (Pontic, sub-Mediterranean and continental elements), as well as some very rare species, which should be protected, were planted the wooden species *Robinia pseudoacacia* (black locust) and *Elaeagnus angustifolia* (Russian olive), possibly to reduce the process of erosion of the soil and the landslide. The growth and development of these two species in the natural habitats prevent the natural succession of the vegetation, fact that can determine the elimination of the some rare species of the territory of the reserve in the case appropriate measures are not taken (Sîrbu et Oprea, 2011).

This paper has as purpose to underline some anthropic factors with negative influence on the “Movila lui Burcel” protected area.

1. Material and methods

From the geographic point of view, the territory of the “Movila lui Burcel” protected area is part of the Moldavian Central Plateau. It is the top of a hill, with an inclination of 15-25° (Mănoiu et Brânzan, 2013), presenting a rugged relief that led to several landslides and the accentuation of the phenomenon of erosion (Dobrescu et Leocov, 1982). The maximum altitude is 273 m. The main types of soil present in the protected area are: leached chernozem characteristic for the plane reliefs, the carbonated chernozem formed on the intensely eroded slopes, semi-carbonated chernozem and the regosols on the slopes with severe erosion (Mănoiu et Brânzan, 2013). The area is characterised by a continental climate of east-European type, with an average annual temperature of 8.4°C and the quantity of annual precipitations between 550-570 mm (Costică, 2012).

Field surveys and observations were made between 2012 and 2014. We identified the anthropic factors with unfavourable influence on the protected area; we followed the modifications on flora, vegetation and landscape.

2. Results and discussions

The field surveys and observations done in the area taken into study underlined that the uniqueness of this protected area is influenced negatively by a series of anthropic factors.

Anthropic factors with negative influence identified on the territory of the protected area are:

➤ Plantations of black locust (*Robinia pseudoacacia*) and Russian olive (*Elaeagnus angustifolia*) existing in the protected area (Fig. 1). These species are

placed as follows: *Robinia pseudoacacia* on slopes with exposure N-NE, S-SW, and *Elaeagnus angustifolia* on slopes W-SW (Costică, 2012). These two species are included on the list of invasive species at global level (*Robinia*, *Elaeagnus* - <http://www.issg.org>).



Fig.1. Plantations of *Robinia pseudoacacia* (a) and *Elaeagnus angustifolia* (b)

Robinia pseudoacacia is one of the most common species of invasive plants in Europe (Sîrbu et Oprea, 2011). In Romania the species was introduced in 1750 (Haralamb, 1967); in Moldova, the first mentioning dates from the beginning of the 19th (Sîrbu et Oprea, 2011). It is a heliophile species, moderately thermophile, xero-mesophile to mesophile, amphotolerant to pH, psamophile (Pârvu, 2000); it develops well on light, permeable, well-drained, wet, wet-dry, fertile soils (Nyárádi, 1957; Dumitriu-Tătăranu, 1960; Pârvu, 2000). It is a pioneer species; it has the capacity to fix the atmospheric nitrogen by symbiosis, reason for which it can colonize soils very poor in nutritive substances. The first plantations of black locust were formed in some areas of the country to fix and improve the degraded soils. Then, together with using the species in forest curtains of protection, it was extended and naturalized on large areas in all the regions of the country, because of the rhythm of rapid growth and intense capacity to form sprouts and root sucking (Dumitriu-Tătăranu, 1960; Pârvu, 2000; Sîrbu et Oprea, 2011).

The studies done underlined the fact that the plantations of black locust represent a threat in preserving the native vegetation in some area. On long term, they contribute to reducing the flora diversity. The reasons for this effect are multiple: the dry soil and the reduction of water and nutrient availability, because of the radial system very well developed; by rapid growth, by intense capacity to form sprouts and root suckers; by very intense transpiration; by shadowing the soil, it contributes to the disappearance of the heliophile species; fixing the atmosphere nitrogen because of root nodosities favours the elimination of native species and

installation of some nitrophile species (Dumitriu-Tătăranu, 1960; Haralamb, 1967; Pârvu, 2000; Enescu et Dănescu, 2013; Kastler et Samimi, 2013); it competes with the native species in attracting the pollinators; the allelopathy effect due to some phenolic compounds (Sârbu et Oprea, 2011).

Dobrescu et Leocov (1982) mentioned the existence of the black locust plantations in the “Movila lui Burcel” natural reserve and recommended to limit the extension of these plantations because of self seeding.

From the perspective of preserving biodiversity it is considered that the black locust plantations should be monitored attentively (Enescu et Dănescu, 2013), especially the ones located in the vicinity of the protected areas or in protected areas (such as the case of the protected area taken into account in this study).

Elaeagnus angustifolia was introduced as ornamental, melliferous plant, as well as to stabilize the degraded fields, realize the forest curtains of protection against wind and snow; it was gradually extended from the culture and it became invasive in Europe (Dumitriu-Tătăranu, 1960), as well as in North America (Katz et Shafroth, 2003). The first mentioning in Moldova was done by Czihack in 1836 (as cultivated species) and then by Szabo in 1841 in Iași (Sîrbu et Oprea, 2011).

It is a heliophile species, but somewhat shade tolerant; mesoxerophile-mesophile; mesotrophic; resistant to drought because of the root system well-developed, but also the morpho-structural adaptations of the leaves. Even though it is a species tolerant for the soil conditions (texture, fertility, soil reaction); it grows best in deep sandy soils, also tolerates a high content of salts in the soil (tolerant halophile) (Dumitriu-Tătăranu, 1960; Pârvu, 2005; Sîrbu et Oprea, 2011).

The species presents: deep roots; rapid growth when young; high capacity to regenerate by sprout and root sucking (Sîrbu et Oprea, 2011). The roots form nodosities because of the symbiosis with fixing actinomycetes of nitrogen (*Frankia elaeagni*), but also present ectotrophic mycorrhizae; because it enriches the soil in nitrogen, it favours the installation of nitrophile weeds (Katz et Shafroth, 2003). Because of the ecological tolerance, it can invade different habitats, competing with the native species in the habitats invaded for the factors of environment (light, water, nutrients) (Collins, 2002).

Sârbu et Oprea (2011) mention in Moldova the negative influence of this species, cultivated against erosion, which extended from these plantations to the detriment of the xerophile meadows. The authors mention the case of the “Movila lui Burcel” protected area, where *Elaeagnus angustifolia* and *Robinia pseudoacacia* were planted “on the slopes with steppe vegetation with very rare flora elements, which should be protected, but which will be surely eliminated by the development of these two invasive species.”

In the Plan of action of the European Union regarding biodiversity (2010) it is mentioned the fact that the invasive species represent an important cause to reduce biodiversity.

➤ Irrational grazing/overgrazing on the protected area (during inappropriate periods of time: March-July, rainy periods), especially on the slopes with exposure N-NW and W-SW, by flock of small herbivorous animals (sheep and goats). On the pastures near the protected area usually graze several flocks of small herbivorous animals. These pastures have low productivity (Dobrescu et Leocov, 1982), and in the period of study we noticed that they were overgrazed.

During the field surveys in 2013, we did not notice grazing flocks, but we identified several signs representing proof of inappropriate grazing (paths made by animals, traces of animals on soil still moist, many animal excrements, wool stuck on black locust twigs, grazed plants) (Fig. 2). In spring 2014, with removing the fence delimiting the protected area from the pastures nearby, the risk of exposure to irrational grazing increased (Fig. 3), in the conditions of not observing some measures regarding grazing in the protected areas of national interest.

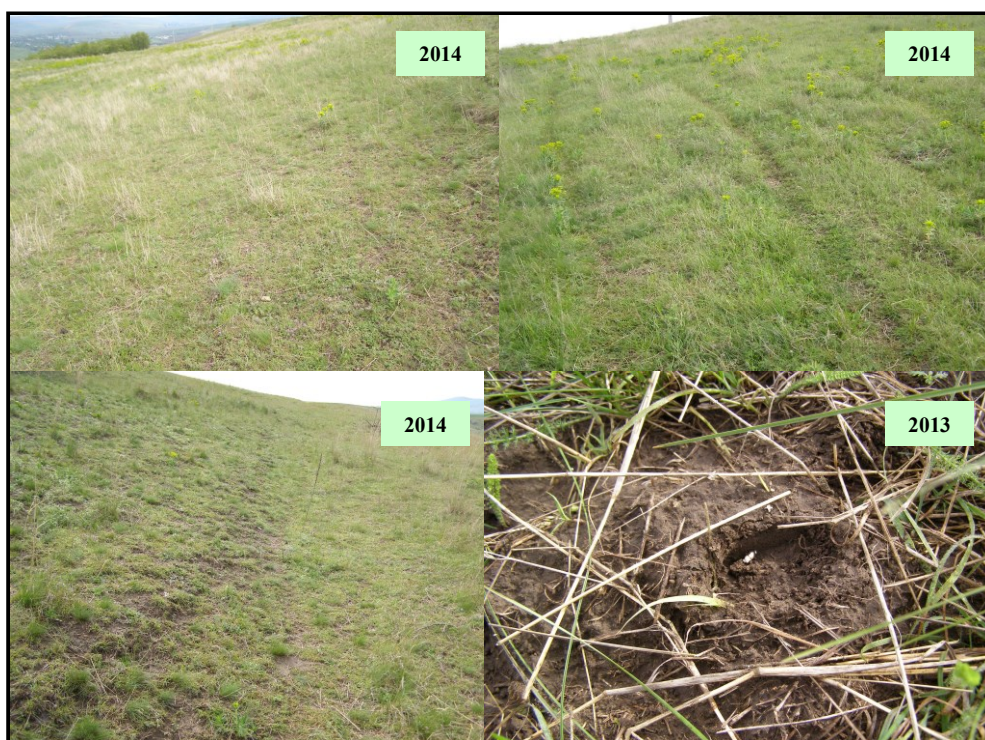


Fig. 2. Degradation of the habitat by the irrational grazing

The negative effects of the irrational grazing/overgrazing noticed on the protected area are: destruction of vegetation by consumption of aerial parts of the plants; treading the soil by moving the animals; emptying the underground parts of the plants of stepping on them; paths left from frequent movement of the animals that favour the installation of the process of erosion of the soil; the frequent movement of animals and the dejections left by them, favours the growth and development of harmful species (*Eryngium campestre*, *Carduus acanthoides* etc.) and toxic (*Euphorbia glareosa* etc.), fact which determines the modification of the floristic composition of the vegetal cover of the meadow.



Fig. 3. Grazing near the protected area and on the protected area

The destruction of the vegetation contributes to the reduction of the populations of protected species, but also other species in the phytocenosis. From the observations in the field done in spring 2014, it was noticed that some rare species are affected by grazing: *Iris pontica*, *Centaurea marschalliana*, *Astragalus dasyanthus* (Fig. 4).

Iris pontica is a perennial species by rhizome, heliophile, which develops on dry neutral soils, on sunny hills with grass. According to Dihoru and Negrean (2009), *Iris pontica* is a species critically endangered. The area where this species grows is from Transylvania to Central Asia. In Romania, the species is found in some places in Transylvania (Dihoru et Negrean, 2009), and in Moldova only in the “Movila lui Burcel” naturale reserve (Irimia et Mânzu, 2013). In the area studied, the species *Iris pontica* grows in the phytocenoses edified by *Festuca valesiaca* which are dominant, the species being exposed to grazing by animals. Leaves are eaten early (vegetative phenophase) by animals and cannot assure anymore the organic substances necessary to the fructification, as well as

depositing in the rhizome (to maintain the viability in periods of dormancy and plant regeneration) (Fig. 4).



Fig. 4. Species included on the national red lists: a – not grazed (2013), b – grazed (2014)

Boşcaiu et al. (1994) mentioned that the direct pressure on the populations of plants determine the reduction of the possibilities for their regeneration.

Another Pontic element, rare in the flora of our country, affected by irrational grazing, is *Centaurea marschalliana*. It is a heliophile, thermophile, xerophile

species, which grows on soils rich in calcium carbonate and reduced content of humus (Dobrescu et Leocov, 1982). The area of spreading this species is in Bulgaria, Moldova, Romania, Russia and Ukraine (Bancheva, 2008). In Romania, the species is found only in some counties in the east and south-east of the country (Sârbu et al., 2013). On the red lists in Romania, the species is classified in the category of the vulnerable species (Dihoru et Dihoru, 1994, Sârbu et Chifu, 2003), vulnerable/rare (Oltean et al., 1994), rare (Oprea, 2005). Because of the consumption of leaves, and the destruction of plants by stepping on them, because of grazing, the plants do not reach the phase of fructification, which is a risk for the species perpetuation. Even though it is perennial by rhizome (Prodan et Nyárady, 1964), the consumption of the aerial part and the destruction of the vegetation around, as well as the compaction of the soil (Fig. 4) represent factors that determine the numeric reduction of the population.

Pricop et al. (2010) identified two populations (with a reduced number of individuals) of *Centaurea marschalliana* on the territory of the “Movila lui Burcel” protected area and underlined the anthropic factors representing a risk for these populations. In their opinion, these factors were represented by the monachal constructions, the statuary groups that reduce the surface occupied by the steppe vegetation, as well as the ways of access to them.

In 1982, Dobrescu et Leocov mention the fact that this species formed dense populations, were in full expansion, the species not being able to cope with the cenotic competition.

Another rare species, Pontic-Pannonian, affected by grazing is *Astragalus dasyanthus*. It is a perennial species, heliophile, thermophile, xerophile (Sârbu et al., 2013), which grows on sandy soils, stones or calcareous, with reduced content of humus; on herb coasts, preferring South, South-West and West slopes (Ermolaev, 2007). According to Bădăraș et al. (2000), the area of this species is typically fragmented: the middle and inferior basin of Volga, the steppe and silvostepa in the North of the Black Sea, the woody steppe of the Pannonian Field, the North of the Balkan Peninsula. In Romania, the species is found in several enclaves of areal: Moldova Plateau, the range of mountains in North Dobrogea, the Transylvania Depression, and in one locality in Mehedinți County.

On the red lists in Romania the species is mentioned in the category of rare species (Oltean et al., 1994; Dihoru et Dihoru, 1994; Negrean, 2001; Sârbu et Chifu, 2003). We noticed that individuals in the population of the species were grazed before blooming/in the period of blooming (Fig. 4), which reduces the percentage of survival of the species, and of maintaining the population in the protected area. The populations of this species are placed on the slopes with West and South-West exposure, slopes under risk of irrational grazing/overgrazing, thus making vulnerable the populations of *Astragalus dasyanthus*.

In the literature in the field, there are studies regarding the reduction of the populations and the degrading of the habitat of this species, caused especially by overgrazing, as well as studies regarding the necessity of *in situ* preservation. According to Bădăraș et al. (2001) *Astragalus dasyanthus* together with two other species of the genus *Astragalus* (*A. excapus* L. ssp. *transsilvanicus* (Barth) Jáv. and *A. asper* Wulf.) are considered indicator species for the xerophile steppe phytocenoses well preserved; these species present a very low resistance to the anthropic impact on the phytocenoses (especially by overgrazing and pollution). Biogeographical research done by Bădăraș et al. (2001), in the Transylvania Depression underlined the negative influence of grazing, on the phytocenoses where there are present the populations of the three species mentioned above. Regarding the species *Astragalus dasyanthus*, in the case of the areas grazed by sheep, the authors noticed a numeric regression in the individuals of this species, the xerophile steppe phytocenoses being in the degradation and ruderalisation process. In the case of using the field as hayfield or pasture for the cattle, the populations of the species *Astragalus dasyanthus* are in general numerous, and the steppe vegetation is well preserved and the phytocenoses have high biodiversity.

According to Vicol (2009), because of the morphology of the oral appliance, the sheep can consume the plants at a distance less than 1 cm from the soil (in some cases even the underground parts), fact that reduces the capacity to remake/regenerate the plants and can lead to their disappearance in time.

The speed of reproduction in the species *Astragalus dasyanthus* by seeds, as well as vegetative ways in the laboratory is low (Ermolaev, 2007). Kožuharova et Firmage (2009) mention that the reproduction by seeds is reduced because: about 46% of the pollinated flowers form fruit and not all the mature ovules are transformed into seeds. In a low proportion, the flowers present the phenomenon of apomixis, the seedlings from these seeds having a very low rate of survival (Kožuharova et al., 2010), and the fruits and seeds can be destroyed by some insects (Kožuharova et Firmage, 2009).

According to Kožuharova et Firmage (2009), to preserve the populations of these species, it is important to protect the area where *Astragalus dasyanthus* grows and maintain the populations of pollinating insects (*Bombus* sp.). The results of the research regarding the germination of the seeds and the growth of the seedlings, done for the species *Astragalus dasyanthus* by Kožuharova et al. (2010), confirm the necessity to protect the native habitats, assuring thus its capacity of reproduction *in situ*.

According to Primack et al. (2002), the degrading of the vegetation by overgrazing determines the destruction of the ability of the vegetal communities to use the solar energy, leading to the reduction of the production of biomass and the

number of the populations of animals dependent by food relations on certain vegetal species.

In the Plan of action of the European Union regarding biodiversity (2010), it is shown the fact that 65% of the protected habitats and 52% of the protected species are in a state of unfavourable preservation, more affected being the species in the meadows, the coast areas and the agricultural areas.

Boșcaiu underlined in 1985 the fact that “the only real possibility to protect the endangered species remains thus to try and preserve the biological communities and the ecosystems where they belong”.

➤ The presence of waste of packages in the protected area (cans of aluminium, PETs, bottles, paper packages). This waste determines modifications of landscape and visual discomfort.

➤ Identification of some fire hearths (mainly on the slopes with S-SW exposure) resulted from burning the vegetal waste remained after cutting the black locust in autumn 2013 – winter 2014, fact that led to the destruction of the vegetal cover on some areas. The hearths represent a factor that can favor the process of soil erosion.

To all of these factors, it is added the climate changes in the latest years, which affects the conditions of habitat and implicitly the biological communities. The negative effects of the natural and anthropic factors can be combined, fact that determines their multiplication. We mention the fact that the threat to biodiversity has an effect also on society, which depends on the services of meadow ecosystem.

The facts presented above underline the insufficient involvement of the decisional factors in planning and implementing the measures regarding the preservation of the protected area.

Conclusions

The aspects presented above underlined for the period taken into account the existence of some negative anthropic influence on the protected area.

The effects of the anthropic factors identified (mainly the irrational grazing/overgrazing) consist in: modifications of the habitat with severe consequences (if appropriate measures are not taken) on the existence and perpetuation of the rare and vulnerable species included on the red lists and the degradation of the landscape.

References

- Bancheva, Svetlana** (2008), *Taxonomic revision and population status of Psephellus marschallianus (Centaureinae, Asteraceae) in Bulgaria*. Phytologia Balcanica, 14 (1), 57-60.

- Bădărău, Al. S., Dezs, Ș., Comes, O.** (2000), *Cercetări biogeografice asupra speciilor stepice-silvostepice de Astragalus L. din Depresiunea Transilvaniei (I)*. Studia Univ. Babeș-Bolyai, Geographia, 45, 2, 117-130.
- Bădărău, Al. S., Dezs, Ș., Man, T.** (2001), *Cercetări biogeografice asupra speciilor stepice-silvostepice de Astragalus L. din Depresiunea Transilvaniei (II)*. Studia Univ. Babeș-Bolyai, Geographia, 46, 1, 51-67.
- Boșcaiu, N.** (1985), *Criterii pentru constituirea și gestiunea ecologică a rezervațiilor botanice*. Ocrot. Nat. Med. Înconj., 29, 2, 126-135.
- Boșcaiu, N., Coldea, G., Horeanu, C.** (1994), *Lista roșie a plantelor vasculare dispărute, periclitare, vulnerabile și rare din flora României*. Ocrot. nat. med. înconj., t. 38 (1), București, 45-56.
- Collins, Emily.** (2002) - *Introduced Species Summary Project Russian Olive (Elaeagnus angustifolia L.)* – http://www.columbia.edu/itc/cerc/danoff-burg/invasion_bio/inv_spp_summ/Elaeagnus_angustifolia.htm (accessed 15.12.2014).
- Costică, M.** (2012), *Planul de management al sitului ROSCI0117 Movila lui Burcel*, 64 pp.
- Dihoru, G., Dihoru, Alexandrina** (1994), *Plante rare, periclitare și endemice în flora României – Lista roșie*. Acta Bot. Hort. Buc. (1993-1994), 173-197.
- Dihoru, G., Negrean, G.** (2009), *Cartea roșie a plantelor vasculare din România*. Edit. Acad. Rom., București, 630 pp.
- Dobrescu, C., Leocov, M.** (1982), *Contribuții floristice în rezervația "Movila lui Burcel" – Micleşti (jud. Vaslui)*. Culeg. Stud. Artic. Biol., Grăd. Bot. Iași. 2, 211-221.
- Dumitriu-Tătăranu, I.** (1960), *Arbori și arbuști forestieri și ornamentali cultivați în R.P.R.*, Ed. Agro-Silvică, București, 337-338, 626-629.
- Enescu, C. M., Dănescu, A.** (2013), *Black locust (Robinia pseudoacacia L.) – an invasive neophyte in the conventional land reclamation flora in Romania*, Bulletin of the Transilvania University of Brașov, Series II: Forestry - Wood Industry - Agricultural Food Engineering, Vol. 6 (55) No. 2, 23-30.
- Ermolaev, E.** (2007), *Research on conservation possibilities for Astragalus dasyanthus Pall. in the Republic of Moldova*. Int. Master Programme Swedish Biodivers. Centre. Master theses No. 33, Uppsala, 21 pp.
- Kožuharova, Ekaterina, Firmage, D.** (2009), *Notes on the reproductive biology of Astragalus dasyanthus Pall. (Fabaceae) a rare plant for Bulgaria*. Comptes rendus de l'Académie bulgare des Sciences, 62, 9, 1079-1088.
- Kožuharova, Ekaterina, Tzvetanova, Viktoria, Firmage, D.** (2010). *Seed germination and seedling development of two rare Astragalus species (Fabaceae)*. Phytologia Balcanica, 16, 1, 51-56.
- Haralamb, A.** (1967), *Cultura speciilor forestiere*. Ed. Agro-Silvică, București: 709-743.
- Horeanu, C., Cogean, I.** (1981), *Rezervații naturale și monumente ale naturii din județul Vaslui*. Vaslui, 50-53.
- Irimia, Irina, Mânzu, C.** (2013), *Iris pontica Zapal. in Moldova's flora (Romania)*. An. Șt Univ „Al. I. Cuza” Iași, s. II a. (Biol. Veget.), 59, 1, 45-51.

- Kastler, Bernadette, Samimi, C.** (2013), *The Impact of Robinia pseudoacacia on Ground Vegetation and Plant Nutrient Matter in Donau-Auen National Park*, 5th Symposium for Research in Protected Areas, 10-12 June 2013, Mittersill, 345-352.
- Katz, Gabrielle, Shafroth, P. B.** (2003), *Biology, ecology and management of Elaeagnus angustifolia L. (Russian olive) in Western North America*, Wetlands, 23, 4, 763-777.
- Mănoiu T (il.), Brânzan T (red.)** (2013). *Catalogul habitatelor, speciilor și siturilor Natura 2000 în România*. Fundația Centrul Național pentru Dezvoltare Durabilă. SC Exclus Prod S.R.L. & R.A. Monitorul Oficial, București, 425.
- Negrean, G.** (2001), *Lista roșie a plantelor din România existente în pajiști (Inclusiv endemite și subendemite) (Tracheophyta)*, in : Coldea Gh. et al. Ghid pentru identificarea și inventarierea pajiștilor seminaturale din România. Edit. Alo, București, 30-58.
- Nyárady, A.** (1957), *Robinia L.*, in: Săvulescu T. (ed.). Flora Republicii Populare Române, V. Edit. Acad. R.P.R., București: 245-250.
- Oltean, M., Negrean, G., Popescu, A., Roman, N., Dihoru, G., Sanda, V., Mihăilescu, Simona** (1994), *Lista roșie a plantelor superioare din România*. Studii, sinteze, documentații de ecologie. 1. Acad. Rom., Institutul de Biologie, 52 pp.
- Oprea, Ad.** (2005). *Lista critică a plantelor vasculare din România*. Edit. Univ. „Al. I. Cuza”, Iași, 668 pp.
- Pârvu, C.** (2000), *Universul Plantelor. Mică enciclopedie*. Edit. Enciclopedică, București, 581-582.
- Pârvu C.** (2005), *Enciclopedia plantelor: plante din flora României*. Vol. IV, Edit. Tehnică București, 365-366.
- Pricop, E., Negrea, B.-M., Gherghel, I., Popescu, I., E.** (2010), *The situation of Centaurea marschalliana Spreng. (Asteraceae: Centaureinae) population from “Movila lui Burcel” natural reserve (Vaslui county, Romania) and the negative impact in this protected area of religious buildings raised up inside the site*. AES Bioflux, 2, 1, 91-96.
- Primack, R. B., Pătroescu, Maria, Rozyłowicz, L., Ioja, C.** (2002), *Conservarea diversității biologice*, Ed. Tehnică, București, 292 pp.
- Prodan I., Nyárady E. I.** (1964), *Centaurea L.*, in: Săvulescu T. (ed.). Flora Republicii Populare Române, IX. Edit. Acad. R.P.R., București, 785-951.
- Sârbu, I., Chifu, T.** (2003), *Lista roșie a plantelor vasculare din Moldova*. Mem. Sect. Șt., ser. IV, 24 (2001), 131-151.
- Sârbu, I., Ștefan, N., Oprea, Ad.** (2013). *Plante vasculare din România: determinant ilustrat de teren*, Edit. victorBvictor, București, 1320 pp.
- Sîrbu, C. (coord.), Oprea, Ad.** (2011), *Plante adventive în flora României*. Edit. „Ion Ionescu de la Brad”, Iași, 181-187, 207-210.
- Vicol, Ioana** (2009), *Factori cu impact negativ asupra habitatelor din cadrul Rezervației Biosferei Retezat*. Ecos, 21, 15-20.
- ***, Legea nr. 5/2000 - Privind aprobarea Planului de amenajare a teritoriului național - Secțiunea a III-a - zone protejate - http://www.mmediu.ro/beta/wp-content/uploads/2012/07/2012-07-26_legislatie_arii_protejate_legea5din2000amenajareteritoriuzoneprotejate.pdf (accesed 15.12.2014)

- ***, OM MMDD nr. 1964 din 13 decembrie 2007- Privind instituirea regimului de arie naturală protejată a siturilor de importanță comunitară, ca parte integrantă a rețelei ecologice europene Natura 2000 în România - http://www.mmediu.ro/app/webroot/uploads/files/2012-07-25_legislatie_arii_protejate_ordin1964din2007scinatura2000%281%29.pdf (accesed 15.12.2014)
- ***, OUG 57/2007 - http://www.batlife.ro/wp-content/uploads/2010/03/doc_02_OU_257_20071.pdf (accesed 15.12.2014)
- ***, Planul de acțiune al UE privind biodiversitatea: Evaluare 2010 - http://ec.europa.eu/environment/nature/info/pubs/docs/2010_bap_ro.pdf (accesed 15.12.2014)
- ***, (2013), Raport național privind starea mediului – anul 2012. Ministerul Mediului și Schimbărilor Climatice, Agenția Națională pentru Protecția Mediului, București - http://www.anpm.ro/anpm_resources/migrated_content/uploads/116008_RSM-2012.pdf (accesed 15.12.2014)
- ***, *Elaeagnus* -<http://www.issg.org/database/species/ecology.asp?si=216&fr=1&sts=sss&lang=EN> (accesed 15.12.2014)
- ***, *Robinia* -<http://www.issg.org/database/species/ecology.asp?si=572&fr=1&sts=sss&lang=EN> (accesed 15.12.2014)