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New Varieties of the Common Cyclamen (*Cyclamen purpurascens* Mill.) in Slovenia

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Abstract: Common cyclamen (*Cyclamen purpurascens* Mill.) is the only representative of its genus in Slovenia where it is a widespread species, growing from sea level to high mountainous areas. It thrives in all four major phytogeographic regions: Alpine, Dinaric, sub-Pannonian and sub-Mediterranean, in both transitional regions, pre-Alpine and pre-Dinaric, and it reacts quickly to weather conditions. It is found mostly in deciduous and mixed forests, at forest margins and in mountain meadows. In the highlands, it often grows on gravel and can also be found in fairly low-scree areas. As such, it is expected to shows great intraspecific diversity. Based on a collection of 6000 units of *C. purpurascens* specimens collected in different parts of Slovenia, we were able to determine different types of *C. purpurascens* and describe new varieties. All of the specimens were divided into four groups with respect to leaf pattern, which is the most durable distinguishing feature. The four dividing groups were silvery, semi-silvery, marbled and green. The most notable variety in the silvery group was *C. purpurascens* 'Idrija', while in the semi-silvery group, it was *C. purpurascens* 'Nova Gorica', in the marbled group, it was '*C. purpurascens* 'Slivje' and in the green group, it was *C. purpurascens* 'Podsreda'.

Keywords: intraspecies diversity; variety; *Cyclamen purpurascens*; *C. purpurascens* 'Idrija'; *C. purpurascens* 'Bela Ljubljana'; *C. purpurascens* 'Podsreda'

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1. Introduction

Common cyclamen (*Cyclamen purpurascens* Mill.) is the only representative of the genus *Cyclamen* (L.) in Slovenia [1]. This genus occupies a special position within the Primrose family (Primulaceae) [2]. Various authors have commented on numerous differences in the external appearance of this genus. Similarities are observed only in round leaves and nodding flowers, as in the Snowbell genus (*Soldanella* L.), and upturned leaves, as in the American cowslips genus (*Dodecatheon* L.). More similarities are evident in the comparison of the reproductive organs [3]. Due to these features, many authors have classified this genus into a special tribe: Cyclamineae [4,5].

The genus *Cyclamen* is distributed throughout the Mediterranean basin and neighbouring countries [6]. It is absent only from Spain, Morocco and Egypt but is present on Mediterranean islands and in northern Africa, reaching as far as Asia Minor all the way to Iran. It grows in the Arabian Peninsula (Lebanon) and has one isolated locality in northern Somalia [7]. Common cyclamen also has a northerly distribution. According to Flora Europaea, its distribution area extends from southeastern France to the western Carpathians and the former central Yugoslavia [8]. As reported by Grey-Wilson [7], it grows from eastern France, Switzerland and northern Italy to Austria, Slovenia, Croatia, Serbia, Macedonia and Bulgaria, reaching as far as Poland, the Czech Republic and Slovakia, its easternmost distribution area including the southwestern Caucasus [7]. In the 2002 edition of Flora Europaea, however, the authors omitted the Caucasus, stating that it is naturalised in the mountains of Romania and western Russia.

In Slovenia, common cyclamen is a widespread species, growing from the coast to high mountainous regions [1]. Slovenian populations are probably in the centre of the species'

natural distribution. This can be seen from the fact that Slovenian cyclamen populations are very variable compared to some more northern ones (e.g., southern Germany) [9]. The populations around Lake Garda, which is also located in the centre of the distribution of the *C. purpurascens* species, are also variable [10].

Species *C. purpurascens* can be found mostly in deciduous and mixed forests but also at forest margins and in higher mountain meadows. Larger populations have been observed even at an altitude of 1500 m and up to 2000 m. Individuals of these populations were more rugged, with thick leathery leaves, and were much more floriferous than specimens in forest understorey [11]. In high mountainous regions, common cyclamen is frequently found in scree, and in this type of locality, it also appears at considerably lower altitudes (Goriška and Kras region). Tubers vary greatly in size, depending on the plant's age, and can grow on top of the soil surface, attached by roots to the soil or rock. Tubers also grow deep in the soil or rubble, with only a long stem protruding from the surface.

Grey-Wilson reported [7,12] marbled specimens of *C. purpurascens* from Lake Bled in Slovenia, which are called *C. purpurascens* f. *Lake Bled.* Opposite to the marbled specimens also specimens with totally green leaves has been found in Slovenia [13]. In former Czechoslovakia in 1971, Halda and Soyák [14] described green-leafed specimens as a new species: *C. fatrense.* It was even considered as an important Slovakian endemic. According to other authors [15,16], it is supposed to be a subspecies of *C. purpurascens* (*C. purpurascens* subsp. *immaculatum*).

The purpose of this study is to determine the intraspecies variability present in *C. purpurascens*, to continue to conserve it in ex situ collections and to discover potentially stable varieties that may form a basis for interesting new cultivars suitable for horticulture. In horticulture, stable varieties of a species are usually denominated as new cultivar, but in nature, most varieties disappear. By isolating and cultivating stable varieties, new cultivars can be described and then also commercially produced. The purpose of the research was also whether we can determine the frequency of individual cyclamen groups in different phytogeography or ecological similar environmental conditions and at different altitudes.

2. Materials and Methods

We started intensively collecting *C. purpurascens* specimens in 2001, which means that some of the plants have now been in culture for twenty-two years, while new specimens are added to the collection each year. Cyclamens are long-lived plants, and only a few collected individuals died during this period. Cyclamen is best collected during autumn, in winter, spring and after the second half of the summer when it begins to bloom. In terms of searching for varied leaf patterns, the best collection period is after bloom when the leaves are already well formed and the leaf pattern is clearly visible. As leaves are wintergreen, the collection period can last until the next spring. By then, numerous leaves are dead, and it often happens that at the time of renewed intensive growth in the second half of the summer, cyclamen is without any leaves.

2.1. Selection of Localities

According to collection permission, which was obtained by the Ministry of Environment, we collected plants in different parts of Slovenia during their entire growth period. At first, most of the specimens were collected during autumn and winter but later on also during the other seasons. Initially, we dug out entire plants, together with tubers. In the fruiting period, we also collected the seeds. For the specimens where floral trunks were present, we took just them and left the tubers. In this way, individual specimens remained in nature, and it was possible to return to the individuals if needed.

The collected plants covered all phytogeographic regions of Slovenia (Figure 1). Climatic factors such as temperature, precipitation and UVB radiation differ between individual phytogeographical regions. Therefore, for the possible influence of temperature on the colouration groups of cyclamen described below, we obtained data on the maximum average temperatures in the ten-year period before collecting specimens (Figures 2–7). We

obtained temperature data from the official climate stations of the Environment Agency of the Republic of Slovenia and only for those localities where we collected specimens of the varieties described below. We chose the climatological station that was closest to our collection locality. Considering the diversity of cyclamen habitats, a larger number of specimens were collected. Between 4 and 20 specimens were taken from each locality, depending on the diversity of local populations. The samples were collected after a systematic survey of the local population. The locations within single-phytogeograpic regions were selected randomly.

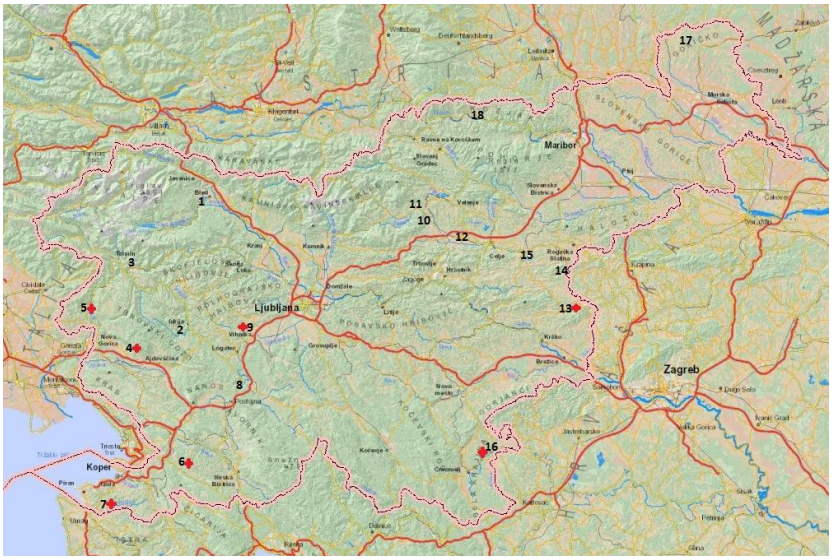

Figure 1. Map of Slovenia with marked localities with high intraspecies variability of *C. purpurascens* (1—Bled, 2—Idrija, 3—Tolmin, 4—Lijak, 5—Plave, 6—Slivje, 7—Dragonja, 8—Planina, 9—Vrhnika, 10—Dobrovlje, 11—Mozirje, 12—Šempeter, 13—Podsreda, 14—Podčetrtek, 15—Gorica pri Slivnici, 16—Božakovo, 17—Grad, 18—Radlje). With red star are marked localities where described varieties were collected (source: https://meteo.arso.gov.si/met/sl/archive, accessed on 27 January 2023).

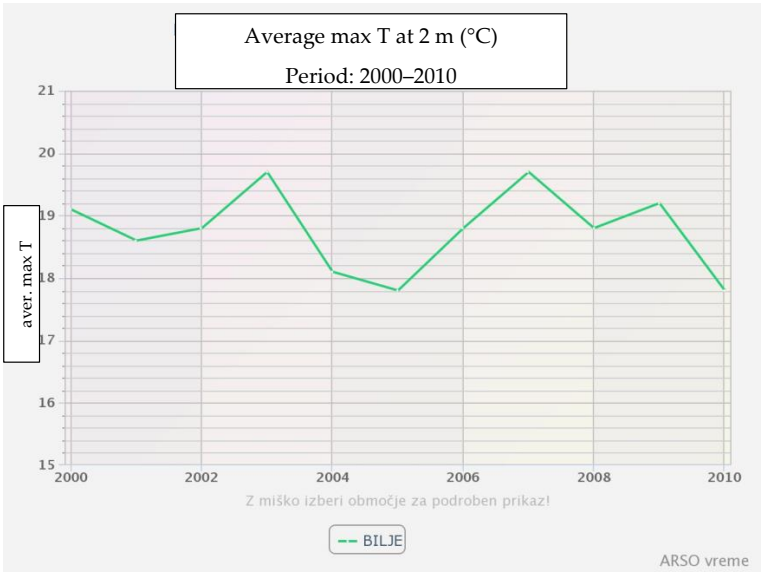

Figure 2. Average maximum temperature for localities 4—Lijak and 5—Plave, measured from nearby climate station Bilje (source: https://meteo.arso.gov.si/met/sl/archive, accessed on 27 January 2023).

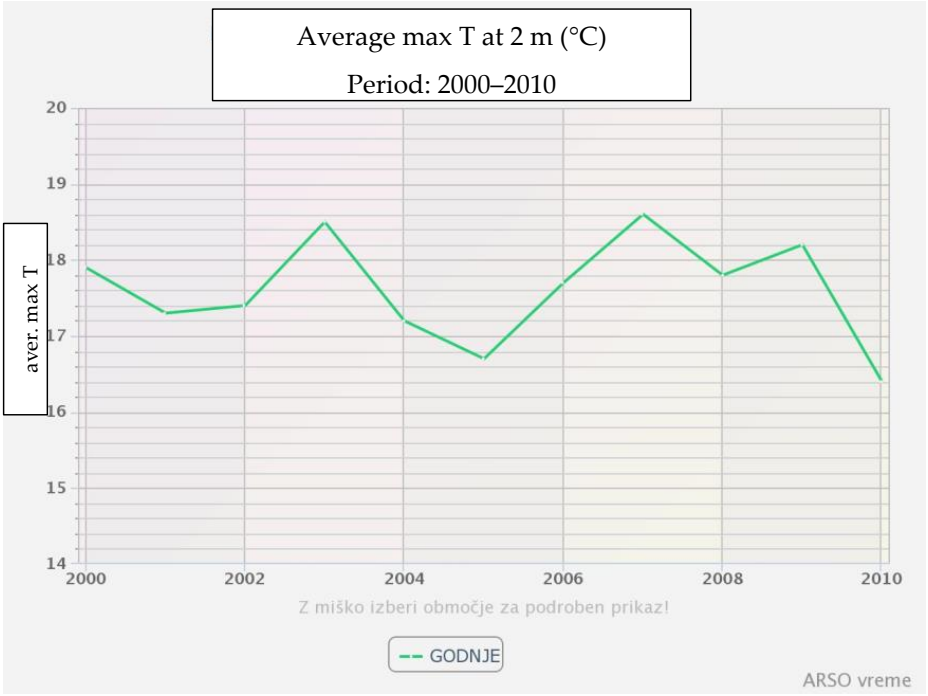

Figure 3. Average maximum temperature for locality 6—Slivje, measured from nearby climate station Godnje (source: https://meteo.arso.gov.si/met/sl/archive, accessed on 27 January 2023).

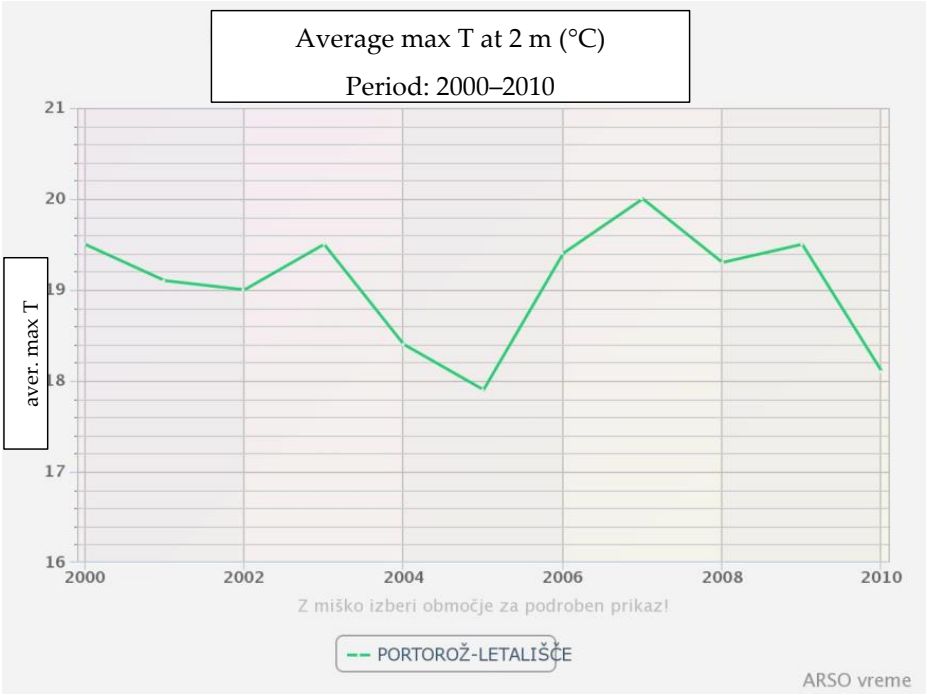

Figure 4. Average maximum temperature for locality 7—Dragonja, measured from nearby climate station Portorož (source: https://meteo.arso.gov.si/met/sl/archive, accessed on 27 January 2023).

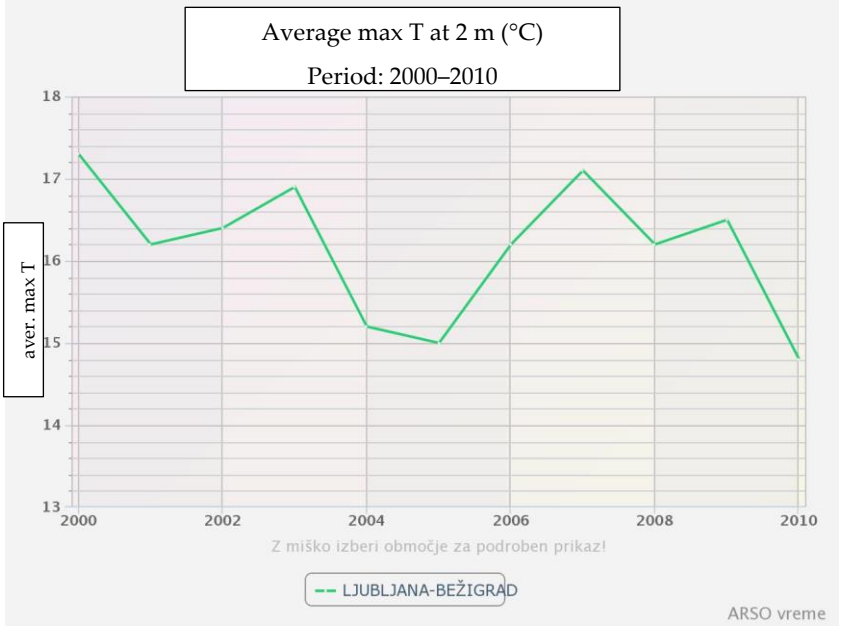

Figure 5. Average maximum temperature for localities 9—Vrhnika, measured from nearby climate station Ljubljana (source: https://meteo.arso.gov.si/met/sl/archive, accessed on 27 January 2023).

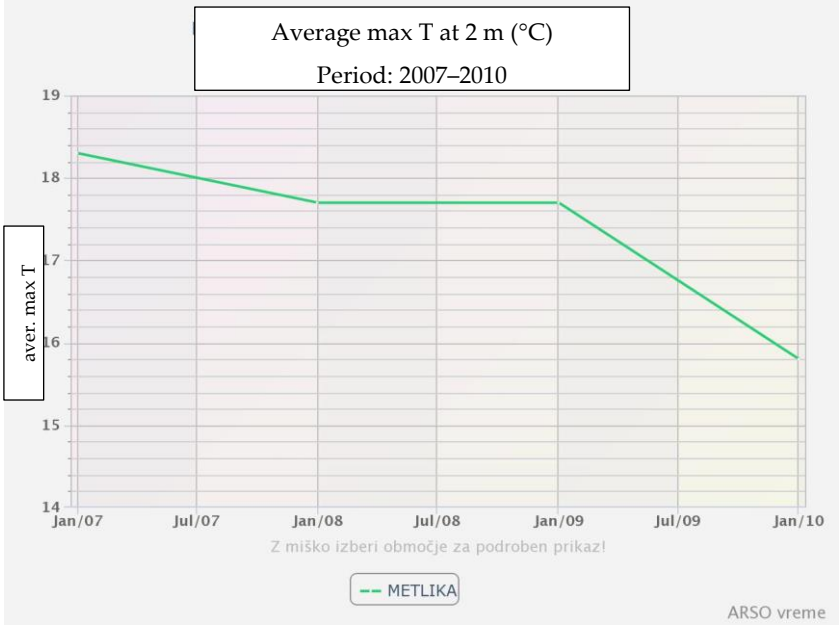

Figure 6. Average maximum temperature for localities 16—Božakovo, measured from nearby climate station Metlika (source: https://meteo.arso.gov.si/met/sl/archive, accessed on 27 January 2023).

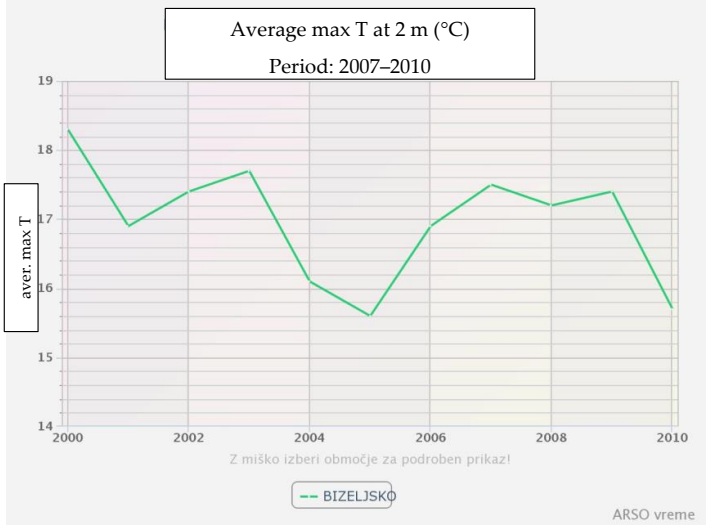

Figure 7. Average maximum temperature for localities 13—Podsreda, measured from nearby climate station Bizeljsko (source: https://meteo.arso.gov.si/met/sl/archive, accessed on 27 January 2023).

2.2. Plant Material Collecting

Plants were dug from the soil and put into PVC bags, and they were moistened when necessary. Each bag from the same site was provided with a label bearing a name and a date. Plants were kept separate when a locality included different growing sites (such as a meadow, forest, and steep rocky walls). All plants were photographed before removal. Some special features of these plants once they were dug up were photographed again.

The plants were taken to the Botanic Garden, after which they were described and additional photographs were taken. Specimens were planted into pots of 10 × 10 to 10 ×15 cm, depending on the size of the tubers. Each pot was provided with its own label indicating the individual's locality and the date of collection. The plants were planted into a mixture of garden-made leaf mould and compost. The pots were arranged over a perforated foil preventing weed growth. Plants were watered and shaded when necessary. The collection currently includes over 6000 units (Figure 8).

Figure 8. *C. purpurascens* plant collection in University Botanic Gardens Ljubljana (Ljubljana, Slovenia).

2.3. Cultivars Determination

Many collected individuals have been in culture for a number of years. Their characteristics have been monitored on an annual basis and compared with first description made on the day of plant material collecting. The plants have also been photographed on a regular basis to provide additional records on the described special features.

According to Grey-Wilson [7,12], the cyclamen leaf pattern is a fingerprint of the plant. Due to the very large number of different leaf patterns in cyclamen, we decided to classify individual specimens into groups with a characteristic that was specific to the majority of specimens in each single group. The characteristics were observed only by leaves, as they are evergreen and present most of the year (from August to the end of June). When forming the groups, we used a similar approach to that used by some researchers before us. On the leaves, we observed the proportion of silvery colouration of the surface and the proportion of green colouration as well as the intensity of visibility or spread of the pattern. Wiltshire [17] and Denny [18] already defined the term silvery-green leaves and describe it by their cultivars. In addition, Mathew [15] described the silver leaf form. In our research, we added additional groups to these groups so that we could classify most of our specimens into them.

We defined the silver group as the one in which upper leaf surface is more than 75% silver coloured. The main characteristic of our defined semi-sliver groups is up to 50% of the silver surface of the leaf, with a larger green pattern in the middle. Meanwhile, the main characteristic of the marble group is a leaf surface with very little silver colouration (less than 25%) in the form of a slightly silvery pattern, and the characteristic of the green group is a leaf surface without a silvery pattern, which means a 100% green upper leaf surface. Cultivars from France and Switzerland, already known before, belong to this last group [19].

3. Results

All varieties of cyclamens collected from different parts of Slovenia were divided into groups on the basis of their leaf pattern. Evergreen leaves are the most enduring plant feature and are present almost throughout the year. Although the colour and shape of the flower are good distinguishing signs, they are short-lived and thus less suitable for determination throughout the year. The colour of flowers, however, does not correlate with leaf colouration, meaning that flowers of the same colour may appear along with variously coloured leaves.

Since leaf pattern is the most durable feature, it was used to distinguish between different varieties. On the basis of leaf patterns we distinguish the following groups: (1) Silvery, (2) Semi-silvery, (3) Marbled and (4) Green. Within each group, we then described new cultivars, for which we have confirmed stability in leaf colouration over the observed years. Our research has shown that the frequency of silver and semi-silver groups is quite frequent in the sub-Mediterranean and sub-Pannonian regions and above all always in warm places south oriented. This distinguishes it from the green and marbled groups, which always appear in the colder parts of the pre-Alpine Alpine and Dinaric world, and from the marbled group, which predominates in cold areas and above all at higher altitudes.

3.1. Silvery Group

The silvery-leaved group consists of varieties in which the central part of the leaf has a silvery colour spreading towards the margin. An uninterrupted silvery belt usually ends before the second venous circle from the leaf margin inwards. From there onwards the silvery colour remains only along the veins [20].

This group also comprises specimens in which the silvery colouration is replaced by a more pewtery colour if an equal distribution of this colour is present over the major part of the lamina. In some individuals, the second to last circle has an uninterrupted silvery strip along the veins, with single interrupted extensions reaching to the leaf margin. The silvery or pewtery colouration of the leaf predominates over green. Leaf shapes range from completely cordate to lanceolate. Leaves are usually mid-sized (5 × 5 to 8 × 8 cm). The margin is usually smooth, rarely toothed, and the lower side of the lamina having a purple to faintly purple colour. The flowers are mostly light pink to mid-purple. Specimens with silver leaves were found mostly in sunny and warm localities. The same was also observed around Lake Garda [21].

3.1.1. Cyclamen purpurascens 'Idrija'

This variety (Figure 9) [22] has large, markedly round-cordate leaves whose inner part has a silvery gloss. The veins are very pronounced, whitish; fine silvery strips run along them to the very margin of the smooth leaf. A faint greenness appears within the silvery colour in the second to last complete venous circle, but the silvery gloss remains interlaced between numerous veins as far as the margin. The leaf lobes touch each other. The underside of the lamina is purple. The flowers, with nicely rounded petals, are light pink. The name "Idrija" is a tribute to the five hundred years of mining history of Idrija, which is a world-renowned mercury mine. The town is also famous for its lace, *Idrija lace*; thus, the silvery leaf and the lace-like design on the leaf margin unite two important local characteristics: mercury and lace.

Figure 9. Cyclamen purpurascens 'Idrija'.

3.1.2. Cyclamen purpurascens 'Plave'

The described variety (Figure 10) is another example in the silvery group with markedly cordate-lanceolate, smaller to mid-sized leaves (2–5 cm in length). The inner part of the leaf is strikingly silvery-pewtery coloured. The plant's winter leaves resemble those of the *C. coum* Pewter Group, the only difference being their more pronounced cordate-lanceolate shape. The leaves are thicker, compact and finely undulate. The leaf lobes are non-contiguous. The underside of the leaves is green to faintly purple. Its pink flowers are smaller than those of other varieties. The name refers to the place of the first recording in the wild.

Figure 10. Cyclamen purpurascens 'Plave'.

3.2. Semi-Silvery Group

The semi-silvery leaved group consists of varieties with a green maple-leaf-shaped centre. The centre of the leaf is surrounded by a wide silvery belt progressing varyingly into the leaf margin: either only along the veins or only in the second to last circle inwards from the margin, which is still silvery along the veins. The ratio between the green and silvery leaf colours is approximately even, or it alternates in favour of one or the other colouration, but the overall impression of a silvery colouration remains uniform. The leaves range between round-cordate to lanceolate and from toothed to smooth margins. The lower surface of the lamina is light to deep purple. The colour of the flowers ranges from very light to deep purple [22].

3.2.1. C. purpurascens 'Nova Gorica'

C. purpurascens 'Nova Gorica' (Figure 11) [23] is an example of the semi-silvery group with mid-sized leaves (5 × 5 to 8 × 8 cm), which are green in the centre, with a plane-tree-leaf pattern with markedly light green veins. The dark part is followed by a broad silvery-pewtery coloured contour reaching almost to the leaf margin. Only the extreme marginal part has a very narrow green outline. The margin has tiny teeth, which is more pronounced, and appears toothed. In reality, it is smooth, but a slight undulation combined with a narrow pewtery stripe gives the impression of a toothed edge. The centre of the underside of the leaf is pale purple changing into a complete green towards the margin. The flowers are pink, with fine auricles on the corolla mouth.

Figure 11. *C. purpurascens* 'Nova Gorica'.

3.2.2. C. purpurascens 'Bela Ljubljana'

It is a variety with flowers, with a somewhat narrower corolla than in the usual species, which is why they look longer, although they do not belong to those with long petals (Figure 12). The leaves are medium large, oblong-cordate, with a fairly acute leaf apex, their margins toothed and undulate, the lamina glossy in a green-silvery shade up to approximately one half of the leaf. The peduncles are greenish-red, turning darker at a later stage. The inner maple-leaf pattern is lighter green in colour, its peaks reaching into the surrounding silvery area. The underside of the leaves is green, acquiring a faint pink nuance only towards autumn. The name "Bela Ljubljana" is symbolic. The plant first bloomed in Ljubljana, which has since old times been popularly known as "white Ljubljana". It differs from the already described form *C. purpurascens* f. *album,* reported by Grey-Wilson [12] and Mathew [15], in that the leaves of the newly described variety are semi-silvery, with a narrow maple-leaf pattern in the middle, and glossy. The leaves of the already known form are marbled. The flowers of the new variety appear bigger, and the corolla-petals ratio is greater. The leaves showing a more acute peak are toothed, undulate and glossy, whereas those of the *album* form are more rounded, marbled and less glossy. As reported by Grey-Wilson [12] and Mathew [15] in their respective monographs on cyclamen, the form *C. purpurascens* f. *album* is very rare in culture.

Figure 12. *C. purpurascens* 'Bela Ljubljana'.

3.3. Marbled Group

The marbled group consists of varieties with leaves that are green in the centre, here again in the shape of a maple leaf that is surrounded by a marbled pattern wherein the silvery colour is barely perceptible against green. It looks like a marbled background. The impression is the same as for marble. Compared to the previous groups, the leaf colouration of this group is indistinct. The silvery parts are not formed into larger, closed patterns but rather an indistinct mesh colouration. Leaves are of very different shapes and are not specifically bound to this leaf pattern. Leaf size ranges from small to giant laminae (2–3 cm, to 10 × 10 to 15 × 15 cm). The underside of the lamina is deep purple to light purple, and it is very rarely green. The colour of the flowers ranges from deep to light purple [20].

C. purpurascens 'Slivje'

Figure 13 contains an example of the marbled group with round-cordate, glossy and dark green leaves with a silvery contour around the central maple-leaf pattern. By their colour and pattern, they show some resemblance to the leaves of *C. pseudibericum*. The leaves are thicker, smaller to mid-sized (2–5 cm), finely toothed and finely undulate. Leaf lobes do not or hardly touch each other. The underside of the leaves is purple. Flowers are pink and smaller to medium-sized (1–1.9 cm). The name refers to the place of the first recording in the wild.

Figure 13. *C. purpurascens* 'Slivje'.

3.4. Green Group

The green-leaved group is comprised of all of those plant types whose leaves are completely without pattern or in which the pattern is only detected after close examination and even then only barely. Here, too, the leaves reveal a great variety of shapes. A look from afar may create the impression of completely green leaves, but fine patterns may in fact be lost in the green colour. We placed these plants in this group because the most overwhelming impression is that of the greenness of leaves. These varieties are usually of a deeper green colour than leaves of the other groups. Completely green leaves are usually of a paler shade of green. The underside of the lamina can be completely green or purple. The flowers are pink to deep pink; this colour is usually very deep in those with an almost imperceptible leaf pattern. The specimens with completely green leaves are bound exclusively to limestone grounds and colder karst areas. The others with a barely visible pattern on green leaves are mostly found on acidified surfaces [20].

3.4.1. C. purpurascens 'Podsreda'

The *C. purpurascens* 'Podsreda' [24] (Figure 14) has a large (up to 8 cm), perfectly green cordate-lanceolate leaves with a smooth margin. The leaves have pronounced light green veins. Leaves are half-matt and green; compared to the other green varieties, they have the largest green leaves that have thus far been found (8 × 8 cm–9 × 9 cm or even larger). The underside of the leaves is the first green later on purple green. The flowers are light pink, larger than usual (up to 2 cm height), and with a pronounced corolla. The name refers to the village Podsreda in whose surroundings the specimens was found for the first time.

Figure 14. *C. purpurascens* 'Podsreda'.

3.4.2. C. purpurascens 'Cankar'

It is a variety with cordate leaves showing a tendency for a slightly rhomboid shape (Figure 15). The leaf lobes mostly overlap or at least touch each other. The leaves are mid-sized (5 × 5 to 8 × 8 cm). They are glossy and look completely green; however, a hardly discernible shade of leaf pattern is visible close-up. The leaf margin is almost imperceptibly toothed to the touch and slightly undulate. The leaves tend to develop additional indentations. The underside of the leaves is pale purple. The leaves are thicker than in other varieties. The flowers are pink to pale pink. The name refers to Ivan Cankar, a Slovenian writer who spent a part of his life in the vicinity of the place of the first recording of this variety in the wild.

Figure 15. *C. purpurascens* 'Cankar'.

4. Discussion

According to Grey-Wilson [7,12], the leaf pattern is a fingerprint of the plant, and it remains unchanged in culture, irrespective of the substrate from which a plant was transferred. Although it is difficult to anticipate places where a single leaf pattern or group may appear or may be more common, our long-term research revealed some patterns. In warmer parts of Slovenia, particularly where summer temperatures are higher, leaf patterns are more diverse. In colder areas of the country where summers are shorter, leaf patterns show less diversity. The leaf pattern is relatively less diverse on slightly acidic or locally acidified soils where common cyclamen thrives. The leaves are usually smaller with few flowers. The tubers of these plants are small but they are, on average, deep in the ground. While it might be expected that single groups are associated with certain phytogeographic regions, this does not apply to common cyclamen. The only exception is the green group, which is bound to colder habitats in various phytogeographic regions with the exception of the sub-Mediterranean region where no specimen from this group had been found by 2010. In 2010, however, we found some specimens from the green group in an atypically warm habitat in the sub-Mediterranean region. Irrespective of this exception, the green group is still considered as a characteristic of cool lower-lying habitats in the interior of Slovenia. While in contrast, it is more frequent in more sun-exposed localities but at altitudes above 600 m [25]. Some authors consider the green-leaf variety of common cyclamen a new species. Thus, Halda and Soyák [14] described a new species for the then Czechoslovakia, now considered an important Slovakian endemic: *C. fatrense*, which has a small distribution area, namely Veľká Fatra and Starohorské vrchy Mts. However, according to Grey-Wilson [7], this species is merely a variety of common cyclamen (*C. purpurascens*). According to other authors [15,16], it is supposed to be a subspecies of *C. purpurascens* (*C. purpurascens* subsp. *immaculatum*). Numerous authors, however, continue to treat it as an important Slovakian endemic [26–28] and describe it in different associations, mostly in deciduous and mixed forests, in non-specific beech associations in limestone soil or together with fir or spruce, or even in spruce monocultures. From our experience, the same type of the green variety of common cyclamen is also present in similar circumstances and associations in Slovenia [13]. Considering the diversity of cyclamen and the already described varieties, we agree with Grey-Wilson [7] in that *C. fatrense* is a variety of common cyclamen (*C. purpurascens*). Within the green group, we distinguish between some interesting green varieties. If the green varieties were raised to a higher rank, i.e., to species level, such as *C. fatrense*, this would mean that a similar status should also be attributed to the extreme silvery group, which is clearly different from the intermediate groups such as the semi-silvery and the marbled group. However, even within these groups, some exceptions occur. According to Grey-Wilson [7], Slovenia constitutes the southwestern limit of the distribution of this species, whereas the northern part of Slovenia constitutes the centre of its distribution. Šilić [29], however, stated that Slovenia lies even closer to the distribution centre of this species. It is thus not surprising that common cyclamen is extremely diverse both with respect to its leaf pattern and the shape and colour of its flowers in Slovenia. As already mentioned, the specific leaf pattern, shape and colour of the flower are not bound to the biogeographical region but rather are more a reflection of the individual habitat and local environmental factors (radiation, temperature, precipitation). Environmental factors affect the synthesis of anthocyanins and flavonols [30]. In one of the studies [31], a difference in the amount and composition of anthocyanins and flavonols was found between individual cyclamen genotypes collected at different locations in Slovenia. Those genotypes contain the same amount and composition of anthocyanins and flavonols after several years of cultivation in University Botanic Gardens under the same environmental factors [32]. We nevertheless believe that common cyclamen constitutes a single species which, horticulturally speaking, has various interesting varieties. Hildebrand [6] reported that herbarium specimens fail to convey strong diversity at all, and having examined the specimens of the LJU herbarium, we agree with him. Single traces of the leaf pattern remain visible in very few herbarium specimens.

Long-term observations have led to the conclusion that common cyclamen reacts quickly to changes in weather conditions [20,33]. The large number of plants collected in the University Botanic Gardens Ljubljana (Ljubljana, Slovenia) makes it possible to verify this assumption. In Slovenia, cyclamens have always been seen as heralds of autumn. They used to start blooming in mid-August when, in the interior of the country, the summer was already ending. In the 1980s, it was already possible to find single blooming common cyclamens towards the end of June. Since the 2000s, however, this is a very frequently observed phenomenon. Our observations revealed that blooming nowadays regularly occurs in years when early May or June are afflicted by drought combined with high temperatures, which is followed by a rainy period or a spell of cooler weather. For cyclamens, this marks the end of the dormant period because dormancy started earlier due to drought and heat. In such years, cyclamens bloom earlier, even as early as during the end of June. Blooming cyclamens are few to begin with but increase in number after longer periods of rain and cooler weather. Sometimes, blooming may also start later, especially if July and August are warm, dry or hot. Recent examples of such years include 2003, 2006, and the second half of the summer of 2008 [20]. During these years, cyclamens bloom only at the end of August, while in the warmest parts of Slovenia, they generally bloom only during the first part of September [34]. In extremely dry summers, common cyclamen develops flowers before developing leaves. When a year is normally humid, the development of leaves is simultaneous with that of flowers [20]. Despite the facts that, as already mentioned, cyclamen flowers are not as variable between individual specimens as leaf samples, they contain various anthocyanins and their amount varies among the specimens [32]. This means that perhaps new varieties could be defined based on the presence and percent of specific pigments in the sepals and therefore the different colouration of the flowers [35–37].

The state of cyclamen leaves allows us to infer what the winter was like. In mild winters, most of the leaves remain alive, while in very cold and dry winters, their survival is fairly poor. Despite the fact that cyclamen is an undergrowth plant species, its leaves are also adapted to exposure to greater UV-B radiation. Their anthocyanin content provides protection against UV-B radiation damage. They found that as radiation increases, the content of anthocyanins in leaves increases, so spring leaves have a lower content than late summer leaves. In addition, those specimens that have been growing for several years in locations exposed to increased radiation already have a higher anthocyanin content in the spring than those that have only recently been exposed to increased radiation [38]. With this adaptation of the leaves, individuals of the species *C. purpurascens* can more easily adapt to changes in the environment, such as, e.g., more and more frequent longer periods of strong solar radiation and the occurrence of forest gaps due to more and more frequent natural disturbances. In addition to being a horticulturally interesting species, common cyclamen is therefore also a good indicator of ongoing changes in weather and ultimately climate change.

Thus, growing various varieties in culture is the only way to conserve special features appearing in nature unless sufficient numbers are present in the wild. In terms of searching for new varieties, artificial selection and ex situ protection represent the only possible ways of exploiting potential sources of new varieties and their conservation for possible further ennobling.

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