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Mediterranean floristic elements in the ruderal flora of Belgrade (Yugoslavia)

Abstract

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The results of a phytogeographical analysis of the ruderal flora of Belgrade are presented. The Mediterranean element, in a wide sense, and its floristic significance is analysed and is found to account for over ¼ of the total ruderal flora.

Introduction

Ruderal and synanthropic (synurban) floras, being very young and dynamic floristic assemblages, as well as the corresponding vegetation units, have recently been attracting increased attention from scientists throughout the world. European geobotanists have been at the forefront of studies in this field for over 50 years, contributing valuable results through their research.

My doctoral thesis (Jovanović 1994), entitled [in translation] "Synecological and floristic study of ruderal vegetation in the city of Belgrade", comprises the results of many years of floristic, phytocoenological and phytogeographical investigation of ruderal habitats in the region of Belgrade. Among other things, this thesis is concerned with Mediterranean floristic elements (in the wide sense) and their significance in the context of the total ruderal flora of Belgrade.

A general characterization of the area

Belgrade is located on the border between the Pannonian plain and Šumadija, at 44°48' of northern latitude and 20°28' eastern longitude (Fig. 1) and at a mean altitude of 132 m (max. 253 m, min. 60 m). The city's climate is moderately continental.

Belgrade lies on the border between two phytogeographical regions: the Pontic-South-Siberian region (extending northward into the Vojvodina) and the Central-European

region, Balkan subregion, of the Mesian province (prevailing in the hilly areas south of the Sava and Danube rivers).

Owing to the dynamic development of the city and the uneven urbanization of the area, the Belgrade region abounds in ruderal habitats of various categories. The most important habitat types are walls and roofs, trampled ground, nitrophilous untrampled sites, moist places, and sand deposits. The area occupied by such habitats in the region of Belgrade sums up to over 1,500 ha.

Material and methods

A full inventory of the 642 vascular plant taxa recorded from the Belgrade area can be found in Jovanović (1994). The floristic element to which each species belongs was

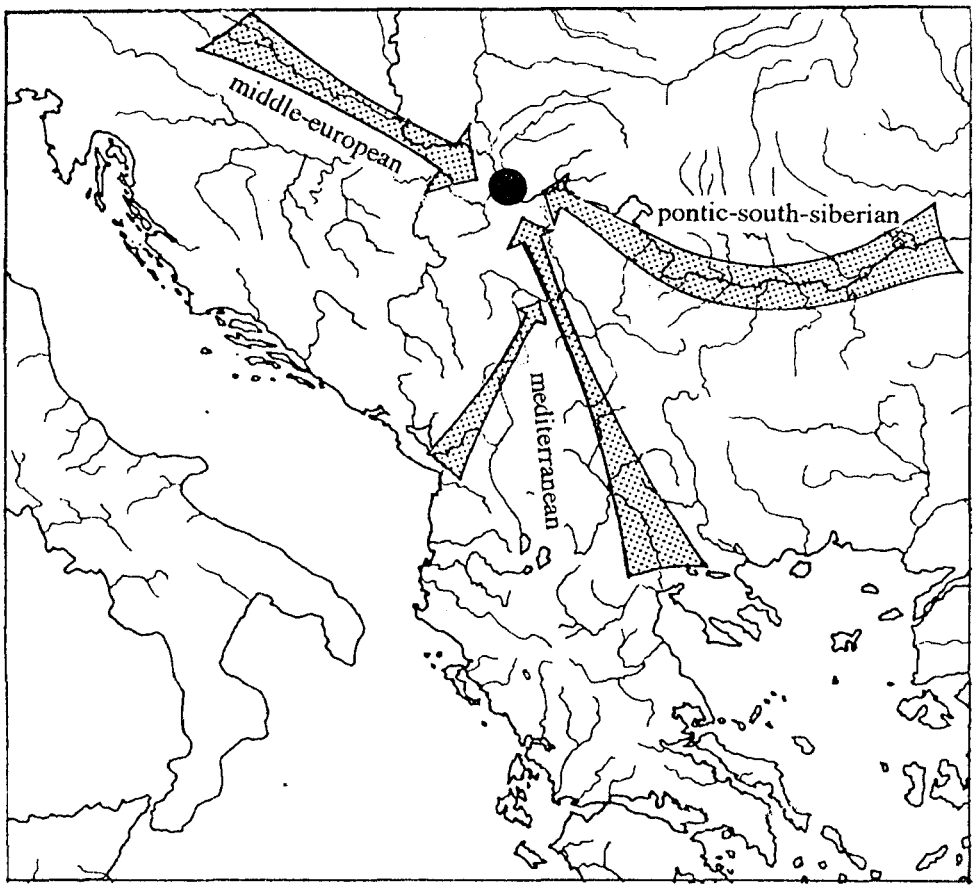

Fig. 1. Geographical location of Belgrade, with main immigration routes of elements of the ruderal flora.

determined on the basis of Meusel & al. (1965, 1978), allowing for some corrections. In addition, the area of origin was determined for all adventive and cosmopolitan species.

A further classification of floristic elements by area groups and basic area types was performed on the basis of the floristic and vegetational subdivision of Serbia into phytogeographical regions proposed by Stevanović (1992).

Results and discussion

The chorological analysis revealed the presence of 397 different floristic elements, belonging to 17 area groups and 7 basic area types (Fig. 2).

Most numerous are species of the Holarctic area type (302 species, or 47.0 %), which occupy areas of varying sizes in the Northern Hemisphere. Among them, different area groups belonging to the European-West-Asian subtype and the Eurasian group of floristic elements predominate. Holarctic species form the basic stock of Belgrade's ruderal flora

The Mediterranean-continental (meridional-submeridional) area type (Fig. 3A) is represented by 125 species (19.5 %) in the ruderal flora of Belgrade. It encompasses four area groups of floristic elements: (a) the Mediterranean-Pontic-South-Siberian group (52 species, or 41.6 %), (b) the Mediterranean-Pontic-South-Siberian-Oriental-Turanian group (44 species, or 35.2 %), (c) the Mediterranean-submediterranean group (17 species, or 13.6 %), and (d) the Mediterranean-Oriental-Turanian group (12 species,

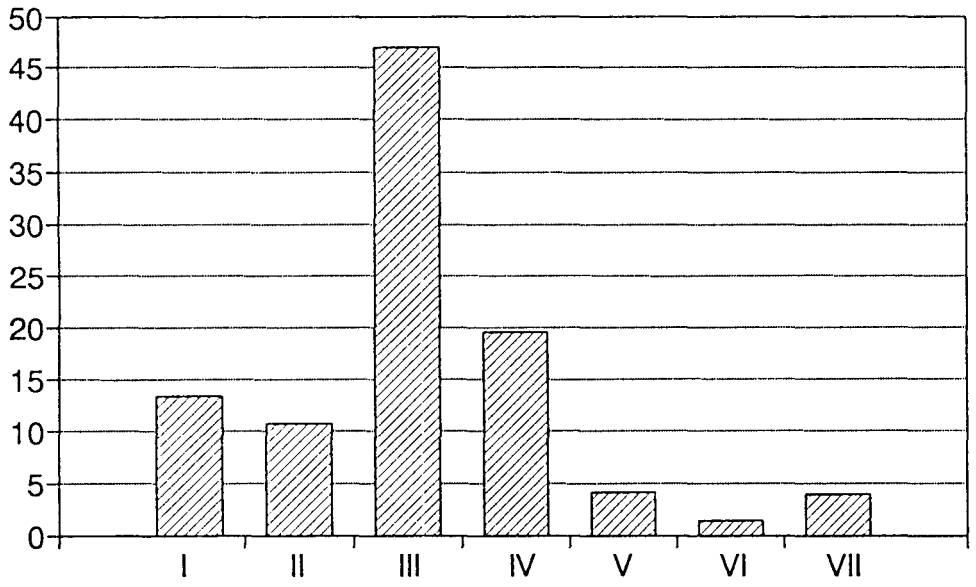

Fig. 2. Chorological spectrum, by basic area types, of the total ruderal flora of Belgrade. – I, Adventive, II, Cosmopolitan, III, Holarctic, IV, Mediterranean-Continental, V, Central-European-Mediterranean, VI, Central European, and VII, Pontic-South-Siberian species (in per cent).

or 9.6 %). The species belonging to these groups of floristic elements share the characteristic that the main part of their area lies within the Mediterranean region, from where it may extend more or less deeply into the continental (meridional-submeridional) regions of Europe and Asia.

The predominance of Mediterranean-continental floristic elements (groups a, b, and d) over the typical Mediterranean-submediterranean element (group c) is indicative of the fact that Belgrade's ruderal flora is transitional, in its phytogeographical character, between the Mediterranean and the Central European region. Given the fact that Belgrade is located on the main migration route of Mediterranean ruderal species – from the eastern Mediterranean to Central Europe and, conversely, from Central Europe and the

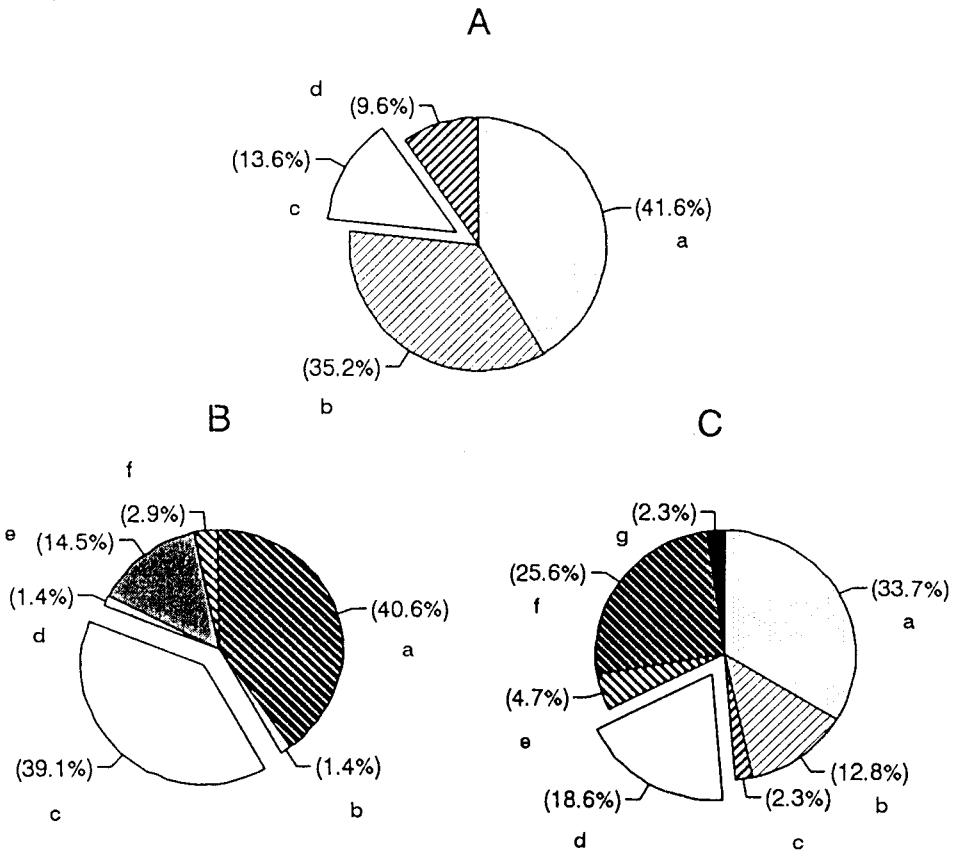

Fig. 3. Chorological spectra, by area groups (A) or centres of origin (B-C), of three of the basic area type elements in the ruderal flora of Belgrade. – A, Mediterranean-continental (meridional-submeridional) area type (lettering as in the text); B, Cosmopolitan area type (a, Eurasian, b, N. American, c, Mediterranean, d, Atlantic, e, circumholarctic, and f, tropical origin); C, Adventive area type (a, N. American, b, S. and Central American, c, N. and S. American, d, Mediterranean, e, tropical, f, Asian, and g, unknown origin).

Pannonian plain to the south (Fig. 1) – the observed ratio between Mediterranean-continental and Mediterranean-submediterranean elements was to be expected. Besides, this ratio between typical and transitional Mediterranean floristic elements also suggests a relative uniformity of ruderal habitats over wide areas, from the Mediterranean proper to Europe and Asia.

The share held by Mediterranean species among the ruderal flora of Belgrade is increased by the presence of 27 (4.2 %) cosmopolitan and 16 (2.4 %) adventive species of Mediterranean origin (Fig. 3B-C). Thus, the total rate of Mediterranean floristic elements, in a wide sense, amounts to 26.1 % of the total ruderal flora of the Belgrade region.

Conclusions

As was to be expected, the widely distributed species are most abundant among the total ruderal flora of the Belgrade region. Their wide distribution results from the intense human impact, the abundance of disturbed habitats and unoccupied ecological niches. Ruderal habitats being in their majority exposed to intense insolation and having a warm microclimate, unstable water regime and high nitrate concentrations in the soil, they will be particularly favourable to the occurrence of Mediterranean species with xerothermal habitat preferences. As a result, the Mediterranean element in a wide sense, including adventive and cosmopolitan species of Mediterranean origin, accounts for over ¼ of Belgrade's ruderal flora.

Acknowledgements

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