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Glimpses of Sicilian and Crimean endemism: an attempt of comparative study

Abstract

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Comparative study of endemism holds much promise for proper understanding of this phenomenon, especially when the regions are commensurable enough in area and phytodiversity like Sicily and Crimea. Applying phytogeographical coordinates affords checking of endemism assessment. Definition of the notion "endemic" is also discussed in the paper.

Comparative study of floristic diversity of Sicily (Italy) and Crimea (Ukraine) is of great interest for some reasons. Both Sicily and Crimea belong to the same floristic region, the Mediterranean, but Sicily is situated in the very centre of it while Crimea is its remote northeastern enclave. Despite of some geological and landscape distinctions, both Sicily and Crimea belong to Alpides. Both regions are well isolated geographically being surrounded by the Mediterranean and Black sea correspondingly (Crimean peninsula is connected to the mainland only through the narrow isthmus).

Both Sicily and Crimea are quite comparable in diversity of vascular plants (of the order of 2600 species and subspecies) but Crimean flora is characterized by marked part of non-Mediterranean phytogeographical elements (Yena & al. 1997). The number of endemics is distinctly different in the two regions. We consider as endemics 238 species and subspecies in Sicily (Yena & al. 2001) and 142 in Crimea (Yena 2001).

While endemism level has been rather well established to Sicily, assessment of endemism in Crimea varied considerable in different authors last decades - from 79 up to 279 species (Yena 2001). As long as seven years ago, Crimean floristic endemism was estimated at 279 species (Golubev 1996) and it gave the impression as Crimea had even more endemics than Sicily. The new investigation by one of the authors (Yena 2001) has brought to the fundamental revision of the Crimean endemism that results in 142 species and subspecies. These are half as many taxa as it is believed earlier. Discordance between assessments required additional checking of whether revised data was more realistic indeed than previous ones. With this aim in mind, we decided to try to use some phytogeographical data.

It is evidenced statistically that direct comparison of floras is rather correct in case of about equal territories (Shmidt 1984; Whittaker & al. 2001). As we can see, both Sicily and Crimea are similar-sized (Sicily = 25430 km², Crimea = 26860 km²). In addition, they are commensurable enough for some biogeographers which consider that precisely areas of ca. 25000 km² meet requirements of a satisfactory level of accuracy when one deals with data



Fig 1. The cliff of the Gurzufskaya yaila in the Crimean Mts, one of endemically richest place in Crimea.

on species phytodiversity (O'Brien 1993). We tried to compare some phytogeographical data of selected similar-sized regions where the number of narrow regional endemics is known precisely (Table 1). We have to ignore many sources where certain types of endemics are not separated distinctively. Anatolia (Kutluk & Aytu 2000). In each grid, however, all Turkish endemics were counted, not only narrow regional endemics.

Only three territories of six mentioned are isolated naturally (Crimea, Sicily and Peloponnese) whereas rest of them is restricted artificially with political borders, so they have lower analytical value for us indeed. Island-like isolation holds much more promise for proper studying phenomenon of endemism (Whittaker & al. 2001).

Aside from selected data on endemism given above, we should take into account general geographical rules concerning latitudinal natural zoning, including climatic and diversity cline and so on; in addition, certain rules of geographical gradients of some floristic indexes are rather clearly evidenced by many florists (Shmidt 1984; Whittaker & al. 2001; Tan & Strid 2001). Despite of lacking correct data, there is a reason to think that there is also a latitudinal gradient of narrow regional endemism (Yena 2003).

Table 1. Comparative data on narrow regional endemism.

Reference	Region	Area (km ²)	Vascular flora, species & subspecies	Endemics, species & subspecies	Endemism, %	Density of endemics, species/100 km ²
Stoyko & al.1991	Ukrainian Carpathians	24000	2012	81	4,0	0,34
Yena 2001	Crimea (Ukraine)	26860	2654	142	5,4	0,53
Tan & Mullaj 2001	Albania	28750	3300	100	3,0	0,35
Özhatay 2000	Turkish Thracia	23500	2350	56	2,4	0,24
Yena & al. 1997	Sicily (Italy)	25430	2631	238	9,7	0,94
Tan & Iatrou 2001	Peloponnese (Greece)	21500	2060	247	12,0	1,15



Fig 2. The dolomitic amphitheatre at Quacella on the Madonie, one of endemically richest place in Sicily.

Geographically and phytogeographically, the six regions are distinctly divided into two groups (North to South): first - with level of endemism 2,4 to 5,4% (or density of endemics 0,24 to 0,53 species/100 km²), and second - 9,7 to 12% (0,94 to 1,15 species/100 km²).

The table illustrates that Crimea belonging to “northern group”, unlikely has the number of endemics that would be close or equal to endemism level in regions of “southern group” like Sicily or Peloponnese, all other things being the same. Consequently, the new assessment of Crimean endemism occurs more realistic than previous.

To gain a better understanding, we are to refine what endemics we deal with. Unfortunately, this concept has been used *sensu latissimo* by various florists. As R. Whittaker with colleagues stated recently, “endemic is simply a species confined to a particular geographical area” (Whittaker & al. 2001). Such a loose concept causes difficulties and even mistakes in floristic data usage. Some authors often manipulate only with national endemics without making clear data when the scale is changed. There are lots of indefinite notions like “endemic of the South-Eastern Europe” or misused like “endemic to calcareous slopes”. Endemics area is demonstrated mathematically (Yurtsev 1983) to be included in a phytochore completely. So we would use the term “endemic” with reference to good natural distinctive areas that often appear to be appropriate phytochores. So we would use the term “endemic” in case of a taxon of certain rank that is distributed in certain phytochore borders. May be, the rest of cases with combine areas should be treated as phytogeographical (or chorological) elements.

“Instead of using the unprecise term “endemic” we need a simple, universal system by which taxa are classified into objective distributional categories”, wrote Kit Tan & Arne Strid and proposed a convenient scheme of categories based on the linear distance between the most remote endemics localities (with the step of EMBED Equation.3) (Tan & Strid 2001). Their approach allows skipping a phase of some cumbersome research that centres around phytochores that are to be distinguish. As to regions we examine, Sicily and Crimea, their endemics fit in the 2nd category of the above scheme – narrow regional endemics (distance between the most remote localities 51-167 km; “Species restricted to an area approximately the size of one Flora of Turkey grid square” (Tan & Strid 2001).

Both regions discussed have been much studied by botanists beginning from Paolo Boccone (XVII century) in Sicily and Carl Gablitz (XVIII century) in Crimea. Meanwhile it is necessary to keep in mind the serious difference in taxonomical approaches in "western Europe s.l." and "post-soviet area" that can lead to mistakes when one compares different floras. We mean species concepts known as polytypic that prevails in the West, and monotypic in the East of Europe. That is why it is necessary to close together taxonomical standards rather towards polytypic species concept as the most accepted among botanists (Hamilton & Reichard 1992).

We are convinced that further thorough comparative analysis of the floristic diversity of Sicilia and Crimea will promote progress in taxonomical and phytogeographical studying of the Mediterranean as a whole and will lead to proper understanding the biogeographical phenomena and the ways to conserve floristic diversity here. Trying to make floristical data from Italy and Ukraine comparable, we expect to get inspiring results taking part in the Euro+Med Plant Base Project.

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