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COMPARATIVE MORPHOLOGICAL ANALYSES OF THE GENUS *Iris* L., *Pallidae* SERIES (A. KERN.) TRINAJSTIĆ (*Iridaceae*)

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Mitić, B. & Pavletić, Z.: Comparative morphological analyses of the genus *Iris* L., *Pallidae* series (A. Kern.) Trinajstić (*Iridaceae*). Nat. Croat., Vol. 8, No. 4., 369–384, 1999, Zagreb.

The qualitative morphological features of the Alpine-Dinaric and cultivated populations, as well as of the herbarium specimens of the genus *Iris*, series *Pallidae*, were investigated. The height of the plant, leaves, inflorescence, flowers (spathe, perigonium, androecium, gynoecium), fruits and seeds were analysed. It was established that the morphological features analysed did not show phenotypic plasticity. The following qualitative morphological features have possible diagnostic significance: intensity of the leaf vein, spathe colour, perigonium colour, and pollen and seed morphology. Of no diagnostic use are ratio of filament and anther lengths (individual variability), and size and form of the fruits (intrapopulation variability).

Key words: genus *Iris* L., series *Pallidae* (A. Kern.) Trinajstić, Alpine-Dinaric region, morphology

Mitić, B. & Pavletić, Z.: Komparativna morfološka analiza roda *Iris* L., serije *Pallidae* (A. Kern.) Trinajstić (*Iridaceae*). Nat. Croat., Vol. 8, No. 4., 369–384, 1999, Zagreb.

Istražene su kvalitativne morfološke osobine alpsko-dinarskih i kultiviranih populacija, te herbariziranih primjeraka roda *Iris*, serije *Pallidae*. Analizirane su veličina biljaka, listovi, cvatovi, cvjetovi (spate, perigon, andrecej, ginecej), plodovi i sjemenke. Ustanovljeno je da istražene kvalitativne morfološke osobine nisu fenotipski plastične, a mogući dijagnostički značaj ima izraženost lisnog žilja, boja spate, boja perigona, te morfologija peluda i sjemenki. Dijagnostički neupotrebljive osobine su: odnos duljine filamenata i antera (individualna varijabilnost), te oblik i veličina tobolaca (intrapopulacijska varijabilnost).

Ključne riječi: rod *Iris* L., serija *Pallidae* (A. Kern.) Trinajstić, Alpsko-Dinarsko područje, morfologija

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INTRODUCTION

On the basis of a cultivated specimen of an iris with pale blue flowers, dryskinned and snow white spathe, LAMARCK (1789) described a new species – *Iris pallida* Lam. (*Iridaceae*). Later botanists used this name or various other names to denote cultivated irises with similar features, and also different indigenous populations of irises with pale to deep blue or violet coloured perigonium and dryskinned spathe in the Alpine and Mediterranean area of Europe (VISIANI, 1826; BERTOLONI, 1842; VISIANI, 1842; REICHENBACH, 1847; AMBROSI, 1854; NYMAN, 1854/55; PARLATORE, 1858; CESATI *et al.*, 1871; KERNER, 1871; TOMMASINI, 1875; VISIANI, 1877; ARCANGELI, 1882; NYMAN, 1882; WILKOM, 1882; STAPF, 1887; ARCANGELI, 1894; FIORI, 1896; FRITSCH, 1897; MARCHESETTI, 1897; ASCHERSON & GRAEBNER, 1898/99; GELMI, 1900; ASCHERSON & GRAEBNER, 1906; DALLA TORRE & SARNTHEIN, 1906; PAMPANINI, 1908; 1909; HEGI & DUNZINGER, 1909; PAULIN, 1917; BONNIER, 1929; FIORI, 1923; FIORI, 1933; DEGEN, 1936; MAYER, 1952; HESS *et al.*, 1972; WEBB & CHATER, 1980; MATHEW, 1981; PIGNATTI, 1982; DOMAC, 1994; VOLARIĆ-MRŠIĆ, 1994; WRABER, 1998; 1999; MITIĆ, 1998).

KERNER (1871) was the first to see that these indigenous varieties were different from the cultivated species *I. pallida* Lam., to which they are linked by certain common characteristics (for example dryskinned spathe), and suggested that they be put together in a circle of kinship that he called the »*Pallidae* group«.

A review of these related taxa was carried out by TRINAJSTIĆ (1976), who took the proposed *Pallidae* group out of the *Elatae* series (LAWRENCE, 1953) as it had existed until then, and put it into the separate *Pallidae* series (A. Kern.) Trinajstić.

TRINAJSTIĆ (1976, 1983) came to the conclusion that four species existed within the series. In his opinion, the species *I. pallida* Lam. (LAMARCK, 1789) was distinct from the other species of the *Pallidae* series as a horticultural species. Indigenous species make a developmental line, which started in Alpine region with the endemic species *I. cengialti* Ambr. (AMBROSI, 1854) and then continue along the northern Croatian Littoral and the Dinaric mountains with the endemic *I. illyrica* Tomm. (TOMMASINI, 1875). The line ends with the species *I. pseudopallida* Trinajstić (TRINAJSTIĆ, 1976), which the author distinguished from the horticultural species *I. pallida,* as endemic to the southern Croatian Littoral. Contribution to this opinion about the existence of four species within the *Pallidae* series are also the latest findings from the taxonomic investigations of Alpine-Dinaric and horticultural populations (MITIĆ & PAVLETIĆ, 1995; SCORTEGAGNA *et al.*, 1995; MITIĆ, 1998; MITIĆ *et al.*, 1999).

However, some authors have treated the taxonomic position of these closely related irises at the lowest taxonomic level and have not even mentioned the *I. pseudopallida* species (WEBB & CHATER, 1980; MATHEW, 1981; SCHULZE, 1988; RAC & LOVRIĆ, 1990; WRABER, 1998).

Morphological features, the most easily visible, have been used longest and most frequently in taxonomic, systematic and classificatory works dealing with the problems of the genus *Iris* (BAKER, 1878; 1892; DYKES, 1913; DIELS, 1930; HAYEK, 1933; LAWRENCE, 1953; RODIONENKO, 1987; WEBB & CHATER, 1980; RAC & LOVRIĆ, 1990;

etc.), or the complex of related species of *Iris pallida* Lam. s.l. (AMBROSI, 1854; KERNER, 1871; PAMPANINI, 1908; 1909; PAULIN, 1917; TRINAJSTIĆ, 1976; KÖHLEIN, 1981; MATHEW, 1981; SCHULZE, 1988). In this work, then, the intention has been to complement the most recent results in morphological research into Alpine and Dinaric populations of the *Pallidae* series (MITIĆ *et al.*, 1999), aiming at additional explanation of the diagnostic importance of the morphological features most often used in describing taxonomic categories within the *I. pallida* complex, or the *Pallidae* series.

MATERIAL AND METHODS

For comparative morphological research into the series *Pallidae* a large number of plants from 30 Alpine and Dinaric populations and four populations of the cultivated species of *I. pallida* were analysed (Fig. 1). Also, herbarium specimens from the whole range of the *Pallidae* series were studied from the following herbarium collections: Herbaria from Department of Botany, Faculty of Science, University of

Fig. 1. Localities of the samples of the *Pallidae* series
○ – *I. cengialti*
● – *I. illyrica*
▲ – *I. pseudopallida*
– *I. pallida*

Zagreb (ZA), Herbaria of Prof. Ivo and Marija Horvat (ZAHO) and Herbaria from Institute of Biology, Faculty of Biotechnology, University of Ljubljana (LJU).

Specimens were collected over the period 1989–1997, during flowering time, apart from the fruits, which were taken at the end of summer. As well as seed gathered in the field, cultivated in the Botanical Garden and from the herbarium collections mentioned, seeds obtained through exchange programmes with other botanical gardens were also subjected to analysis.

Comparative morphological research was carried out by observation and analysis of the external morphology of plants directly in the field. A large number of plants were placed in a personal herbarium. Some plant parts were preserved in FAA-mixture (JOHANSEN, 1940); the seeds were stored in deep freeze, and the stamens and pollen on silica gel. Some specimens were planted and cultivated over a long period of time in the Botanical Garden in Zagreb. During this period their morphological characteristics were observed and compared with their state when collected.

The following morphological characteristics were analysed and described: height of the plant, leaves, inflorescence, flowers (spathe, perigonium, androecium, gynoecium), fruits and seeds.

Interesting details were either drawn or photographed, seeds and leaf surfaces were observed and photographed with a ZEISS STEMI 2000 C polarising magnifying glass, and pollen with an OPTON III light microscope.

RESULTS

The height of the plant. The tallest plants at the moment of picking and in cultivation in Botanical Garden in Zagreb were from the horticultural species *I. pallida*, while specimens of *I. pseudopallida* were somewhat shorter. On average specimens of *I. illyrica* and *I. cengialti* are shorter than the previous two species. They have similar stem length values. In the Stara Baška population, specimens were the lowest in morphometrical analyses (MITIĆ *et al*., 1999) and also, in cultivation over a longer period of time.

Leaves. The biggest, the most numerous and the most succulent leaves are to be found in the *I. pallida* species. The leaves of the species *I. pseudopallida* are somewhat smaller, but also well succulent and suffused with grey. The leaves of all *I. cengialti* specimens are strongly developed, but intensively green and smaller than at the two previous species. Within the species *I. illyrica*, the plants have the most gentle and often the smallest leaves. Particularly small leaves occur in the Stara Baška population (MITIĆ *et al*., 1999).

The leaves of the species investigated show differences in leaf veins expression (Fig. 2A-E). In the whole sample the most highly expressed and broadest leaf veins are found in samples of *I. cengialti* (Fig. 2A). For this reason their leaf surface is always furrowed and wavy. Specimens of *I. pallida* (Fig. 2B) and *I. pseudopallida* (Fig. 2E) have somewhat weakly, but nevertheless clearly, visible expressions of leaf veins. The weakest expression of leaf veins in the whole sample is found in the spe-

cies *I. illyrica* (Fig. 2D), with the exception of the Stara Baška population. Its specimens have small, but clearly visible expression of leaf veins (Fig. 2C).

Inflorescence. The irises' inflorescence (monochasium) is more branched in the higher species *I. pallida* and *I. pseudopallida*. In specimens of *I. illyrica* and *I. cengialti* (often with two flowers) the monochasium type is difficult to see.

Flowers. In the whole sample the flower numbers of morphometrically analysed populations varied from 2 to 5, and for investigated species the following numbers of flowers were established: for *I. pallida* 3–5, for *I. pseudopallida* (2) 3–5, and for *I.*

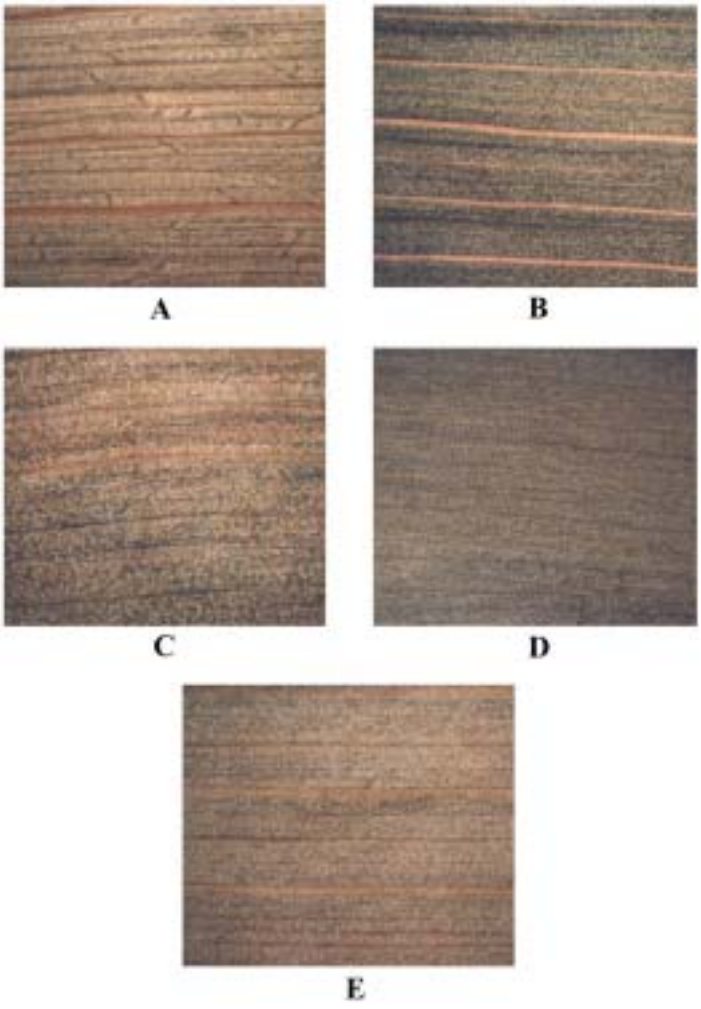

Fig. 2. The leaf surface of the *Pallidae* series: (25x): A – *I. cengialti* (Kobarid), B – *I. pallida* (Samobor), C – *I. illyrica* (Stara Baška), D – *I. illyrica* (Sibinje), E – *I. pseudopallida* (Kotišina)

illyrica and *I. cengialti* 2–4 (cf. MITIĆ *et al*., 1999). The flowers show individual variability.

Spathe. In the whole sample membranous dryskinned spathes were noticed (Fig. 3), their appearance and colour being stable during cultivation in the Botanical Garden in Zagreb. The lightest, almost snow-white, spathe is found in the cultivated species *I. pallida* (Fig. 3A), while specimens of *I. pseudopallida* have a brownish suffused spathe (Fig. 3B). Within *I. cengialti* and *I. illyrica* populations, spathe colour varies from brownish to lilac or reddish suffused (Fig. 3 C, D). The most reddish suffused spathe was noticed in the Stara Baška population.

Perigonium. Analyses of the colour and size of the perigonium have revealed that populations of the species *I. pallida* have the brightest, pale blue flowers (Fig. 3A). Flowers of the species *I. pseudopallida* (Fig. 3B) have somewhat darker, pale

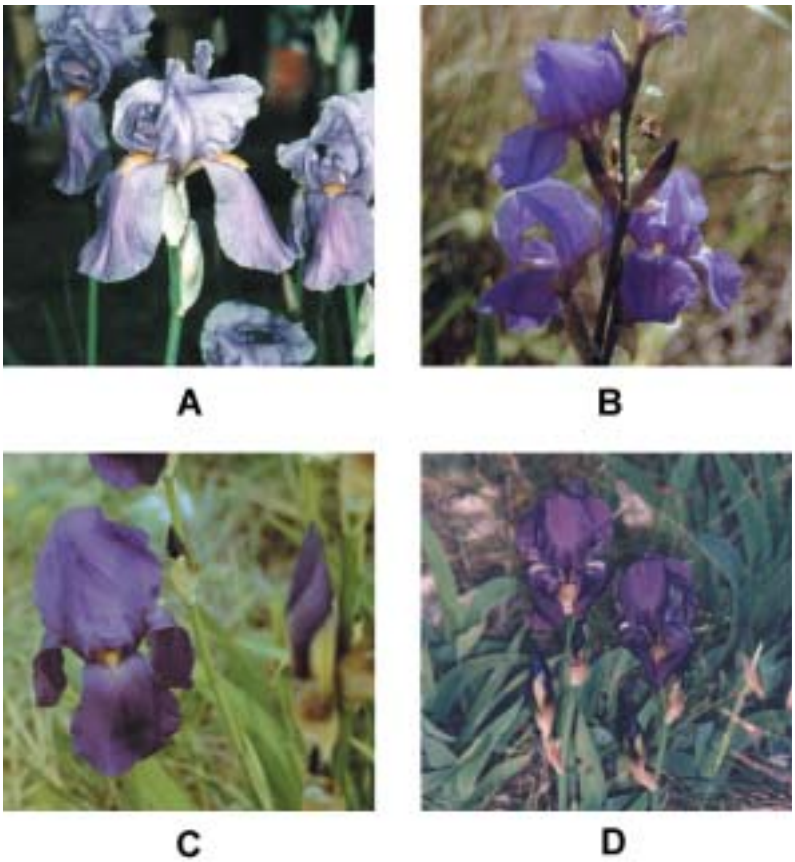

Fig. 3. Spathe and flowers of the *Pallidae* series: A – *I. pallida* (Samobor), B – *I. pseudopallida* (Dubrovnik), C – *I. cengialti* (Komarča), D – *I. illyrica* (Stara Baška) (Photo: A – B. Mitić, B – N. Jasprica, C, D – M. Mitić)

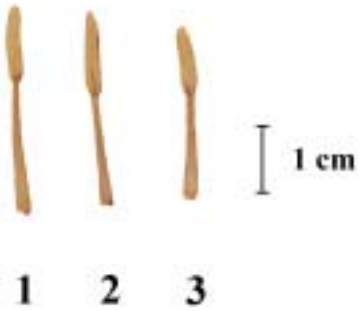

Fig. 4. Stamens of the same sample of the species *I. illyrica* (locality of Sv. Juraj)

violet flowers. Populations of the *I. cengialti* and *I. illyrica* species have darker violet flowers and showed variability in flower colour (Fig. 3 C, D). The darker flowers belong to the *I. illyrica* species, especially to the Stara Baška population (Fig. 3D).

Anthers. In the whole sample, the individual variability of the ratio between the lengths of the filaments and the anthers was established (Fig. 4), which was the reason for the elimination of this feature from morphometric analyses (cf. MITIĆ *et al.*, 1999).

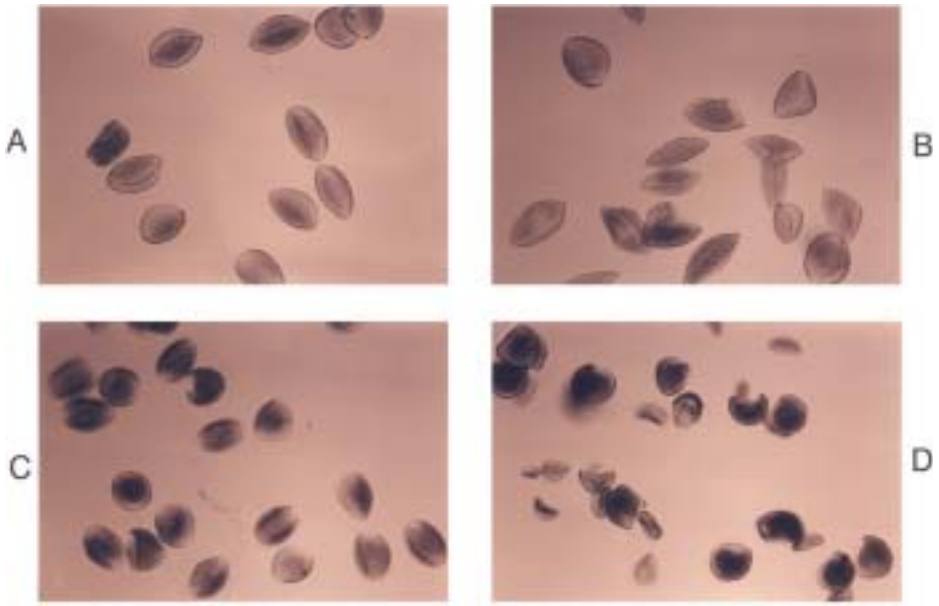

Fig. 5. Pollen grains of the *Pallidae* series, SM (40 x): A – *I. cengialti* (Kobarid), B – *I. illyrica* (Žrnovnica), C – *I. pseudopallida* (Trstenik), D – *I. pallida* (Samobor)

Pollen. All analysed samples have monocolpate pollen with reticulate sculpture of the exine (Fig. 5 A-D). Under a light microscope we can distinguish a greater similarity of pollen forms and sizes between the *I. cenigalti* and *I. illyrica* species (pollen grains in the equatorial plane of a more elongated and oval form), and between the *I. pseudopallida* and *I. pallida* species (pollen grains in the equatorial plane of the roundest form). The pollen grains of the species *I. pallida* showed up quite a lot of degenerated grains (Fig. 5D).

Ovarium. The size, form and structure of the ovaries showed up individual and intrapopulation variability.

Fruits (capsules). In populations with a small number of specimens, fruits were never found, only dried stems. Sometimes thus were happened in larger popula-

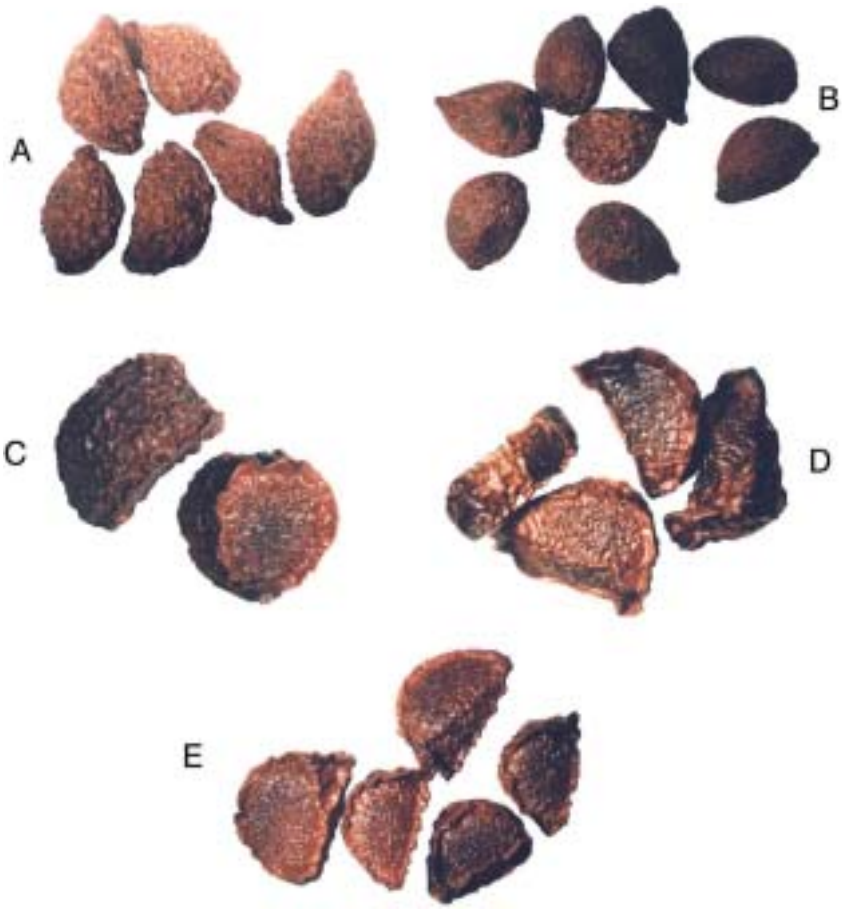

Fig. 6. Seeds of the *Pallidae* series (25 x): A – *I. cengialti* (Kobarid), B – *I. illyrica* (Grobnik), C – *I. pallida* (Samobor), D – *I. pseudopallida* (Kotišina), E – *I. illyrica* (Stara Baška)

tions (for example, in the Trstenik population). Also, cultivated specimens of *I. pallida* rare gave fruits, and when they did the fruits were relatively large with large, but small and numerous seeds.

Fruit shape and size, investigated in a great number of specimens, showed intrapopulation variability of these features, which was not reflected in the shape and size of seeds.

Seeds. The seeds of the whole series can be grouped into two major groups (Fig. 6). In one group come the oval seeds of the species *I. cengialti* and *I. illyrica* (Fig. 6 A, B). In both species they are small, of similar dimensions, dark brown or tawny, and the surface of the testa is extremely reticularly scored. The seeds of the species *I. illyrica* nevertheless have a somewhat more spherical shape and a more weakly scored testa surface. An exception is the seeds collected in the Stara Baška population from the range of the species *I. illyrica*, which in their shape and dimensions correspond more to those in *I. pseudopallida* than in *I. illyrica* (Fig. 6 E).

The second group (Fig. 6 C, D) is made up of the larger seeds of the species *I. pallida* (the biggest seeds in the whole sample) and *I. pseudopallida* (somewhat smaller than with the preceding species). The seeds of these species are very sharp, reddish brown to brown, the testa surface also having scored reticulation.

DISCUSSION

The height of the plant proved to be a stable feature of the species of the *Pallidae* series (cf. MITIĆ *et al*., 1999), and the application of these features for diagnostic purposes is possible. An exception is found in the species *I. illyrica* and *I. cengialti*. Among populations of these species there are similar mean values for the height of the plants and considerable overlapping of results (cf. MITIĆ *et al*., 1999), which deprives this feature of diagnostic value for these two species. It was probably for this reason that HORVAT *et al*. (1974) marked the species *I. illyrica* in the *Carici-Centauretum rupestris* association as *I. cengialti.*

A comparison with plants grown in the Botanical Garden in Zagreb over a longer period of time showed that even over quite many years the height of the plants did not change as against that of the plants collected in the wild. In general the tallest were specimens of the species *I. pallida*, and the lowest were those in the Stara Baška population. For this reason we can conclude that height of plant is very likely a genetically determined feature.

The size and appearance of **leaves** have often been used as differentiating features among taxa of the related circle *I. pallida* s.l. The morphometric features of the leaves are discussed in the work MITIĆ *et al*. (1999). The most important detail obtained in this research is that the leaves of the species *I. cengialti* stand out from the whole sample because they have the most highly expressed and broadest leaf veins (Fig. 2 A-E). For this reason their leaf surface is always furrowed and wavy, as noticed by other authors (KERNER, 1871; PAMPANINI, 1909; TRINAJSTIĆ, 1976; SCORTEGAGNA *et al*., 1995).

The weakest expression of leaf veins in the whole sample belongs to the populations of the species *I. illyrica* (Fig. 2D). For this reason, the last two species can be distinguished without difficulty in a flowerless state, notwithstanding some overlapping of results in morphometric analysis (MITIĆ *et al*., 1999).

Field research suggested a possible significance for leaves falling off or staying on in winter in the species *I. illyrica* and *I. pseudopallida.* In natural conditions, that is, the leaves of *I. pseudopallida* do not drop off in winter, but in *I. illyrica* they do. For this reason *I. illyrica* could be designated a deciduous and *I. pseudopallida* an evergreen plant.

Number of **flowers** is very often used as a differentiating feature for taxa of the *Pallidae* series (KERNER, 1871; PAMPANINI, 1908; PAULIN, 1917; DYKES, 1913; DIELS, 1930; LAWRENCE, 1953; TRINAJSTIĆ, 1976; MATHEW, 1981). PAMPANINI (1909), however, considers that this is an inconstant feature, too unreliable to be suitable for determination. Because of such viewpoints, the results of statistical analysis of number of flowers (cf. MITIĆ *et al*., 1999) will be briefly discussed. It was ascertained that the number of flowers in the whole of the sample varies from two to five, which does not totally agree with the numbers given in any work, but can to a certain extent fit in with them. In populations of the species *I. cengialti* on average more than three flowers were ascertained (the number varies from two to four) and not a single specimen with only one flower was found. In other works, mainly (1) 2 (3, 4) flowers are mentioned for this species (KERNER, 1854) or 1–2 (seldom 3) flowers (TRINAJSTIĆ, 1976), mainly two flowers (WEBB & CHATER, 1980) and so on. SCORTEGAGNA *et al*. (1995) recorded 2–3 flowers for *I. cengialti* subsp. *cengialti*, and for subsp. *veneta* (2) 3–4(5) flowers. PAULIN (1917) gives 2–3 flowers for specimens from Bohinj. It can be concluded that number of flowers is not a reliable indicator for determining taxa from the *Pallidae* series.

The membranous dryskinned **spathe** can be designated the main common feature of all kinds of irises of the *Pallidae* series (KOCH, 1844; AMBROSI, 1854, KERNER, 1871, BAKER, 1878; 1892, PAMPANINI, 1908; 1909; PAULIN, 1917; TRINAJSTIĆ, 1976; SCHULZE, 1988). This has been confirmed by this research as well, and it has been ascertained that the appearance and colour of the spathe are stable during cultivation in the Botanical Garden in Zagreb. Plants of different species can to some extent be distinguished according to their colour (Fig. 3 A-D). The lightest, almost snow-white, spathe is typical of cultivated species of *I. pallida*, which sets this species apart from *I. pseudopallida,* often equated with it, which has an off-white, often brownish suffused spathe. Within the populations of *I. cengialti* and *I. illyrica* it is more difficult to determine whether a plant belongs to a given species according to this feature. In their populations spathe colour varies from brownish to lilac or reddish suffused.

The colour and size of the **perigonium**, in the opinion of many authors (KERNER, 1871; PAMPANINI, 1908; 1909; PAULIN, 1917; DYKES, 1913; DIELS, 1930; LAWRENCE, 1953; TRINAJSTIĆ, 1976; MATHEW, 1981), is a significant distinguishing feature of taxa of the *Pallidae* series. Our research also confirmed this opinion with respect to distinguishing the species *I. pallida* and *I. pseudopallida* (Fig. 3 A, B) from each other. With the species *I. illyrica* and *I. cengialti* (Fig. 3 C, D), however, inter- and intra-

population variability in perigonium colour has been ascertained. It is important to mention that populations for the peripheral areas of the range of the species *I. pseudopallida* (Omiš, Marušići, Vrulje), recorded by morphometric analysis as being transitional with the species *I. illyrica* (cf. MITIĆ *et al*., 1999), in terms of perigonium features and spathe colour, fit without any problem within the species *I. pseudopallida*, and correspond to the description of *I. pseudopallida f. transiens* (TRINAJSTIĆ, 1976).

Notwithstanding intrapopulation variability of perigonium colour recorded within the species *I. illyrica* and *I. cengialti*, this is obviously not a phenotypic plastic feature, for during cultivation it does not change.

The **anthers** of the taxa of the *Pallidae* series have also been the subject of prior research. Many authors have given the ratio between the lengths of the filaments and the anthers as a diagnostically important feature of taxa of the *Pallidae* series (KERNER, 1871; MARCHESETTI, 1897; PAULIN, 1917; SCORTEGAGNA *et al*., 1995). This research confirmed that in all populations there is a seasonal and individual variability of filament and anther length (Fig. 4). For this reason these features cannot be included into the statistical research, and cannot be considered diagnostically important features.

Morphology of the **pollen** of members of the *Pallidae* series (Fig. 5 A-D) shows a greater similarity of forms and sizes of pollen grains between the species *I. cenigalti* and *I. illyrica* (pollen grains in the equatorial plane of a more elongated and oval form), and between the species *I. pseudopallida* and *I. pallida* (pollen grains in the equatorial plane of a roundest form). Among the pollen grains of the species *I. pallida* quite a lot of degenerated grains were seen (Fig. 5D), which indicates a reduced ability to germinate. Such finds can be linked with reports of male sterility in Padova populations of the species *I. pallida* (MAUGINI & BINI MALECI, 1976; BINI MALECI & MAUGINI, 1977). This is explicable in terms of their being cultivated plants which are through human agency reproduced primarily vegetatively (rhizomes), the need for sexual reproduction and the creation of new characteristics being thus reduced. Analysis of the reticular sculpture of the sexine of the pollen grains with a scanning electric microscope might show the real significance of the use of size, form and structure of pollen grains in the diagnostic distinction of taxa of the *Pallidae* series.

The shape and structure of the **ovarium** and **capsule** in the opinion of some authors show certain differences among the taxa of the *Pallidae* series (KERNER, 1871; PAMPANINI, 1908; 1909; PAULIN, 1917). Their individual and intrapopulation variability established during this research, shows that these features cannot have any significance for determination.

In connection with irregularity in the ripening of the fruits of members of the *Pallidae* series, it has been noticed that in populations that occupied a smaller space, fruits were not found, almost as a rule. Occasionally this happened with populations that took up a greater area as well. A similar occurrence was noticed earlier for some populations of the *Pallidae* series (PAMPANINI, 1909; SCORTEGAGNA *et al*., 1995). Since the *Iris* can reproduce vegetatively very easily, by rhizomes, this phenomenon has occurred in these cases as well. In the case of small populations, it is

probably a matter of vegetative reproduction, employed for the sake of taking over new territory more rapidly. On the other hand, the occurrence of a large number of sterile plants within a widely distributed population of the genus *Iris* has also been observed (PAMPANINI, 1909). There could be two reasons for this. On the one hand it has been noticed that if some plants that reproduce vegatatively with ease, as is the case with the *Iris*, come into ideal conditions of life, they increasingly lose the capacity to reproduce by seed. On the other hand, the lack of fertility of some colonies of *Iris*es can be interpreted by their isolation (PAMPANINI, 1909; SCORTEGAGNA *et al.*, 1995).

The rare occurrence of **seeds** in cultivated specimens of the species *I. pallida* suggests that, very likely, fertilisation does not even occur, which can be linked with the already described great number of degenerated pollen grains precisely in specimens of the species *I. pallida*, that is, with the propensity of horticultural plants to vegetative reproduction (KÖHLEIN, 1981).

Plants brought from the field and cultivated a long time in the Botanical Garden regularly gave seeds in the first year, but later with increasing rarity. The reason for this may be the so-called prolonged cultivation effect – in plants that can easily reproduce non-sexually, it often happens that the facility to reproduce through seed is weakened, which has been noticed with some other Irises and some other self-sown plants (PAMPANINI, 1909).

Seed characteristics have been considered by some authors (PAMPANINI, 1908; 1909; PAULIN, 1917; SCORTEGAGNA *et al.*, 1995) as one of the most crucial differentiating marks of this group of related irises. This has been borne out by this work (Fig. 6 A-E), the results of which show that the appearance, colour and perhaps the size of seeds can be used for diagnostic purposes, especially, for example, for flowerless state differentiation of the populations of the species *I. illyrica* and *I. pseudopallida*, the ranges of which are very close. For more detailed conclusions about grouping species on the basis of seed size, a numerical population analysis of a large number of seeds over the whole range of the *Pallidae* series should be carried out.

After morphometric and comparative (cf. MITIĆ *et al.*, 1999) morphological research into various populations of the *Pallidae* series, we can conclude that, irrespective of the intra- and inter-population variability expressed with most of the morphological features analysed, this is not a matter of phenotypic plastic features. The following qualitative morphological features have diagnostic significance for telling apart species of the *Pallidae* series often equated: intensity of the leaf vein, spathe colour, perigonium colour, and pollen and seed morphology. Of no diagnostic use, however, are: ratio of filament and anther lengths (individual variability), and size and form of the fruits (intrapopulation variability).

A particular position is occupied by the population from Stara Baška, collected in the area of the range of *I. illyrica.* In it we can notice features close to those of the species *I. illyrica* and *I. cengialti* and of *I. pseudopallida* as well. Plants from this population are most similar to the species *I. illyrica* and *I. cengialti*, are the shortest in the whole sample, their leaves are the smallest, but the most fleshy and with the most highly expressed veins. The spathe is the most reddish suffused, and the

leaves of the perigonium are the darkest violet coloured in the whole sample. The seeds are larger and sharper, like the species *I. pallida* and *I. pseudopallida*. In terms of seed characteristics, plants from this population recall a cross that has been described from the Italian region – *I. marchesetti* Pampanini (PAMPANINI, 1908). All this leads to the suggestion that this is a matter of a cross within the *Pallidae* series, most likely between the species *I. illyrica* and *I. pseudopallida.*

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SAŽETAK

Komparativna morfološka analiza roda *Iris* L., serije *Pallidae* (A. Kern) Trinajstić (*Iridaceae*)

B. Mitić & Z. Pavletić

Ovaj je rad nadopuna najnovijih rezultata kvantitativnih morfoloških istraživanja alpsko-dinarskih populacija serije *Pallidae* (MITIĆ *et al*., 1999), koji su potvrdili opravdanost gledišta o postojanju četiriju vrsta unutar serije: hortikulturne *I. pallida* Lam., endemične alpske vrste *I. cengialti* Ambr., endemične sjevernojadranske i dinarske vrste *I. illyrica* Tomm., te vrste *I. pseudopallida* Trinajstić, endemične na južnom hrvatskom litoralu.

Cilj rada bio je dodatno razjašnjavanje taksonomskog značaja morfoloških osobina, najčešće korištenih pri opisivanju taksonomskih kategorija unutar *I. pallida* kompleksa, odn. serije *Pallidae*. Analizirano je 30 autohtonih alpsko-dinarskih populacija, četiri kultivirane populacije vrste *I. pallida*, te herbarizirani primjerci ovog

kompleksa srodnih vrsta iz triju legaliziranih herbarijskih zbirki (ZA, ZAHO, LjU). Analizirane su veličina biljaka, listovi, cvatovi, cvjetovi, plodovi i sjemenke.

Ustanovljeno je da istražene kvalitativne morfološke osobine nisu fenotipski plastične, a dijagnostički značaj imaju izraženost lisnog žilja, boja spate, boja perigona, te morfologija peluda i sjemenki. Dijagnostički neupotrebljive osobine su odnos duljine filamenata i antera (individualna varijabilnost), te oblik i veličina tobolaca (intrapopulacijska varijabilnost).

Specifičan položaj na temelju analize morfoloških osobina zauzima populacija Stara Baška, iz areala vrste *I. illyrica*. To su najniže biljke u cijelom uzorku, s najmanjim, ali mesnatijim listovima od ostalih populacija vrste *I. illyrica*. Spate su im najjače crvenkasto nahukane, a listovi perigona najtamnije ljubičasto obojeni u cijelom uzorku. Sjemenke su im veće i bridaste, slično kao kod vrsta *I. pallida* i *I. pseudopallida*, te zaključujemo da se radi o mogućem hibridu između vrsta *I. illyrica* i *I. pseudopallida*.