# RESEARCH REGARDING THE ALIEN PLANT SPECIES IN THE SATU MARE COUNTY

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**ABSTRACT.** Alien (non-native) species biological invasions are widely recognized as a serious threat to environments and economies throughout the world. Alien invasive plants are becoming recognized by some authorities as another component of global environmental change. The decrease in biological diversity is a concern among many ecologists, and invasive plants are seen as a threat to ecosystem health. In studying invasion ecology, an introduced species should be treated as an alien to the natural ecosystem because it would not be there without human intervention. Alien invasive plants have become firmly naturalized in most habitats of Europe and Romania. Often, the spread of alien species also poses an increasing risk to human health and socio-economic values. In this paper, a list of alien plant species recorded from Satu Mare county in the last years is presented. These species are discussed regarding their impact to the ecosystems, immigration modes, invasive status, geographical origins, dispersal mechanism, their distribution, main infestation sites etc. The most dangerous alien species for semi-natural and natural habitats in the investigated territory are identified.

**Keywords:** alien species, invasive species, non-native, environmental change, ruderal communities, xenophytes, hemerophytes

## INTRODUCTION

Situated in the north part of the country, Satu Mare County is neighboured with Maramures County, Bihor County, Sălaj County, the north border is the same with the country's frontier with Ukraine and the west border is with de Hungarien.

It has a total surface of 4,405km$^2$ of varied relief in it's morphology and with complex geological structures. The plain area belongs to the West plain, and the mountain area (in North of county) belongs to the North branch of Oriental Carpathians and it is formed by hills, plateaus and piedmont, and the low region (depressions, meadows and terraces). The main mountain unities are: Oasului Mountains and Codrului's Peaks.

The waters network includes large rivers such as: Somes, the main river gathering water flows from Codrului's Peak, from Ierului plane and from Ecedea meadows; in North Tisa, wich, gathering the water flows from Maramures Mountains through the Viseu, Iza and Mara rivers. They are also some smaller rivers such as: Homorod, Crasna.

Some humid, swampy areas, both eutrophic and oligotrophic, with specific vegetation are part of the region, in Oas Mountains.

Climate: prevalent atmospheric streams from the west and the north - west and the shelter of mountains that surround the area determine its climatic set up

temperate with continental hints. The annual average temperatures are 8-9°C. The rainfalls are 600-700 mm/year.

Flora overview. Euro - Asian species largely prevail in the regional flora (50,9%). In various geologic periods have also adapted: circumpolar species (9%), central- European species (7%), a few south - Mediterranean species (4,9%) and other continental elements. Flora – wise, this territory belongs to the Euro - Siberian area.

## MATERIAL AND METHODS

The presence distribution in the territory and invasive character of lien plant species are documented on the grounds of our recent (1998-2008) field works. Data from some plants collections and information ( Karacsonyi 1995) in the literature are also used.

## RESULTS AND DISCUSSIONS

The alien (non-native) flora of Satu Mare county consists of 97 vascular taxa, belonging to 92 species with 10 subspecies, from 67 genera and 37 families. On the whole, the next families are best represented: *Asteraceae* (21,64%), *Brassicacea* (7,2%), *Graminee* (7,2%), *Amaranthaceae* (6,18%), *Leguminosae* (5,15%).

These main families comprise 47,37% of alien taxa in this territory.

We give below a sistematic list of the identified species, specifying their locations:

***Fam. Salicaceae***

1. *Populus x canadensis* Moench (*deltoides x nigra*), Satu Mare, Carei, Apa, Livada.

***Fam. Juglandaceae***

2. *Jugland regia L.* Nirului plane, Ciumesti, Bixad,, Satu Mare, Codru's peak.
3. *Juglans nigra L* Satu Mare, Urziceni, Carei, Ganaş.

***Fam. Fagaceae***

4. *Quercus rubra L (Quercus borealis)* Foieni, Scărişoara Nouă, Răteşti, Someşului plane, Sărvăzel.

***Fam. Ulmaceae***

5. *Ulmus pumila L*
   - *var. pinnato-ramosa* (Koehne) Henry, Nirului plane, Urziceni, Carei.

***Fam. Moraceae***

6. *Morus alba L.,* Nirului plane, Crasnei plane, Mărtineşti, Tătăreşti, Cuţa, Soconzel.

***Fam. Cannabaceae***

7. *Cannabis sativa L.* subspont. Nirului plane, Ierului plane, Ecedea plane, Crasnei, plane.
   - subsp. s*pontanea* Serebr.

***Fam. Polygonaceae***

8. *Polygonum orientale L.*, Satu Mare, Carei.
9. *Reynoutria japonica* Houtt., (*Polygonum cuspidatus)* , Bogdand, Ser, Bicău, Bârsău de Sus, Călineşti Oaş, Remetea Oaşului, Bixad, Negreşti – Oaş.

***Fam. Chenopodiaceae***

10. *Atriplex hortensis L.* Foieni, Carei, Andrid, Tiream, Oar, Satu Mare, Hodişa, Huta Certeze.
11. Chenopodium botrys L. sandy flats, gardens Bogdand.
12. *Chenopodium murale L.* Pişcolt, Berveni, Dindeşti, Satu Mare, Hodod, Cuţa. Corund, Hodod.
13. *Kochia scoparia (L) Schrader* Carei, Ady Endre, Tiream, Tăşnad, Oraşu Nou.

***Fam. Amaranthaceae***

14. *Amaranthus albus L.* Poiana Codrului.
15. *Amaranthus blitoides S. Watson* Resighea, Sanislău, Căuaş, Carei, Pir, Santău, Moftinu Mic, Ghilvaci, Supuru de Jos, Supuru de Sus, Secherea. Disturbed habitats, roadsides, riverbanks, railroads, fields, waste places, sandy flats
16. *Amaranthus crispus (Lesp.&Thév.) N. Terrac* Ghilvaci, Dara, Odoreu, Culciu Mare, Săuca, Silvaş, Tăşnad, Blaja. Disturbed habitats, roadsides, railroads, fields, gardens.
17. *Amaranthus hypochondriacus L (A.hybridus L.)* Satu Mare, Piscolt, Carei. Somesului plane.
18. *Amaranthus lividus L. (A. blitum L.)* Resighea, Carei, Medieşu Aurit, Turulung Vii, Huta Certeze.
19. *Amaranthus retroflexus L.* – f. *simplex* Priszter – Negreşti Oaş. Poiana Codrului.

***Fam. Phytolacaceae***

20. *Phytolaca americana L.* Foieni, Berveni, Carei, Ghenci, Medieşul Aurit, Prilog Vii.

***Fam. Portulacaceae***

21. *Portulaca oleracea L.* subsp. *Oleracea* Hodod, Solduba.

***Fam. Caryophyllaceae***

22. *Agrostemma ghitago L. (pe cale de dispariţie)* Ciumeşti, Carei, Berveni, Sudurău, Ambud, Soconzel, Lechinţa .
23. *Dianthus barbatus L.*
    - subsp. *barbatus,* Turulung, Negreşti Oaş.

***Fam. Brassicaceae***

24. *Armoracia rusticana P. Gaertner, B. Meyer&Scherb* Blaja, Hurezu Mare, Racova, Oraşu Nou Vii, Vama Negreşti Oaş, Certeze, Satu Mare.
25. *Brassica rapa L. emed. Metzger*
    -subsp. *Rapa*
    - subsp. *campestris (L) Clapman* Aciua
26. *Brassica x napus* L. emed. Metzger,
    - convar. *napus*
27. *Eruca versicaria (L) Cav.*
    -subsp. *sativa (Miller)Thell* (*Eruca sativa Miller)* Dindeşti.
28. *Lepidium densiflorum Schrader* Foieni, Resighea, Pişcolt.
29. *Lepidium virginicum L.* Foieni, Pişcolt, Resighea, Marna Nouă, Carei, Supuru de Jos, Satu Mare, Medieşu Aurit, Apa, Supuru de Jos, railway station.
30. *Sinapis alba L* . Horea, Sanislău, Satu Mare.

***Fam.* Crassulaceae**

31. *Sedum reflexum L. (S. rupestre L.)* Pir, rare.
32. *Sedum spectabile Boreau* Acâş railways.
33. *Sedum spurium Bieb.* Pir, Supuru de Jos, Dobra.

***Fam. Grossulariaceae***

34. *Ribes rubrum L.* sălbăt. La Foieni, Săcăşeni, Pir.

***Fam. Rosaceae***

35. *Fragaria x magna Thuill. (Fragaria x ananasa Duchesne) (chiloensis x virginiana)* Turulung, Halmeu, Babţa.
36. *Fragaria x hagenbachiana Lang (vesca x viridis)* Turţ.
37. *Prunus serotina Ehrh. (Padus serotina (Ehrh. Borkh..)* Ganaş, Răteşti, Becheni, Hodod, Dobra, Solduba, Călineşti Oaş.
38. *Rosa rugosa L.* Foieni, Răteşti, Şărvăzel, Crucişor.

*Fam. Caesalpiniaceae*

39. *Gleditsia triacanthos L* Nirului plane, Ghenci, Someşului plane.

***Fam. Leguminosae***

40. *Amorpha fruticosa L* Carei, Ghenci, Ruşeni, Sărătura. Satu Mare.
41. *Medicago sativa L* frecventă


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42. *Medicago x varia Martyn (falcata x sativa)* Moftinu Mic, Căuaş, Dob, Tiream, Ambud, Tăşnad, Săcăşeni, Oraşu Nou.
43. *Robinia pseudacacia L* locally abundant.

***Fam. Oxalidaceae***

44. *Oxalis corniculata L* Chilia, Carei, Ardud, Băbăşeşti, Mărius, Tarna Mare, Turţ.
45. Oxalis europaea Jord. Disturbed habitats, roadsides, riverbanks, railroads, fields, waste places, sandy flats. Homorod.

***Fam. Linaceae***

46. *Linum usitatissimum L.* Poiana Codrului.

***Fam. Euphorbiaceae***

47. *Euphorbia marginata Pursh* Istrău.

***Fam. Anacardiaceae***

48. *Rhus typhina L.* Satu Mare, Cămin, Tiream, Halmeu Vii.

***Fam. Aceraceae***

49. *Acer negundo L* Căpleni, Ghenci, Micula.

***Fam. Balsaminaceae***

50. *Impatiens glandulifera Royle (I. roylei Walpers)* Mărius, Poiana Codrului, Tarna Mare.

***Fam. Vitaceae***

51. *Parthenocissus inserta (Kerner) Fritsch (P.quinquefolia* auct) Vama, Bixad.
52. *Vitis vinifera L.* subsp. *vinifera* Carei, Pir, Blaja, Oaş; subsp. *sylvestris (C.C. Gmelin)Hegi (V. sylvestris C.C. Gmelin)* Satu Mare.

***Fam. Malvaceae***

53. *Sida spinosa L.* Carei, railways.

***Fam. Cucurbitaceae***

54. *Echinocystis lobata (Michx) Torrey & Gray* Urziceni, Carei, Viisoara, Ganas, Tiream, Piru Nou, Sudurau, Lunca Crasnei, Lunca Somesului, Cehalut, Corund, Racsa, Vama, Remetea Oasului, Calinesti Oas.
55. *Thladiantha dubi Bunge* Piscolt, Portita, Carei.

***Fam. Onagraceae***

56. *Oenothera biennis L.* Nirului plane, Capleni, Carei, Hotoan, Giungi, Satu Mare, Oar, Pomi, Giorocuta, Crucisor.

***Fam. Umbelliferae (Apiaceae)***

57. *Anethum graveolens L.* Subspont. Carei, Tiream, Ardud.

***Fam. Oleaceae***

58. *Syringa vulgaris L.* Subspont. Muntele Mic de la Turulung.

***Fam. Asclepiadaceae***

59. *Asclepias syriaca L.* Piscolt, Sanislau, Scarisoara Noua, Calinesti Oas.

***Fam. Cuscutaceae***

60. *Cuscuta campestris Yuncker (C. arvensis auct.)*
    - *f. breviloba Buia* Satu Mare, Botiz. Culmea Codrului.

***Fam. Lamiaceae (Labiatae)***

61. *Elsholtzia ciliata (Thunb.) Hyl.* Racsa, Negrsti Oas, Turicelului valley and near railway station..
62. *Melissa officinalis L.* Subspontan. Dindesti, Silivas.

***Fam. Solanaceae***

63. *Lycium barbarum L. (L. halimifolium Miller)* subspontana, Pir, Sauca, Silvas. Poiana Codrului.
64. *Nycandra physaloides (L.) Gaertner* Dindesti, Dara.

***Fam. Compositae***

65. *Ambrosia artemisiifolia L.* Foieni, Horea, Sanislau, Piscolt, Berveni, Carei, Ghilvaci, Hotoan, Santau, Cean, Blaja, Ardud. Locally abundant.
66. *Aster novi-belgium L.* Subspontan, Urziceni, Foieni, Carei, Ghirisa, Ardud, Racova, Comlausa.
67. *Artemisia annua L.* Cultivată şi sălbăticită. Racova, Giurtelecu Hododului, Hurezu Mare.
68. *Erechites hieraciifolia (L) Rafin ex DC.* Dindesti, Terebesti, Satu Mare, Carei, Turulung – Vii, Livada, Hodod, Giurtelecu Hododului, Cuta, Marius, Batarci, Turt, Vama, Turt Bai. Hodod, Cuţa, Mărius.
69. *Erigeron annuus (L) Pers.*
    - s*ubsp. annuus (Stenactis annua (L) Nees)* frequent in Satu Mare county.
    - subsp. *strigosus (Muhl. ex Willd.) Wagenit (Stenactis strigosa (Muhl. ex Willd.)* Cheja, Medies Vii, Camarzana, Negresti Oas.
70. *Erigeron canadensis L. (Conyza canadensis (L) Cronq.)* frequent.
    - f. i*ntegrifolius Peterm.* Batarci. Necopoi.
71. *Galinsoga ciliata (Rafin.) S.F. Bake* Carei, Traian, Oar, Dara, Oas, Turt, Remetea Oasului, Racsa, Vama, Negresti Oas, Certeze, Huta Certeze.
    - var. *hispida D.C.* Certeze, Huta Certeze.
72. *Galinsoga parviflora Cav.* Comuna, frecventa. Tămăşeşti, Cuţa, Sâi.
73. *Heliantus annuus L.* Salbaticita Oas, Vama, Turt, Socond, Satu Mare.
74. *Helianthus decapetalus L.* Supuru de Jos, Somesului valley, Sacaseni, Necopoi.
75. *Helianthus tuberosus L* Foieni, Sanislau, Carei, Tiream, Dindesti, Ardud, Andrid, Pir, Chereusa, Becheni, Marius, Orasu Nou, Turt, Racsa, Vama. Mărius, Socond, Cuta.
76. *Helminthia echioides (L) Gaertner (Picris echioides L)* Satu Mare, Carei, Tasnad.
77. *Inula helenium L.* Urziceni, Piscolt, Carei, Hotoan, Pir, Satu Mare, Halmeu Vii, Turulung Vii, Cehalut, Tasnad, Blaja, Dobra, Beltiug, Homorodu de Jos. Tămăşeşti, Hurezu Mare.

78. *Matrichara discoidea D.C. (M. matricharioides (Less) Porter p.p. Chamomilla suaveolens (Pursh) Rydb)* frequent in Satu Mare county.
79. *Rudbeckia laciniata L.* Tiream, Turulung, Iegheriste, Crucisor, Borlesti, Halmeu, Vii, Tarna Mare, Turt, Iegheriste, Crucisor, Borlesti, Orasu Nou. Sâi.
80. *Solidago canadensis L.* Resighea, Care, Ghenci, Satu Mare, Oar, Dara, Nisipeni, Iojib, Sacaseni.
81. *Solidago gigantea Aiton, subsp. Serotina* (O. Kuntze) McNeill, Ganas, Siter.
82. *Solidago virgaurea L. subsp. virgaurea* Urziceni, Foieni, Ardud, Ratesti, Turulung, Turulung Vii
83. *Tanacetum parthenium (L.) Schultz- Bip. (Chrysanthemum parthenium (L.) Bernh.)* Camin, Giurtelecu Hododului, Batarci, Turt. Oţeloaia.
84. *Xanthium italicum moretti (X. strumarium L. subsp. italicum (Moretti) D. Löve)* Supuru de Jos, Homorodu de Mijloc, Halmeu Vii, Turt, Turt Bai, Racsa, Calinesti- Oas, Vama, Negresti Oas. Invasive.
    - var. *rubricaule Bitter* Turt. Homorodu de Mijloc.
85. *Xanthium spinosum L.* Frequent. Solduba.

***Fam. Liliaceae***

86. *Allium schoenoprasum L.*
    - subsp. s*choenoprasum* salbaticita Urziceni, Carei, Pir.
87. *Hemerocallis fulva (L.) L.* Subspont. la Turulung.

***Fam.Iridaceae***

88. *Sisyrinchium montanum E. L. Green* Bixad, Negresi-Oas, Certeze, rare.

***Fam. Juncaceae***

89. *Juncus tenuis Willd.* Frequent in Satu Mare county. Oas, Zona Codrului. Oţeloaia.

***Fam. Cyperaceae***

90. *Schoenoplectus mucronatus (L.) Palla (Scirpus mucronatus L.)* Domanesti, in *Oryza sativus* fields.

***Fam. Gramineae (Poaceae)***

91. *Dasypyrum villosum (L.) P. Candargy (Haynaldia villosa (L.) Schur)* Domanesti, Tiream, Hotoan, Cauas, Andrid.
92. *Eleusine indica (L.) Gaertner* Carei railways.
93. *Panicum capillare L.* Subspont. Nirului plane, Berea, Carei, Ganas, Tiream, Dindesti, Ardud, Porumbesti, Mediesu Aurit, Racova.
94. *Panicum dichotomiflorum Michx.* Carei, Marius.
95. *Panicum miliaceum L.* salbaticit Campia Nirului, Istrau, Domanesti, Santau.
96. *Setaria italica (L.) Beauv.* Ganas, Hotoan, Domanesti.
97. *Sorghum bicolor (L.)* Moench. Acas, Sacaseni, Marna Noua, Carei, Domanesti, Hotoan, Viisoara.

Of the total number of 97 de taxa of this alien flora (spontaneous or sub-spontaneous taxa) from the investigated territory, 41,24% (40) have been accidentaly (unintentionally) introduced (xenophytes), while 58,76% (57) have been initially introduced as cultivated plants (hemerophytes). With regard to the invasive status of xenophytes, the observations indicated that the majority of taxa are just naturalized (47,5%), a lot of species have an invasive character (32,5%), while (20%) are casual. Among heterophytes there are few taxa with invasive character (8,77%), some of taxa are naturalized (26,31%) and the most species are just casual (64,91%) (fig.1).

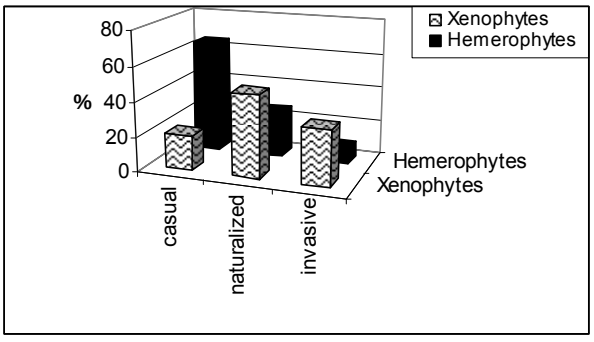


**Fig. 1** Invasive status of species

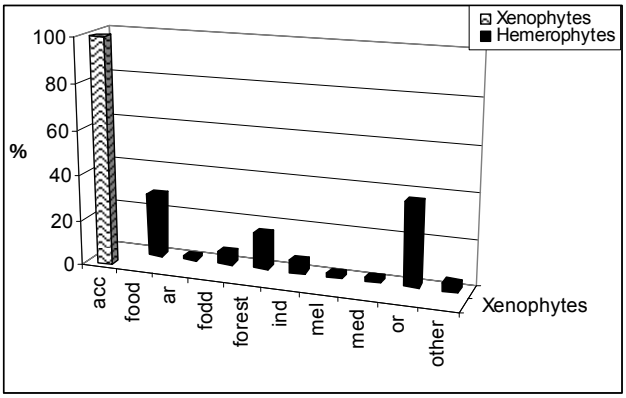


**Fig. 2** Immigration mode: accidental (acc) or deliberate with alimentary (al), aromatic (ar), fodder (fodd), forest, industrial (in), melliferous (mel), medicinal (med), ornamental (or), other.

Of the main species with an invasive character, that are or can be detrimantal to tha natural and anthropic ecosystems, we can enumerate: *Amaranthus albus, A. crispus, A. retroflexus, Ambrosia artemisiifolia, Erigeron canadensis, Erigeron annuus, Cuscuta campestris, Erechites hieracifolia, Galinsoga parviflora, Xantium italicum, Xantium spinosum* (xenophyte), respectively: *Amorpha fruticosa, Helianthus tuberosus, Impatiens glandulifera, Reinouttria japonica* (hemerophyte).

If all xenophytes have been accidentaly introduced in the region (through the migration of the peoples,

animals, urbanization, wars, trade or other activities), the hemerophyte plants have been introduced as: ornamental (36,84%), fodder (5,26%), alimentary (28,07%), industrial (5,26%), or other uses (fig.2).

Most xenophyte species came from North America (22 sp. 55%), South America (2 sp. 5%)) other came from: Mediterranean region (6 sp. 15%)) Central and South Europe (5 12,5%), Asia (5 sp. 12,5%). With regard to the hemerophytes origins we can see the situation: America (21 sp. 36,84%), Asia (15 sp. 26,31%)., Mediterranean region(6 sp. 10,52% ), Central and South Europe (9 sp. 15,78%3,50% ), Caucazian (2 sp. 3,50%), Africa (1 sp. 1,75%), South America (1 sp. 1,75%), Circ. (2 sp. 3,50%) (fig.3).

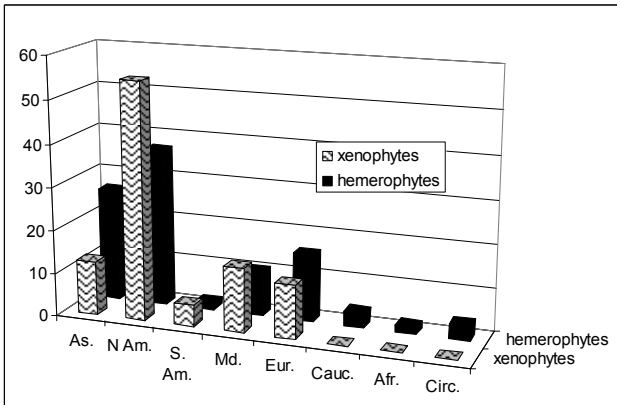


**Fig. 3** The origin of the species: As- Asia, N.Am – North America, S. Am – South America, Md- Mediterranean, Central and South Europe- Eur., Caucasian – Cauc., Africa – Afr., Circumpolar – Circ.

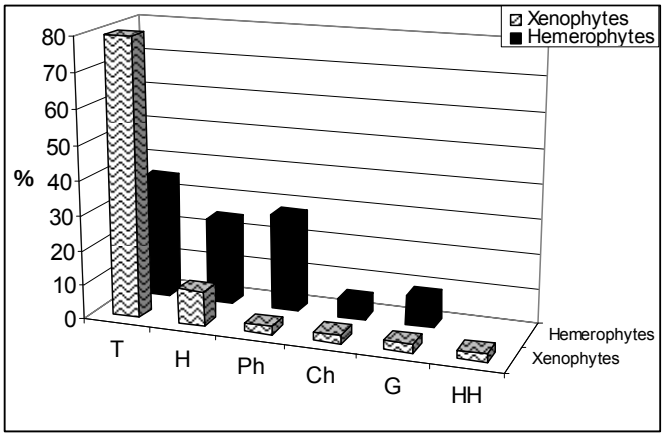


**Fig. 4** Raunkiaer's life forms: T-therophytes, H-Hemicryptophytes, G-geophytes, ch-chamaephytes, Ph-phanerophytes

The structure of Raunkiaer's life forms is also different at the xenophytes as against with hemerophytes: 80% oh xerophytes are therophytes, what emphasizes the pronounced pioneer character of the xenophyte flora; therophytes also prevail in the hemerophyte flora (35,08%), but in a smaller proportion, while the share of phanerophytes (28,04%) and hemicryptophytes (24,56%) becomes a significant one (fig.4).

*Table 1*

**The alien flora of the analised territory generally contains more polyploid (P) than diploid (D) species (D/P = 0,76). Nevertheless, polyploids only prevail in the xenophyte flora (D/P = 0,42), while the hemerophyte flora contains more diploids than polyploids (D/P = 0,9)**

| | D | P | D/P |
|---|---|---|---|
| Hemerophyte | 30 | 27 | 0,9 |
| Xenophyte | 12 | 28 | 0,42 |

Besides anthropochory, met at all analyzed species, the main means of natural spreading of the germs (seeds, fruits etc) are the anemochory in case of xenophytes (47,5%) and vegetativ propagation (by radicular buds, rhisomes, stolones etc) for hemerophyte plants (43,85%). The zoochory and autochory are also important (fig.5).

As a whole, the alien species from the investigated territory are identified (as accompanying, dominant or characteristic species) in vegetation units integrated in 22 order of the coenotaxonomic system. Ruderal communities of *Artemisietalia* order harbour 25% of xenophytes and 12,28% of hemerophytes (fig.). Other important ruderal communities that also shelter alien species belong to the next order: *Atriplici-Chenopodietalia* (xenophytes 15,78%, hemerophytes 12,28%), *Eragrostetalia* (12,5% xenophytes, 12,28% hemerophytes), *Centaureetalia cyani* (10% xenophytes, 2,5% hemerophytes), *Sisymbrietalia* (2,59% xenophytes, 3,50% hemerophytes), *Convolvuletalia, Lamio-Chenopodietalia,Sedo-Scleranthetalia, Bidentetalia.*

The natural vegetation affected by presence of the alien plants is represented in the territory by forest, pastures and meadows communities from several orders: *Quercetalia* (14,03%), *Fagetalia, Prunetalia, Sambucetalia, Rubo-Franguletalia, Alnetalia glutinosae, Festucetalia valesiacae* (5% xenophytes, 8,77% hemerophytes)*, Brometalia, Phragmitetalia, Nanocyperetalia.*

Some communities dominated by alien plants are also represented in Satu Mare county:

*Artemisietea* Lohm., Prsg., et Tx. 1950 (Art)

*Calystegietalia sepium* Tx. 1950 (Cl)

*Calystegion sepium* Tx. 1947 ex Oberd. 1949 (Cl.se.)

Rudbeckio-Brachypodietum silvaticae Szabó 1970, Poiana Codrului and Bicau.

*Helianthetum tuberosi* (Moor 1958) Oberd. 1967, *Helianthetum decapetali* Morariu 67. nom. nudum. Socondului Valley, Soconzel, Satu Mare.

*Convolvuletalia sepium* Tx. 1950

*Calystegion sepium* Tx. 1947 ex. Oberd.1949

*Helianthetum decapetali* Morariu 1967, nom. nudum Somesului Valley.

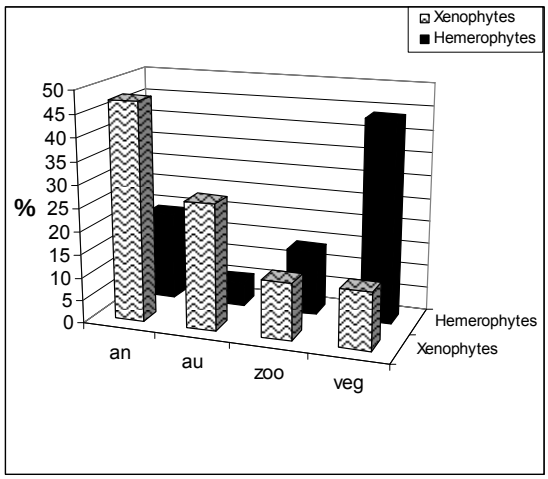


**Fig. 5** Means natural spreading of the germs: an anemochory, aut – autochory, zoo – zoochory, veg – vegetative

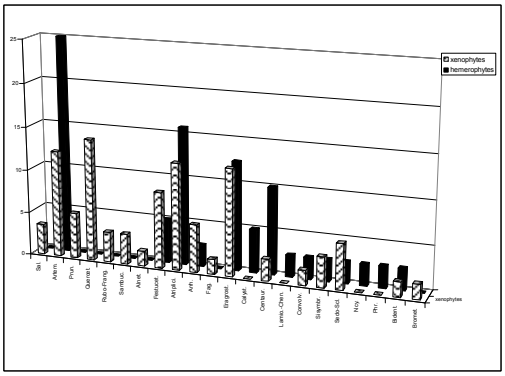


**Fig. 6** Syntaxa in wich the alien plants occur: Salicetalia purpureae Sal., Artemisietalia – Art., Prunetalia – Prun. Quercetalia – Querc., Rubo – Franguletalia – Rubo., Sambucetalia – Sambuc., Alnetalia glutinosaea – Alnet., Festucetalia valesiacae – Festuc., Atriplici-Chenopodietalia – Atrip., Arrhenatherethalia Arrh., Fagetalia – Fag., Eragrostetalia – Eragrost., Calystegetalia Calysteg., Centauretalia Centaur., Lamio – Chenopodietalia Lamio., Convolvuletalia – Convolv., Sisymbrietalia Sis., Sedo-Scleranthetea Sedo-Sclr., Nanocyperetalia Ncy, Phragmitetalia Phr., Bidentetalia Bident., Brometetalia Br.

## CONCLUSIONS

The alien (nonnative) flora of Satu Mare county consists of 97 vascular taxa belonging 92 species, 5 hybrids, 10 subspecies, 1 var., 1 convar., 3 f., 76 genera, 37 families.

The next families are best represented: Asteraceae (21,64%), Brassicacea (7,2%), Graminee (7,2%), Amaranthaceae (6,18%), Leguminosae (5,15%).

Of the total number of taxa in the investigated territory, 40 (41,23%) have been accidentaly (unintentionally) introduced (xenophytes), while 57 (48,17%) have been initially introduced as a cultivated plants (hemerophytes).

These species are discussed regarding their impact to the ecosystems, immigration modes, invasive status, geographical origins, dispersal mechanism, their distribution, principal infestation sites etc.

The most dangerous alien species for semi-natural habitats in the investigated territory are identified.

Some communities dominated by alien plants are also represented in Satu Mare county.

## REFERENCES

Ciocarlan, V., Flora ilustrata a Romaniei. Pteridophyta et Spermatophyta, Editura Ceres, Bucuresti, 2000

Gergely I., Ratiu O., Asociatiile ierboase din "Tara Oasului" (jud. Satu Mare) si importanta lor economica, Contributii botanice, Cluj Napoca, 89-142, 1980

Koracsonyi C., Flora si vegetatia judetului Satu Mare, Editura Muzeului Satmarean, Satu Mare, 1995

Pysek P., Sadlo J., Mandak B., Catalogue of alien plants of the Czech Republic, Preslia Praha, 74:97-186, 2002

Reuben P., Keller Frang Kristin, Lodge, D., Preventing and spread of invasive species: economic benefits of intervention guided by ecological predictions, Conservation biology, Vol. 22, Nr. 1, 2008