

PULSATILLA STYRIACA (PRITZEL) SIMONK. (RANUNCULACEAE) - A NEW SPECIES FOR BULGARIAN FLORA

A. TASHEV

University of Forestry, Department of Dendrology, Faculty of Forestry, BG - 1756 Sofia, Bulgaria

Abstract

TASHEV, A., 2013. *Pulsatilla styriaca* (Pritzel) Simonk. (Ranunculaceae) - a new species for Bulgarian flora. *Bulg. J. Agric. Sci.*, 19: 347-352

The paper presents first record of the rare and endangered species *Pulsatilla styriaca* (Pritzel) Simonk. (*P. halleri* (All.) Willd. subsp. *styriaca* (Pritzel) Zämsels), a species not known for the Bulgarian flora so far and found to date only in Eastern Austria. The locality reported is situated in Western Sredna Gora and has been monitored during the period 1998 – 2010. During the 1998 inventory total 89 individuals were found, 53 of which having generative stems. Next inventories revealed a clear trend of decreasing the population size. The main trees, shrubs and other plant species in the locality are reported and the results showed that it is within a habitat of European importance. A status of protected site is recommended for the locality.

Key words: Bulgaria, new species, *Pulsatilla styriaca* (Pritzel) Simonk.

Introduction

During the floristic investigations in the Western Sredna Gora, a species of genus *Pulsatilla*, found in the region of study was preliminary identified as *Pulsatilla halleri* (All.) Willd. (*Anemone halleri* All.) (Tashev, 2008). It is a perennial herbaceous plant, 5-40 cm in height with oblique or vertical root. The species inhabits dry stony places in the bushes, exclusively on limestone. Its distribution includes Central (Alps, Western Carpathians) and Southeastern Europe (Balkan Peninsula, Crimea) and in Bulgaria the species is in the easternmost peripheral part of its area of distribution (Jordanov and Kozuharov, 1970; Tutin and Akeroyd, 1993). The species is Alpine-Carpathian-Balkan floristic element (*Alp-Carp-Bal*) and its present distribution in Bulgaria includes Middle Rhodopes and Eastern Stara Planina (Jordanov and Kozuharov, 1970; Panov, 1975; Kožuharov (ed.), 1992; Delipavlov and Cheshmedjiev (eds.), 2003; Assyov and Petrova (eds.), 2006). Ac-

cording to Assyov and Petrova (eds.), 2006 its vertical distribution covers the range 300-1400 m a.s.l., and according to Delipavlov and Cheshmedjiev (eds.) (2003) the species occurs within the range 500-1500 m a.s.l. In Bulgaria, only *Pulsatilla halleri* (All.) Willd. ssp. *rhodopaea* (Stoj. and Stef.) K. Krause was reported to date (Jordanov and Kozuharov, 1970; Kožuharov (ed.), 1992; Delipavlov and Cheshmedjiev (eds.), 2003). The closest to *P. styriaca* species in the Bulgarian flora, *P. halleri*, is considered to be of high conservation importance in Bulgaria. It is listed in the Red Data Book of P R Bulgaria (Velchev (ed.), 1984) with the category “rare species” and was protected in 1961 sub the name *Anemone rhodopaea* Stoj. et Stef. (Order № 701/12.04.1961). Its protection status was confirmed by including in the new List of the protected species sub its present name (State Gazette, 56, 1989). Finally, it was included in Appendix 3 of the Biodiversity Act of Bulgaria (2002). In the Red Lists of the higher plants in Bulgaria elaborated in 2005, *Pulsatilla halleri* was listed as “endangered”

(EN) species (Petrova and Vladimirov, 2009). The species is included under the same status in the new Red Data Book of R Bulgaria (Peev (ed.), 2011).

Materials and Methods

The locality of *Pulsatilla styriaca* (Pritzel) Simonk. was found during a field study of the locality of *Anthemis argyrophylla* (Halácsy and Georgiev) Velen. – critically endangered and protected species, local endemic and tertiary relict. The identification of the herbarium materials was done following Jordanov and Kozuharov (1970), Hegi (1965–1974), Tutin and Akeroyd (1993), Maurer (1996), Fischer et al. (2008). A survey on the literature and the herbarium collections in Bulgaria (SOM, SO and SOA) and in Austria (W, WU, WHB and WFBVA) was performed. The habitat of the locality was identified according to Kavrakova et al. (2005) and the Interpretation Manual for the habitats in the European Union, Eur 15.2. (2002). The code followed NATURA 2000 (HD Code), European Nature Information System (EUNIS database v. 2) and “Classification of the Palaearctic habitats” (PAL. CLASS), version 1996.

Results and Discussion

Ranunculaceae

Pulsatilla styriaca (Pritzel) Simonk., (1906) – Syn.: *P. halleri* (All.) Willd. subsp. *styriaca* (Pritzel) Zámels, (1926); *Anemone halleri* var. *styriaca* Pritzel, (1841); *A. styriaca* (Pritzel) Hayek, (1902); *A. halleri* All. subsp. *styriaca* Widder, (1934) (Janchen, 1956) (Figure 1).

Bulgaria: Sredna Gora (Western) (Ichtimanska Sredna Gora): North-west from Belovo, northern from the Maritza riverbed, between Momina Klisura village and Belovo. The slope is of southeastern exposition and the rock is limestone (Figure 3). Collected with flowers.

380 m a.s.l.; N: 42°13'27.6"; E: 23°59'56.4". GM-57, 26.04.1998, coll. *Al. Tashev* (SOM 164107) (Figure 2);

385 m a.s.l.; N: 42°13'27.7"; E: 23°59'55.9". GM-57, 11.05.2008, coll. *Al. Tashev* (W 2009-0003619, <http://herbarium.univie.ac.at/database/detail.php?ID=136481>).

The comparison of the herbarium specimens of *P. styriaca* from Bulgaria and Austria (W, WU, WHB and WFBVA) proved their complete identity (Figures 5 and 6).

The most important differences between *Pulsatilla halleri* (All.) Willd. subsp. *rhodopaea*, occurring in Eastern Stara Planina and in the Central Rhodopes, are the following ones: in subsp. *rhodopaea* the primary divisions of the basal leaves are often petiolate, and the number of all lobes is 50–100. The plants seldom exceed 5 cm during the flowering. In *P. styriaca* the number of all leaflets is less than 50 and the primary leaflets of the basal leaves' blade are 5. The plants are usually higher than 5 cm during the flowering. This subspecies is closer to *Pulsatilla halleri* subsp. *halleri* and differs from it only in the size of the basal leaves – in subsp. *halleri* it is 3–7 cm, and in *P. styriaca* is 5–11 cm. This subspecies is known to date only from Eastern Austria (Tutin and Akeroyd, 1993).

The habitat was identified as Arborescent matorral with *Juniperus* spp. (HD Code 5210; PAL.CLASS.: 32.131) or [*Juniperus oxycedrus*] arborescent matorral (EUNIS: F5.1311; PAL.CLASS.: 32.1311), which is a habitat of European importance (Interpretation Manual for the habitats in the European Union, Eur 15.2. 2002).

The locality is situated in the Central-Rhodopean low-mountainous climatic district of the Transitional continental climatic sub-region of the European Continental climatic region (Sabev and Stanev, 1963; Velez, 2005). According to the forest regionalization, it is located in the Thracian forest region, lower plain and hilly oak forests (Zahariev et al., 1979), and according to the regionalization of vegetation in Bulgaria – in the belt of xerophyte and mesoxerophyte, microthermic and mesothermic vegetation in the xerothermic oak belt and in hilly plains (Bondev, 1991). According to the floristic regionalization of the country, it is in the floristic region Western Sredna Gora (Bondev, 1966).

The locality is situated at the lower part of the 25° slope. The rock is limestone and the soil is stony, shallow, poor and very dry. The soil type is *Rendzic Leptosols*. The original secondary plant community dominated by *Quercus pubescens* Willd. with participation of *Ostrya carpinifolia* Scop. (Figures 1 and 4) and *Fraxinus ornus* L., where *P. styriaca* was found, had reached its final stage of degradation. Therefore, in 1955 it was afforested by Black Pine (*Pinus nigra* Arnold) and single individuals of Scots Pine (*Pinus sylvestris* L.). At the moment there are still several survived individu-



Fig. 1. The Western Sredna Gora. A part of the habitat of *Pulsatilla styriaca* (Pritzel) Simonk. including three plant tufts between threes of *Ostrya carpinifolia* Scop (24.02.2008)



Fig. 2. The Western Sredna Gora. A tuft of blossoming individuals of *Pulsatilla styriaca* (Pritzel) Simonk. (24.02.2008)



Fig. 3. The Western Sredna Gora. A blossoming individual of *Pulsatilla styriaca* (Pritzel) Simonk. among limestone rocks



Fig. 4. The Western Sredna Gora. A tuft of faded plants of *Pulsatilla styriaca* (Pritzel) Simonk. with fully developed leaves close to a three of *Ostrya carpinifolia* Scop. (6.06.2008)



Fig. 5. The Western Sredna Gora. Herbarium specimens of *Pulsatilla styriaca* (Pritzel) Simonk. from Bulgaria. (10.05.2009)



Fig. 6. Vienna. Herbarium specimens of *Pulsatilla styriaca* (Pritzel) Simonk. (Herbarium of the Museum of Natural History (W) (3.03.2009)

als or small groups of Black Pine in the lower part and very few Scots Pine individuals. Also, single trees of *Quercus pubescens* Willd., *Q. frainetto* Ten., *Q. dalechampii* Ten., *Ostrya carpinifolia* Scop., *Fraxinus ornus* L., *Pistacia terebinthus* L., *Pyrus pyraeaster* Burgsd. participate in the tree composition. There are also small groups or single individuals of shrubs: *Juniperus deltoides* R. P. Adams, *Carpinus orientalis* Mill., *Paliurus spina-christi* Mill., *Cotinus coggygria* Scop. *Coronilla emerus* L. subsp. *emeroides* (Boiss. & Sprun.) Hayek, *Rhamnus rhodopeus* Velen., *Prunus spinosa* L., *Rosa obtusifolia* Desv., *Amelanchier ovalis* Medicus etc.

The herbaceous layer is formed by more than 50 species, the most typical being *Chrysopogon gryllus* (L.) Trin., *Poa badensis* Haenke ex Willd., *Stipa pennata* L., *Koeleria nitidula* Velen., *Carex humilis* Leuss., *Teucrium polium* L., *Jurinea consanguinea* DC., *Achillea clypeolata* Sm., *Anthemis argyrophylla* (Halacsy & Georgiev) Velen., *Convolvulus cantabrica* L., *Erysimum diffusum* Ehrh., *Onosma taurica* Pall. ex Willd., *Minuartia rhodopaea* (Degen) Kožuharov & Kuzmanov, *Inula asherssoniana* Janka, *Sedum kostovii* Stef., *Silene flavescens* Waldst. & Kit., *Scorzonera austriaca* Willd., *Salvia argentea* L., *Stachys recta* L., *Hypericum rumeliacum* Boiss., *Anthyllis vulneraria* L. subsp. *polyphylla* (DC.) Nyman, *Thesium arvense* Horv., *Helianthemum nummularium* (L.) Mill., *Fumana procumbens* (Dunal) Gren. & Godr., *Corothismus procumbens* (Waldst. & Kit.) C. Presl., *Ononis pusilla* L., *Globularia aphyllanthos* Crantz etc. A clear trend to more dry conditions during the vegetation period was observed during the years of monitoring, and most probably, this is the reason of the many dried individuals of *Juniperus deltoides* R. P. Adams. It is also possible that the proximity of the Pulp and paper plant "Belana" has also influenced the process.

Full inventory of the individuals of *P. styriaca* was performed 07.05.1998, and partial inventory – 06.05.2000 and 11.05.2003. The plants grow at southeastern and southwestern exposition and there is a small group in the gully that separates them. The total area where the individuals grow was roughly estimated to about 2 hectares.

Most individuals were recorded on the southeastern slope, at altitude 385 m and geographic coordinates in the center of the group: N: 42°13'28.0"; E: 23°59'56.1". Sixty-four individuals were recorded in 1998 and 40 of

them had generative stems. There were 17 micro-groups consisting of more than 1 individual – 1 group of 5 individuals, 2 groups of 6 individuals, 3 groups of 3 individuals and 2 groups of 2 individuals each. The remaining 20 individuals were solitary distributed. In 2000 the total number of individuals were 59 and 5 of them had generative stems. There were 14 groups consisting of more than 1 individual: 1 group of 8 individuals, 1 group of 5 individuals, 1 group of 3 individuals, and 9 groups of 2 individuals each. The remaining 16 individuals grew solitary. In 2003, the population consisted of 39 individuals and only one had a generative stem. There were 9 groups of more than one individual – 1 of 5 individuals, 2 of 4 individuals and 6 of 2 individuals each. The remaining 14 individuals grew solitary.

In the gully, under the canopy of threes of tertiary relic *Ostrya carpinifolia*, at an altitude 380 m and geographic coordinates in the center of the group: N: 42°13'27.5"; E: 23°59'56.3", six plants were recorded in 1998, all of them with generative stems. Only three individuals remained in 2003 and no one of them had a generative stem.

Two other spots of *P. styriaca* were found on the southwestern slope. The first spot had coordinates: 378 m a.s.l., N: 42°13'26.6"; E: 23°59'59.6". Five individuals were recorded in 1998 within a group of *Juniperus deltoides* and below *Pinus nigra* canopy and three of them had generative stems. The second one was at 440 m a.s.l. and N – 42°13'30.6"; E – 24°00'00.7". Total 14 individuals were found there, under *Pinus nigra* canopy and near *Fraxinus ornus*. Nine of them had generative stems. At the same place six individuals were found in 2003 – all of them with generative stems.

The results show how the number of individuals on the southeastern slope has decreased considerably during a 5-year period – from 64 to 39, and the individuals with generative stems from 40 to 1. The same is valid also for the spot in the gully, where the number of individuals decreased two times. During the period of monitoring, many damages caused by domestic animals were found, especially on the generative stems.

Subsequent observations up to 2007 confirmed the trend of decreasing of population size. Total 42 individuals having 58 generative stems were found in the locality during the last inventory – 24.02.2008.

The status of *P. styriaca* population in the locality is being destroyed during the last decade, as shown by the results of the periodical observations. Several reasons could be hypothesized: regular grazing by goats, which is rather common in the region; the evident xerophytization of the climate during the monitoring period, and the negative influence by the pulp and paper plant “Belana”, which is close to the locality. In addition, high rainfalls could cause possible torrents that could destroy the scree, where the locality is situated. Therefore, it is proposed the locality to be given a status of protected site. This necessity is underlined by the fact that most part of the locality of *P. styriaca* overlaps with the unique locality of the critically endangered *Anthemis argyrophylla* (Halácsy & Georgiev) Velen.

Conclusion

A new for the Bulgarian flora species – *Pulsatilla styriaca*. was found in Western Sredna Gora (Ihtiman Sredna Gora) and is known to date only from Eastern Austria (Styria). The locality is situated in a habitat of European significance and hosts several other endemic species, including *Anthemis argyrophylla*, with international and national conservation status. The habitat characteristics – altitude and rock characters – of the species’ locality in Bulgaria are very similar to these in Styria (Maurer 1996; Fischer et al. 2008). Therefore, the reason for the disjunction in the area of distribution of this rare European species could be traced back to Quaternary period. Most probably, today the species survived only in two refugia – one in Austria, and the second, smaller one – in Bulgaria.

The monitoring on the population size revealed a clear decreasing trend. Among the negative factors most important are: the trend to xerophytisation during the period of study, grazing and unfavorable influence of the closely situated pulp and paper plant.

The studies on the species distribution in the region should be continued because of the information provided by local people that the plant could be found also in other places in the region. Therefore, there is a high probability of finding new localities in similar habitats. This will allow proper information about its distribution in the floristic region. In addition, the moni-

toring on the population status of the species must be continued.

Conservation measures are recommended, including giving the locality the status of “protected site”, the species must be included in the “Red Data Book of R Bulgaria” with category „critically endangered” and protected by the Bulgarian law.

References

- Assyov, B. and A. Petrova, (eds.) 2006. Conspectus of the Bulgarian Vascular Flora. Distribution maps and floristic elements. Ed. 3. BBF, Sofia. 454 pp. (Bg).
- Biodiversity Act of Bulgaria, 2002. State Gazette, 77. pp. 9-43. (Bg).
- Bondev, I., 1966. Map of floristic regions of Bulgaria. In: Jordanov, D (ed.). Flora of the PR Bulgaria. Vol. III. Publ. House of BAS, Sofia. 638 pp. (Bg).
- Bondev, I., 1991. The vegetation of Bulgaria. St. Kliment Ohridski University Press, Sofia. 184 pp. (Bg).
- Delipavlov, D. and Cheshmedjiev (eds.), 2003. Guide to plants in Bulgaria. Acad. Publ. House of Agr. Univ. Plovdiv. 591 pp. (Bg).
- European Nature Information System (EUNIS database v. 2) <http://eunis.eea.eu.int/habitats>
- Fischer, M. A., K. Oswald and W. Adler, 2008. Exkursionsflora für Österreich, Liechtenstein und Südtirol. 3. verb. Auflage. Biologiezentrum der Oberösterreichischen Landesmuseen, Linz: 303.
- Hegi, G., (Begr.), K.-H. Rechinger and J. (Hrsg.) Damboldt, 1965–1974. Illustrierte Flora von Mitteleuropa. Band III. Teil 3: Angiospermae Dicotyledones 1. 2., völlig neubearb. Auflage. Carl Hanser/Verlag Paul Parey, München/Berlin, Hamburg.: 221.
- Interpretation Manual for the Habitats in the European Union, Eur 15.2. Pl., Green Balkans, 2002. 126 pp.
- Janchen, E., 1956. Catalogus Florae Austriae. Teil I: Pteridophyten und Anthophyten (Farne und Blütenpflanzen). Heft 1 (Apetalae:1956). Springer-Verlag Wien: 193.
- Jordanov, D. and S. Kožuharov, 1970. Genus *Pulsatilla* Mill. In: Jordanov (ed.). Flora of the PR Bulgaria. Vol. IV. Publ. House of BAS, Sofia: pp. 106-111 (Bg).
- Kavrakova, V., D. Dimova, M. Dimitrov, R. Tzonev and T. Belev (eds.), 2005. Handbook for identification of the habitats of European significance in Bulgaria. S., WWF, Green Balkans and MoEW, 128 pp.
- Kožuharov, S. (ed.), 1992. Guide to vascular plants in Bulgaria. Nauka i Izkustvo, Sofia. 787 pp. (Bg).

- Maurer, W.**, 1996. Flora der Steiermark. (Küchenschelle, Kuschelle, *Pulsatilla* Mill.). Bd I. Farmpflanzen (Pteridophyten) und freikronblättrige Blütenpflanzen (Apetale und Dialypetale). Eching: IHV-Verl.: 88 pp.
- Order № 701/12.04.** 1961. Journal of the Presidium of the National Assembly, 63, 1961, 9.
- Order № 718/20.06.** 1989. State Gazette, 56, 1989, 1-7.
- Panov, P.**, 1975. Floristic Materials and Critical Notes. III. *Phytology*, **2**: 68-77.
- Peev, D.** (ed.), 2011. Red Data Book of the R. Bulgaria. V. I. Plants et Fungi. *Publ. House of BAS*. Sofia. 848 pp. (Bg).
- Petrova, A. and V. Vladimirov**, (eds.) 2009. Red List of Bulgarian Vascular Plants. – *Phytologia Balcanica*, **15** (1): 63-94.
- Sabev, L. and S. Stanev**, 1963. Climatic Districts in Bulgaria and Their Climate. *Zemizdat*, Sofia. p. 184 (Bg).
- Tashev, A.**, 2008. New Locality of *Pulsatilla halleri* (All.) Willd. (Ranunculaceae) in Bulgaria. *Comptes rendus de l'Academie bulgare des Scienses. Biologie: Botanique*, **61** (9): 1139-1144.
- Tutin, T. G. and J. R. Akeroyd**, 1993. Genus *Pulsatilla* Miller. In: Tutin, T. G. & al. (eds.). *Flora Europaea*. 1: 264-266. *Cambridge, Univ. Press*.
- Velchev, V.** (ed.), 1984. Red book of the P. R. Bulgaria. V. I. Plants. S., *Publ. House of BAS*. Sofia. 448 pp. (Bg).
- Velev, St.**, 2005. Climatic regions in Bulgaria. In: *Geography of Bulgaria*. For Kom., Sofia. 760 pp. (Bg).
- Zahariev, B., V. Donovan, K. Petrunov and S. Masarov**, 1979. Forest Regions Classification in Bulgaria. S., *Zemizdat*, 199 pp. (Bg).
- <http://herbarium.univie.ac.at/database/detail.php?ID=136481>

Received April, 2, 2012; accepted for printing March, 1, 2013.