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European and Mediterranean plants in the wild flora of Uruguay

Abstract

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In this research are analysed the European and Mediterranean floristic representatives established in the most humanized regions of Uruguay as a consequence of the continuous exchange of plant entities occurred since the last five centuries between Europe and South America. As far as Uruguay is concerned, the taxa adventitious and the ones that became spontaneous, have been listed and analyzed according to their occurrence and territorial significance (k). There have been selected the regions from the middle West to South, Centre and East according to the most humanized areas in terms of labored soils and population density. Herbarium samples for all the species found have been collected. In total 174 taxa have been taken into account, 7 of the most represented families includes the 73% of the total species found. According to the chorological scheme, the Mediterranean types and the South European amount 52% of the European contingent surveyed for this work in Uruguay. In relation to the introduction process, the majority of taxa is adventitious (72% naturalized and casuals) in contrast to the ones escaped from cultivation that amount to 28%. The gradient in the species occurrence with the correspondence analysis taxa/sites, shows that there is no defined trend of correlation between territories and colonizing species variability. The gradient on the axis 1 is more related to higher human land use and to the proximity to the more important points connecting with foreign countries. The gradient on the axis 2, instead is likely more related to a specific culture type like rice. Regarding to the species with higher influence (k) in the colonized area, the k value shows that only 5% of the total species number, have value higher than 40. On the other hand, whilst k values lower than 10 represent 54% of the total species number.

Introduction

Between the Old and the New World, a continuous exchange of plant entities of economic and environmental interest has occurred since the last five centuries. The main causes of this exchange, have been cultivation for cropping or for ornamental purposes as well as dispersion caused by other human activities of the European conquest in South America.

Regarding the climate features in the new colonized areas, Uruguay is included in the temperate zone (Bidegain & al. 1977) and climate parameters don't have variations of importance. The annual media temperature is 17ºC; the annual medium rain records have a minimum value of 1000 mm in the South and a maximum of 1500 mm in the North East.

The atmospheric annual medium relative humidity has a variation between 70% and 75% in the whole territory, the most humid month is July (80%) and the driest is January (65%). According to Koeppen scale, the whole territory may be characterized as: temperate climate, moderate and rainy (the temperature of the coldest month is between 3ºC and 18ºC): "C type". Climate of humid atmospheric conditions (irregular rain, intermediate conditions between class w and s in Koeppen scale): "f type". Specific variation of temperature (the temperature of the hottest month is higher than 22ºC): "a type". In conclusion, the Uruguayan territory has a "Cfa" climate type in the Koeppen scale.

In this research the European and Mediterranean floristic representatives established in the most humanized regions of Uruguay are analysed.

Methods

The taxa adventitious and the ones that became spontaneous in Uruguay have been listed and analyzed according to their occurrence and territorial significance (k). The species list and its analysis is done based on the chorological scheme according to Pignatti (1982) and, regarding the aliens, the classification based on the introduction process by Viegi & al. (1974). The taxa were identified according to Tutin & al. (1968-1980; 1993).

The main categories that represent the introduction process of the analyzed taxa are defined as follows:

plants escaped from cultivation becoming spontaneous (S): the exotic cultivated plants that have escaped from the culture, established in a territory and persist on their own reproductive system;

casual plants (C): the exotic adventitious ones with temporary occurrence in one or a few localities;

naturalized plants (N): the exotic adventitious plants with constant occurrence in zones where they persist on their own reproductive system.

To define the studying areas, there has been used the geographic map of Uruguay (S.G.M.), (Fig. 1: regions 1-12) and the map of regions by labored soils percentage (Evia & Gudynas 2000). There has been selected the regions from the middle West to South, Centre and East (Fig. 1) according to the most humanized areas in terms of labored soils and population density. The total of 57 sites were localized on uncultivated ground, in cities and ruins, road edges, agriculture farms, cattle and dairy farms in intensive and extensive production system.

Herbarium samples for all the species found have been collected. With the purpose of analyzing possible relations between localities and colonizing species, were selected 57 random sites in the twelve regions and there have been carried out surveys and a presence/absence matrix. The obtained data was analyzed with an indirect ordination method, the taxa/sites correspondence analysis (CA) (Hill 1973; Kent & Crocker 1994) with PC-ORD informatics program. Finally, the influence on the territory (or territorial significance) was evaluated by the constant (k), which is expressed for each species as the percentage of records in relation to the total surveys.

Fig. 1. Geographic map of Uruguay (S.G.M.) with surveyed regions marked.

Results

The total of 174 taxa were taken into account (Tab. 1). The most represented families by the higher number of taxa are: *Poaceae* (35), *Asteraceaeae* (31), *Papilionaceae* (25), *Schrophulariaceae* (10), *Apiaceae* (10), *Labiatae* (8), *Crucifereae* (7).

Remarkable is that 50 species are Euri-Mediterranean (29.59%) and 5 of them are Euri-Mediterranean-Turanian (2.96%). The strictly Mediterranean chorological type and its West, South, Atlantic and Macaronesian variants are represented by 16 taxa (9.47%); the Steno-Mediterranean and its variants includes 14 species (8.28%), the South European and

Table 1. List of taxa with chorological type: escaped from cultivation becoming spontaneous (S), casual (C), naturalized (N); introduction process (I. P), incidence (k).

Taxa	Chorological type	I. P.	k
PIACEAE			
Ammi majus L.	Euri-Medit.	N	52.63
Ammi visnaga (L.) Lam.	Euri-Medit.	N	10.53
Apium nodiflorum (L.) Lag.	Euri-Medit.	N	7.02
Conium maculatum L.	Paleotemp. div. Subcosmop.	N	1.75
Daucus carota L.	Paleotemp. div. Subcosmop.	S	28.07
*Foeniculum vulgare*subsp. *vulgare* Mill.	S-Medit.	S	1.54
Oenanthe globulosa subsp. *globulosa* L.	Steno-Medit.-Occid.	N	1.75
Pastinaca sativa subsp. *sativa* L.	Eurosib. div. Subcosmop.	N	8.77
Torilis arvensis (Hudson) Link	Subcosmop.	C	3.51
Torilis nodosa (L.) Gaertn.	Euri-Medit.-Turan.	N	5.26
APOCYNACEAE			
Vinca major L.	Euri-Medit.	S	3.51
ARALIACEAE			
Hedera helix L.	Submedit. Subatl.	S	3.51
ASTEREAE			
Achillea millefolium subsp. *millefolium* L.	Eurosib.	S	1.75
Anthemis cotula L.	Euri-Medit.	N	38.6
Arctium minus Bernh.	Europeo (Euri-Medit.)	N	8.77
Artemisia vulgaris L.	Circumbor.	S	–
Carduus acanthoides L.	Europ.-Caucas.	N	–
Carduus pycnocephalus L.	Euri- Medit.-Turan.	N	18.54
Carduus tenuiflorus Curtis	W- Europ.-Subatl.	N	38.6
Carthamus lanatus subsp. *lanatus* L.	Euri-Medit.	N	12.28
Centaurea calcitrapa L.	Euri-Medit.div. Subcosmop.	N	15.79
Centaurea debeauxii Gren. & Gordon	Non determined	C	1.75
Centaurea melitensis L.	Steno- Medit. div Pantrop e Subtrop.	N	1.75
Centaurea solstitialis L.	Steno-Medit. div. Subcosmop.	N	5.26
Chamomilla recutita (L.) Rauschert	S.E. Asiat (?) div. Sucosmop.	S	–
Cichorium intybus L.	Cosmopol.	N	36.84
Cirsium vulgare subsp. *vulgare* (Savi) Ten.	Paleotemp. div. Subcosmop.	N	47.37
Coleostephus myconis (L.) Rchb.	Steno-Medit.	N	35.09
Crepis capillaris (L.) Wallr.	Centro-Europ. (Subatl.)	C	1.75
Cynara cardunculus L.	Steno-Medit.	S	29.82
Dittrichia viscosa subsp. *viscosa* (L.) W. Greuter	Euri-Medit.	N	1.75
Hedynopsis cretica (L.) Dum	Steno-Medit.	C	–
Hypochoeris radicata L.	Europ.-caucas.	N	28.07
Lactuca saligna L.	Euri-Medit.-Turan.	N	1.75
Lactuca serriola L.	Euri-Medit.-S-Siber.	N	24.56

Table 1. (continued.)

Leucanthemum vulgare Lam.	Euro-Sib.	S	–
Picris echioides L.	Euri-Medit. (baricentro oriental)	N	26.32
Senecio vulgaris L.	Euri-Medit. div. Cosmop.	N	5.26
Silybum marianum (L.) Gaertn.	Medit.-Turan.	C	1.75
Sonchus asper (L.) Hill	Eurasiat.div. Subcosmop.o Cosmop.	N	19.3
Sonchus oleraceus L.	Eurasiat. div. Subcosmop.	N	38.6
Taraxacum officinale Weber	Circumbor.	N	7.02
Urospermum picroides (L.) Scop.	Euri-Medit.	C	–
BORAGINACEAE			
Borago officinalis L.	Euri-Medit.	N	8.77
Echium plantagineum L.	Euri-Medit.	N	40.35
Myosotis sylvatica Hoffm.	Paleotemp.	C	–
CARYOPHYLLACEAE			
Cerastium glomeratum Thuill.	Euri-Medit.div. Subcosmop.	N	3.51
Polycarpon tetraphyllum subsp. *tetraphyllum* (L.)	Euri-Medit.	N	8.77
Sillene gallica L.	Euri-Medit. div. Cosmop.	N	14.04
Stellaria media subsp. *media* (L.) Fern.-Vill.	Cosmopol.	N	1.75
CHENOPODIACEAE			
Chenopodium album subsp. *album* L.	Subcosmop.	N	8.77
Chenopodium murale L.	Subcosmop.	C	–
CONVOLVULACEAE			
Calystegia silvatica (Kit.) Griseb.	SE- Europ.	C	1.75
Convolvulus arvensis L.	Paleotemp. div. cosmop.	N	12.28
CRASSULACEAE			
Sedum acre L.	Steno-Medit.	C	–
CRUCIFERAE			
Brassica rapa subsp. *sylvestris* L.	Medit?	S	2
Capsella brusa-pastoris (L.) Medicus	Cosmopol.(sinantr.)	N	–
Hirschfeldia incana (L.) Lagr.-Foss.	Medit.-Macarones.	C	2
Lepidium graminifolium L.	Euri-Medit.	C	–
Raphanus raphanistrum subsp. *raphanistrum* L.	Euri-Medit. div. Circumbor.	N	18
Rapistrum rugosum subsp. *rugosum* (L.) All.	Euri-Medit.	N	35
Sisymbrium officinale (L.) Scop.	Paleotemp. div. Subcosmop.	C	4
CYPERACEAE			
Cyperus difformis L.	Paleotemp. div. Subcosmop.	N	2
Cyperus rotundus L.	Subcosmop. Trop. e subtrop.	N	2
DIPSACACEAE			
Dipsacus fullonum L.	Euri-Medit.	N	28
Scabiosa artropurpurea L.	Steno-Medit.	N	14
EUPHORBIACEAE			
Euphorbia peplus L.	Eurosib. div. Cosmop. (Archeofita)	N	4

Table 1. (continued.)

FUMARIACEAE			
Fumaria agraria Lag.	Steno-Medit.	N	–
Fumaria capreolata L.	Euri-Medit.	N	1.75
Fumaria officinalis L.	Paleotemp. div. Subcosmop.	N	10.53
GENTIANACEAE			
Blackstonia perfoliata (L.) Huds.	Euri-Medit.	N	12.28
Centaurium pulchellum (Sw.) Druce	Paleotemp.	N	57.89
GERANIACEAE			
Erodium malacoides (L.) L'Hér. ex Aiton	Medit.-Macarones.	N	8.77
Geranium dissectum L.	Eurasiat. div. Subcosmop.	N	8.77
IRIDACEAE			
Iris pseudacorus L.	Eurasiat.	S	3.51
Gladiolus italicus Miller	Euri-Medit.	S	–
LABIATAE			
Marrubium vulgare L.	Euri-Medit.-Sudsiber. div. Subcosmop.	N	1.75
Mentha Pullegium L.	Euri-Medit. div. Subcosmop.	N	28.07
Mentha spicata L.	Euri-Medit.	S	3.51
Mentha suaveolens subsp. *suaveolens* Ehrh.	Euri-Medit.	S	10.53
Mentha x piperita L.	Non determined	S	3.51
Prunella vulgaris L.	Circumbor.	N	7.02
Salvia verbenaca L.	Medit.-Atl.	C	–
Stachys arvensis L.	Europ.(Subatl.) div. Subcosmop.	N	7.02
LILIACEAE			
Asparagus officinalis L.	Euri-Medit.	S	1.75
MALVACEAE			
Malva nicaensis All.	Steno-Medit.	N	3.51
OLEACEAE			
Nerium oleander L.	S-Medit.	S	–
OXALIDACEAE			
Oxalis corniculata L.	Euri-Medit. div. Cosmop.	N	15.79
PAPAVERACEAE			
Papaver somniferum L.	Euri-Medit. div. Subcosmop.	S	–
PAPILIONACEAE			
Lathyrus hirsutus L.	Euri-Medit.	C	5.26
Lotus angustissimus L.	Euri-Medit.	C	1.75
Lotus corniculatus L.	Paleotemp. div. Cosmopol	S	49.12
Lotus pedunculatus Cav.	Non determined	S	–
Lotus subbiflorus subsp. *subbiflorus* Lag.	W-Medit.	S	10.53
Lotus tenuis Waldst. & Kit.	Paleotemp.	S	7.02
Medicago arabica (L.) Huds.	Euri-Medit.	S	5.26
Medicago lupulina L.	Paleotemp.	S	56.14
Medicago polymorpha L.	Euri-Medit. div. Subcosmop.	S	7.02
Medicago sativa subsp. *sativa* L.	Eurasiat.	S	10.53

Table 1. (continued.)

Melilotus alba Medicus	Eurasiat. div. Subcosmop.	S	22.81
Melilotus indica (L.) All.	Medit.-Turan. div. Subcosmop.	N	19.3
Spartium junceum L.	Euri-Medit.	S	12.28
Genista monspessulana L.A.S.Johnson	Steno-Medit.-Macarones.	S	–
Trifolium alexandrinum L.	E-Medit.	S	1.75
Trifolium angustifolium subsp. *gibellianum* Pign.	N-medit	C	1.75
Trifolium campestre Schreb.	W-Paleotemp.	S	1.75
Trifolium pratense L.	Eurosib. div. Subcosmop.	S	28.07
Trifolium repens subsp. *repens* L.	Paleotemp. div. Subcosmop.	S	50.88
Ulex europaeus L.	Subatlant.	N	3.51
Vicia benghalensis L.	Steno-Medit.	N	10.53
Vicia sativa subsp. *nigra* (L.) Ehrh.	Medit.-Turan. div. Subcosm.	N	17.54
Vicia sativa subsp. *sativa* L.	Medit.-Turan. div. Subcosm.	C	7.02
Vicia villosa subsp. *eriocarpa* (Hauskn.) P. W. Ball	Euri-Medit.	N	–
Vicia villosa subsp *varia* (Host) Corb	Euri-Medit.	N	–
PINNACEAE			
Pinus pinaster Aiton	W-Medit. (steno)	S	3.51
PLANTAGINACEAE			
Plantago lanceolata L.	Eurasiat. div. Cosmopol.	N	28.07
Plantago major L.	Eurasiat. div. Subcosmop.	N	3.51
POACEAE			
Aira caryophyllea subsp. *caryophyllea* L.	R- Paleo-subtrop..	N	1.75
Aira elegantissima Schur	Euri-Medit.	N	–
Avena barbata Potter	Euri-Medit.-Turan.	N	3.51
Avena fatua L.	Eurasiat.	N	1.75
Avena sativa L.	Eurasiat.	S	12.28
Avena sterilis L.	Euri-Medit.-Turan.	N	21.05
Brachypodium sylvaticum (Hudson) P. Beauv.	Paleotemp.	C	5.26
Briza maxima L.	Paleosubtrop.	N	14.04
Briza minor L.	Subcosmop. (Regioni calde)	N	24.56
Bromus hordaceus subsp. *hodaceus* L.	Subcosmop.	N	5.26
Bromus inermis Leyss.	Eurasiat.	N	1.75
Cynodon dactylon (L.) Pers.	Termocosmop.	N	92.98
Cynosurus echinatus L.	Euri-Medit.	C	1.75
Dactylis glomerata L.	Paleotemp	S	7.02
Desmazeria rigida subsp. *rigida* (L.) Tutin	Euri-Medit.	C	1.75
Digitaria sanguinalis L. Scop.	Cosmopol.	N	12.28
Echinocloa colonum (L.) Link	Paleotrop. e Subtrop.	N	7.02
Echinocloa crus-galli (L.) Beauv.	Subcosmop.	N	7.02
Eragrostis cilianensis (All.) F.T. Hubbard.	Termocosmop.	N	3.51
Festuca arundinacea subsp. *arundinacea* Schreb.	Paleotemp.	S	7.02
Gaudinia fragilis (L.) P. Beauv.	Euri-Medit.	N	8.77

Table 1. (continued.)

Melilotus alba Medicus	Eurasiat. div. Subcosmop.	S	22.81
Melilotus indica (L.) All.	Medit.-Turan. div. Subcosmop.	N	19.3
Spartium junceum L.	Euri-Medit.	S	12.28
Genista monspessulana L.A.S.Johnson	Steno-Medit.-Macarones.	S	–
Trifolium alexandrinum L.	E-Medit.	S	1.75
Trifolium angustifolium subsp. *gibellianum* Pign.	N-medit	C	1.75
Trifolium campestre Schreb.	W-Paleotemp.	S	1.75
Trifolium pratense L.	Eurosib. div. Subcosmop.	S	28.07
Trifolium repens subsp. *repens* L.	Paleotemp. div. Subcosmop.	S	50.88
Ulex europaeus L.	Subatlant.	N	3.51
Vicia benghalensis L.	Steno-Medit.	N	10.53
Vicia sativa subsp. *nigra* (L.) Ehrh.	Medit.-Turan. div. Subcosm.	N	17.54
Vicia sativa subsp. *sativa* L.	Medit.-Turan. div. Subcosm.	C	7.02
Vicia villosa subsp. *eriocarpa* (Hauskn.) P. W. Ball	Euri-Medit.	N	–
Vicia villosa subsp *varia* (Host) Corb	Euri-Medit.	N	–
PINNACEAE			
Pinus pinaster Aiton	W-Medit. (steno)	S	3.51
PLANTAGINACEAE			
Plantago lanceolata L.	Eurasiat. div. Cosmopol.	N	28.07
Plantago major L.	Eurasiat. div. Subcosmop.	N	3.51
POACEAE			
Aira caryophyllea subsp. *caryophyllea* L.	R- Paleo-subtrop..	N	1.75
Aira elegantissima Schur	Euri-Medit.	N	–
Avena barbata Potter	Euri-Medit.-Turan.	N	3.51
Avena fatua L.	Eurasiat.	N	1.75
Avena sativa L.	Eurasiat.	S	12.28
Avena sterilis L.	Euri-Medit.-Turan.	N	21.05
Brachypodium sylvaticum (Hudson) P. Beauv.	Paleotemp.	C	5.26
Briza maxima L.	Paleosubtrop.	N	14.04
Briza minor L.	Subcosmop. (Regioni calde)	N	24.56
Bromus hordaceus subsp. *hodaceus* L.	Subcosmop.	N	5.26
Bromus inermis Leyss.	Eurasiat.	N	1.75
Cynodon dactylon (L.) Pers.	Termocosmop.	N	92.98
Cynosurus echinatus L.	Euri-Medit.	C	1.75
Dactylis glomerata L.	Paleotemp	S	7.02
Desmazeria rigida subsp. *rigida* (L.) Tutin	Euri-Medit.	C	1.75
Digitaria sanguinalis L. Scop.	Cosmopol.	N	12.28
Echinocloa colonum (L.) Link	Paleotrop. e Subtrop.	N	7.02
Echinocloa crus-galli (L.) Beauv.	Subcosmop.	N	7.02
Eragrostis cilianensis (All.) F.T. Hubbard.	Termocosmop.	N	3.51
Festuca arundinacea subsp. *arundinacea* Schreb.	Paleotemp.	S	7.02
Gaudinia fragilis (L.) P. Beauv.	Euri-Medit.	N	8.77

Table 1. (continued.)

Hainardia cylindrica (Willd.) Greuter	Euri-Medit.	C	1.75
Holcus lanatus L.	Circumbor.	S	19.3
Hordeum murinum subsp. *leporinum* (Link) Arcangeli	Circumbor.	N	3.51
Koeleria pyramidata (Lam.) P. Beauv.	Nord- e Centro-Europ.	N	7.02
Lolium multiflorum Lam.	Euri-Medit.	S	54.39
Phalaris aquatica L.	Steno-Medit.-Macarones.	S	14.04
Phalaris canariensis L.	Macarones.	S	1.75
Poa annua L.	Cosmopol.	N	3.51
Polypogon maritimus subsp. *maritimus* Willd.	Steno-Medit.-Macarones.	N	3.51
Polypogon monspeliensis (L.) Desf.	Paleosubtrop.	N	1.75
Setaria italica (L.) Beauv.	Asia Tropic. ?	S	5.26
Sorghum halepense (L.) Pers.	Termocosmop.	N	33.33
Vulpia bromoides S. F. Gray	Paleotemp.	N	8.77
Vulpia myuros (L.) C.C.Gmel.	Subcosmop.	N	1.75
POLYGONACEAE			
Rumex conglomeratus Murray	Eurasiat. Centro-occid.	N	17.54
Rumex crispus L.	Subcosmop.	N	35.09
Rumex pulcher subsp. *pulcher* L.	Euri-Medit.	N	21.05
PRIMULACEAE			
Anagallis arvensis L.	Euri-Medit. div. Subcosmop.	N	31.58
RANUNCULACEAE			
Ranunculus muricatus L.	Euri-Medit.	N	7.02
ROSACEAE			
Duchesnea indica Focke	Asia Tropic. div. Subcosmop.	S	1.75
Rubus idaeus L.	Circumbor.	S	–
Rubus ulmifolius Schott	Euri-Medit.	S	3.51
RUBIACEAE			
Galium aparine L.	Eurasiat.	N	3.51
SALICACEAE			
Populus alba L.	Paleotemp.	S	3.51
SCROPHULARIACEAE			
Antirrhinum majus L.	W-Medit.	S	–
Bellardia trixago (L.) All.	Euri-Medit.	N	12.28
Cymbalaria muralis Gaertn. Mey & Scherb.	S-Europ. div. Subcosmop.	N	1.75
Parentucellia viscosa (L.) Caruel	Medit.-Atl.	C	3.51
Verbascum virgatum Stokes	W- Europ. Subatl.	N	12.28
Veronica anagallis-aquatica L.	Cosmopol.	N	3.51
Veronica arvensis L.	Subcosmop.	N	1.75
Veronica persica Poir.	Subcosmop. (Neofita)	N	1.75
Veronica polita Fries	Subcosmop. (Arqueofita)	N	–
Veronica serpyllifolia L.	Circumbor. div. subcosmop.	N	–

Table 1. (continued.)

URTICACEAE			
Urtica dioica L.	Subcosmop.	N	–
VIOLOCEAE			
Viola odorata L.	Paleotemp.	S	1.75

its variants 2 species (1.18%). Notoriously, the Mediterranean types and the South European amount to 88 taxa which represent 52% of the European contingent surveyed for this work in Uruguay.

In relation to the introduction process (Tab. 1), the main role reached by the taxa in the new environment is adventitious, among which the naturalized ones reach 59% and casuals 13%, in contrast to the ones escaped from cultivation that amount to 28%.

The correspondence analysis taxa/sites (Fig. 2), about the gradient in the species occurrence, shows that there is no defined trend between territories and colonizing species. Nevertheless, at least two groups showing some variability can be distinguished. The gradient that expresses the higher variability on the first axis is followed by: *Brachypodium sylvaticum*, *Ranunculus muricatus*, *Festuca arundinacea*, *Geranium dis-*

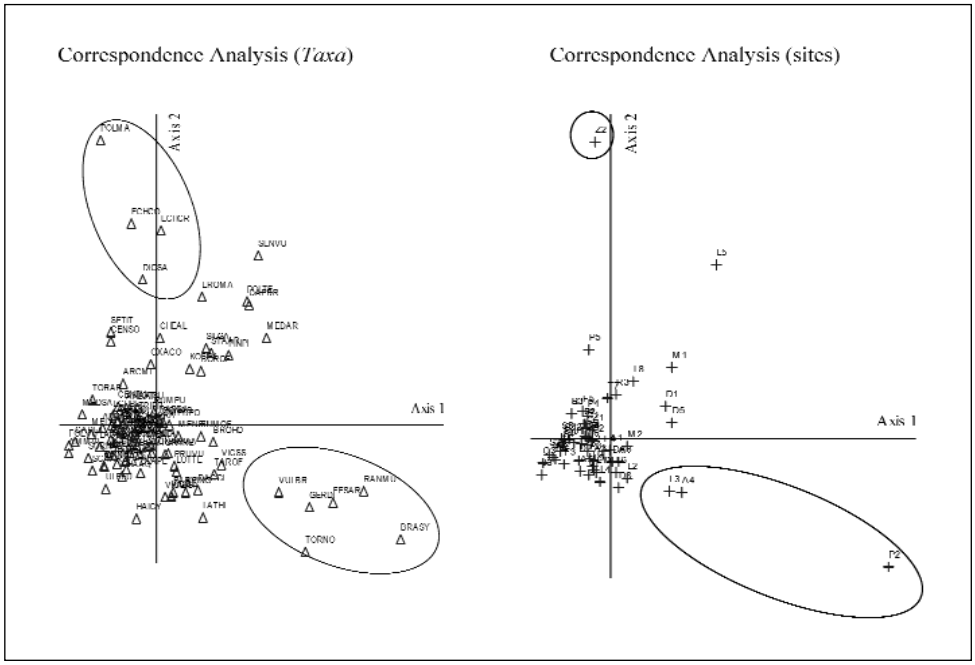

Fig. 2. The gradient in the taxa occurrence in correspondence to territories (sites) where surveys were done (site Z2 belongs to region 9, L3 to region 7, A4 to region 8, P2 to region 1, M1 to region 12, D1 to region 5).

Table 2. Range of k values for the studied taxa.

k	numb. of species	%
-	24	15
1-10	94	54
10-20	25	14
20-30	13	7
30-40	9	5
40-93	9	5

sectum, *Torilis nodosa*, *Vulpia bromoides*, this have correspondence mainly with regions 1, 7 and 8 (Fig. 1: Paysandú Montevideo and Canelones: sites L_3, A_4 and P_2). The first is located in a zone that has 70 to 100% of disturbed soils and the other two are in mostly urbanized zones with 95 to 100% of disturbed soils, both characterized by lime-argillaceous sedimentary soils with tendency to high PH. The second gradient on the axis 2, is followed by *Polypogon maritimus*, *Echinochloa colonum*, *Echinochloa crus-galli*, and have correspondence mainly with region 9 (Fig. 1: site Z_2). Both regions are in zones with 30 to 70% and 70 to 95% of disturbed soils, these are in the east area of the territory characterized by plane soils (Duran 1985). This region is directly related with the rice culture; at the same time the last two named species grow as invasive of summer cultures (Mazocca 1976), in particular rice and *P. maritimus* is invasive of wet areas (Rosengurt & al. 1970). These results have the limitation of a very low eigen value, 0.3, this indicates a very little correspondence or low correlation between the parameters and lack of hardness of the indicated tendency.

Regarding to the species with higher influence in the colonized area (Tab. 2), the *k* value shows that only 9 taxa (5% of the total species number) have a *k* value higher than 40, instead *k* values lower than 10 concern 94 taxa (54% of the total species number); 24 taxa (15%) belonging to the total contingent found did not appear in the 57 systematic relieves.

In the group with a higher value of k = 40-93 are included: *Cynodon dactylon* (93), *Centaurium pulchellum* (58), *Medicago lupulina* (56), *Lolium multiflorum* (54), *Ammi majus* (53), *Trifolium repens* (51), *Lotus corniculatus* (49), *Cirsium vulgare* (47) and *Echium plantagineum* (40). In the next group, k = 30-40 are: *Anthemis cotula* (39), *Carduus tenuiflorus*, (39), *Sonchus oleraceus* (39), *Cichorium intybus* (37), *Rumex crispus* (35), *Coleostephus myconis* (35), *Rapistrum rugosum* (35), *Sorghum halepense* (33), *Anagallis arvensis* (32). Most of the species are invasive of crops, pastures, uncultivated ground and road edges (Tab. 1, Fig. 3-8) (Mazocca 1976). On the other hand, *Lolium multiflorum*, *Lotus corniculatus*, *Lotus subbiflorus*, *Lotus tenuis*, *Medicago lupulina*, *Trifolium repens* are remarkable since their diffusion as forage cultivation, until today they play an important role in cattle nutrition (Izaguirre & al. 1998; Rosengurt & al. 1970).

Figs. 3-8. Common species invasive of crops, pastures, uncultivated ground and road edges: 3 *Lolium multiflorum*, 4 *Coleostephus myconis*, 5 *Cynara cardunculus*, 6 *Lactuca serriola*, 7 *Vicia sativa* subsp. *nigra*, 8 *Ammi visnaga*.

Conclusions

The 174 taxa that were found, belong to 36 families, conversely the 7 more represented families include the 73% of the total species found.

Regarding the chorological classification, among the six more represented groups the most important is the Euro-Mediterranean with 29.59% of the species; the following chorological types in decreasing importance are the Paleotemperated, Mediterranean, steno-Mediterranean, sub-cosmopolitan and Eurasian. All Mediterranean types and the South European are about 52% of the European contingent.

In relation with the introduction process, the majority is naturalized (59%). At the same time, inside the group of 9 taxa with major acquired importance in the colonized area (with *k* values between 40 and 93) belong to the more represented families: *Papilionaceae*, *Poaceae*, *Apiaceae* and *Asteraceae*; four of them are escaped from cultivation and five are naturalized; three of them are euri-Mediterranean, five are Paleo-temperate and one is thermo-cosmopolitan. In the group of 9 *taxa* with k values between 30 and 40, most are *Asteraceae* and all of them are naturalized; three are euri-Mediterranean, one of them is steno-Mediterranean, and the rest are thermo-cosmopolitan, sub-cosmopolitan, cosmopolitan, West Euro - sub-Atlantic, and Eurasian chorological types (Tab. 1). From that point of view, the majority of naturalized taxa inside the European contingent shows that the introduction process is mainly involuntary.

The gradient in the species occurrence with the correspondence analysis taxa/sites (Fig. 2), shows that there is no defined trend between territory and colonizing species, except for a few species that show a tendency with a low correspondence and its specifically related to human activity in different aspects. The gradient on the axis 1 is more related to higher population density, higher agriculture intensity and the proximity with the more important points connecting to foreign countries; at the same time is related to one of the sites of higher number of taxa presence (Montevideo). The gradient on the axis 2, instead, is more likely related to a specific culture type like rice.

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