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***Malosorbus florentina* (Rosaceae-Maloideae) – Distribution, Synecology and Threatened Status in Serbia**

By

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With 3 Figures

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Summary

TOMOVIĆ G., NIKETIĆ M. & STEVANOVIĆ V. 2003. *Malosorbus florentina* (Rosaceae-Maloideae). – Distribution, synecology and threatened status in Serbia. – *Phyton* (Horn, Austria) 43 (2): 295–306, 3 figures. – English with German summary.

Malosorbus florentina (ZUCCAGNI) BROWICZ (pro hybr.) is a relic plant species, distributed in the Apennines, as well as in the Balkans and in Asia Minor. During floristic investigations on Mt. Sokolovica (central part of Serbia), we found an extremely small population of this plant. This locality represents a new northern distribution limit in the Balkan Peninsula. In this paper we present all the nine known localities, as well as synecology (occurrence mainly in the thermophilous oak forests and scrubs) and threatened status (endangered to vulnerable) of *M. florentina* in Serbia.

Zusammenfassung

TOMOVIĆ G., NIKETIĆ M. & STEVANOVIĆ V. 2003. *Malosorbus florentina* (Rosaceae-Maloideae). – Verbreitung, Synökologie und Gefährungsgrad in Serbien. – *Phyton* (Horn, Austria) 43 (2): 295–306, 3 Abbildungen. – Englisch mit deutscher Zusammenfassung.

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Malosorbus florentina (ZUCCAGNI) BROWICZ (pro hybr.) ist eine reliktsche Art, die im Apennin, auf der Balkanhalbinsel und in Kleinasien vorkommt. Im Zuge floristischer Studien am Mt. Sokolovica (Zentral-Serbien) fanden wir eine sehr kleine Population dieser Art. Die neue Lokalität stellt den nördlichsten Punkt des Areals auf der Balkanhalbinsel dar. Wir behandeln alle neun bekannten Fundorte in Serbien, ebenso wie Synökologie (Vorkommen hauptsächlich in wärmeliebenden Eichen-Wäldern und -Gebüsch) und Gefährdungsgrad (gefährdet bis potentiell gefährdet).

Introduction

Malosorbus florentina (ZUCCAGNI) BROWICZ (pro hybr.) belongs to the group of phytogeographically important relic taxa with distribution in the Apennines, the Balkans and the northern part of Asia Minor (Fig. 1). The great problems in solving general distribution and nomenclature data of this species lie in the fact that there are many synonyms in the literature. Many authors considered this taxon to be an independent species and included it in various genera of the subfamily *Maloideae* (*Rosaceae*). For example, some of these synonyms are as follows: *Crataegus florentina* ZUCCAGNI [basion.], *Mespilus florentina* (ZUCCAGNI) BERTOL., *Torminaria florentina* (ZUCCAGNI) ROEMER, *Cormus florentina* (ZUCCAGNI) DECNE., *Sorbus florentina* (ZUCCAGNI) NYMAN, *Eriolobus florentina* (ZUCCAGNI) STAFF, *Malus florentina* (ZUCCAGNI) C. K. SCHNEIDER, *Pyrus florentina* (ZUCCAGNI) TARG.-TOZZ., *Pyrus crataegifolia* TARG.-TOZZ. ex SAVI, *Sorbus crataegifolia* (TARG.-TOZZ. ex SAVI) WENZIG, *Malus crataegifolia* (TARG.-TOZZ. ex SAVI) KOEHNE. There are also many different nothogeneric formulas or hybrid combinations respectively.

The first valid description of this taxon originated from ZUCCAGNI 1809: 142, who named it *Crataegus florentina*. HAYEK 1926: 750 proclaimed it to be a hybrid with the formula *Sorbus torminalis* (L.) CRANTZ \times *Malus pumila* MILLER only. The opposite conception offered RONNIGER 1927: 102, who considered this taxon, together with *Eriolobus trilobata* (LABILL.) M. J. ROEMER, as an ancient type close to hypothetical ancestors of genera *Sorbus* and *Malus*. In the *Flora Europaea* 2: 67, TERPÓ 1968 accepted the name *Malus florentina*, while BROWICZ 1970, 1983 considered the taxon " \times *Malosorbus florentina*" as an intergeneric hybrid within the subfamily *Maloideae*, which resulted from a cross of *Malus sylvestris* MILLER s. l. and *Sorbus torminalis*. HOLUB 1998: 115 proclaimed a new combination \times *Tormimalus florentina* (ZUCCAGNI) HOLUB on the basis of the newly separated nothogenus \times *Tormimalus* HOLUB, a "nomen nothogenericum novum".

BROWICZ 1970: 72, stated this plant to be an old "natural sexual intergeneric hybrid", while HOLUB 1998: 115 even quoted it "as taxon which originated from an ancient hybrid origin, i.e. from the hybridogenesis of two species . . .". Consequently, their designations (of "nothotaxa") were in discordance with Art. H.3, Note 1 (GREUTER & al. 2000). Those names must be transferred to non-hybrid categories, followed by the indication "(pro

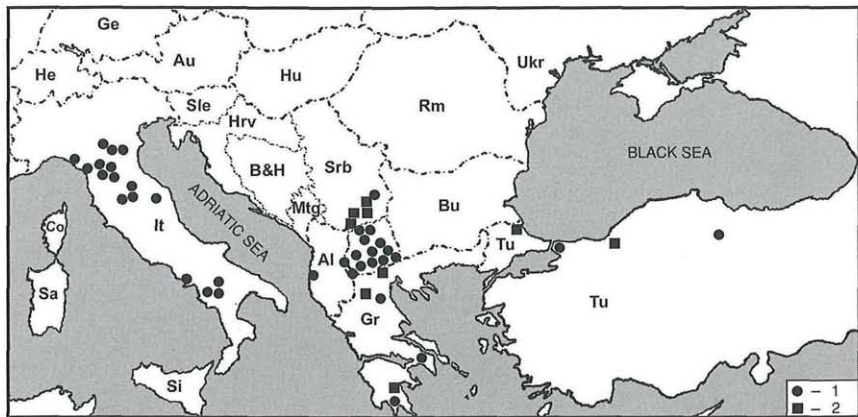


Fig. 1. General distribution of the species *Malosorbis florentina* in the Apennines, in the Balkans and in Asia Minor: 1 – literature data according to BROWICZ 1970; 2 – additional literature data and new herbarium data. – UTM grid squares 10 × 10 km.

hybr.”, under Art. 50 (GREUTER & al. 2000). We have adopted the generic name *Malosorbis* to be current.

Considering that EM & RISTEVSKI 1974 have proved stable sexual reproductive ability of this plant in its natural habitats, this and our own experience move us to accept the concept of a true species of hybridogenous origin. Our opinion is also based on the facts that the species distribution area is restricted only to some refugial habitats (in SE Europe and Asia Minor) of the whole ancestor's area of sympatry. Besides that, we found a fertile specimen in Mt. Sokolovica, and only one ancestral species (*Sorbus torminalis*) in the surrounding of *M. florentina*.

Here we present all the distribution data of *M. florentina* in Serbia, its synecology, threatened status in Serbia, as well as conservation measures that should be taken for the protection of this relic plant and its remnant habitats.

Materials and Methods

Plant material has been collected, determined and deposited in the herbarium collections of the Natural History Museum, Belgrade (BEO), and the Institute of Botany and Botanical Garden, Faculty of Biology, University of Belgrade (BEOU).

The species distribution has been mapped on 10 × 10 squares km. UTM grid.

For the estimation of threatened status for *M. florentina* in Serbia, IUCN Red List Categories and Criteria 2001 were applied.

General Distribution (Fig. 1)

The first distribution data of *M. florentina* were reported from the vicinity of Florence. Later, this species was found at more localities in the

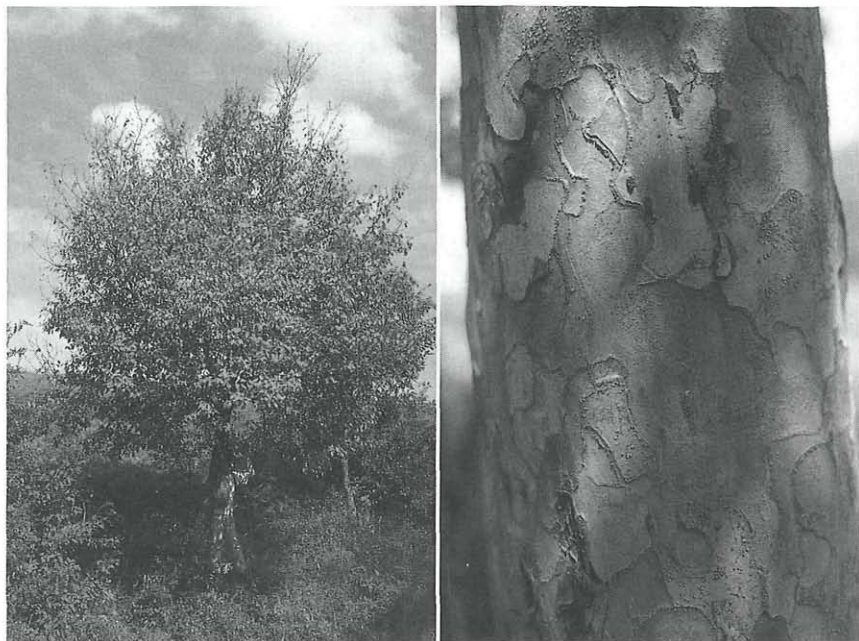


Fig. 2. *Malosorbus florentina* in its natural habitat in Mt. Sokolovica (central Serbia); habitus and bark.

northern as well as in central and southern parts of the Apennines (BROWICZ 1970; PIGNATTI 1982).

BORNMÜLLER 1940 discovered this taxon in 1889 in Asia Minor, and in 1962 DEMIRIZ found another locality for this species west of Istanbul. According to the Flora of Turkey (BROWICZ 1972: 159), there are only four known localities for *M. florentina* in Turkey.

In 1918 BORNMÜLLER 1926 found two stands of *M. florentina* in Macedonia: Drenovo in m. Radobilj and supra pag. Raduša. The most recent papers (MICEVSKI 1998) complete these distribution data (with more than 70 localities) of this species in Macedonia.

The only locality of *M. florentina* in Albania was mentioned by RONNIGER 1927: 99: „Albanien, Ljušna südwestlich von Elbasan und nordwestlich von Berat (28. April 1918, leg. J. SCHNEIDER)“.

In Greece, according to the most recent data (CHRISTENSEN 1995), this species was found only in six localities (three in southeastern and three in northern-central parts of this country).

Distribution in Serbia (Fig. 4)

The first records of the existence of *M. florentina* in Serbia (also in the Balkan Peninsula) originate from the end of the 19th century. BORNMÜLLER

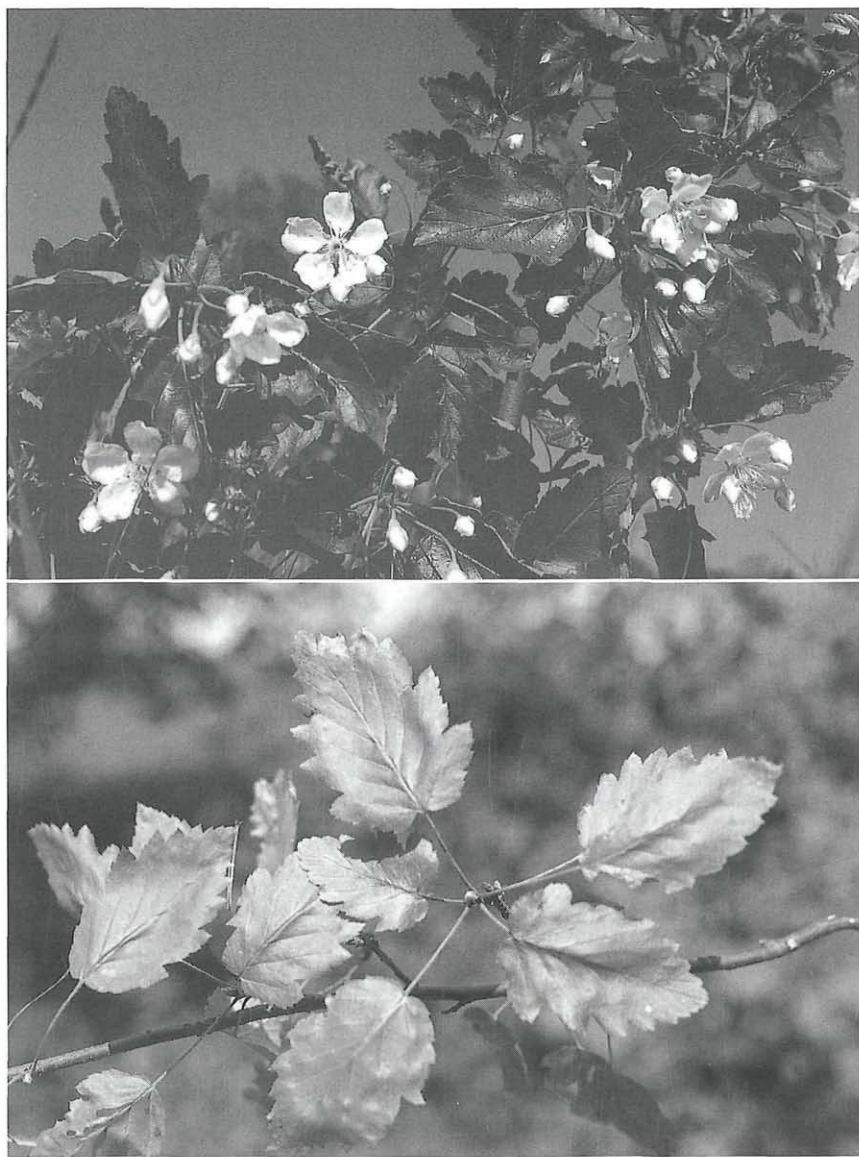


Fig. 3. *Malosorbus florentina* from Mt. Sokolovica (central Serbia); flowering twig and leaves.

1888: 289 found this relic species in May 1888 in eastern Serbia, on Ms. Gorica near the town of Niš. In the same year and in the same locality it was found by Ž. JURIŠIĆ 1894: 417. This stand was the species' northernmost distribution limit in the Balkan Peninsula (Fig. 4). JURIŠIĆ 1901: 622

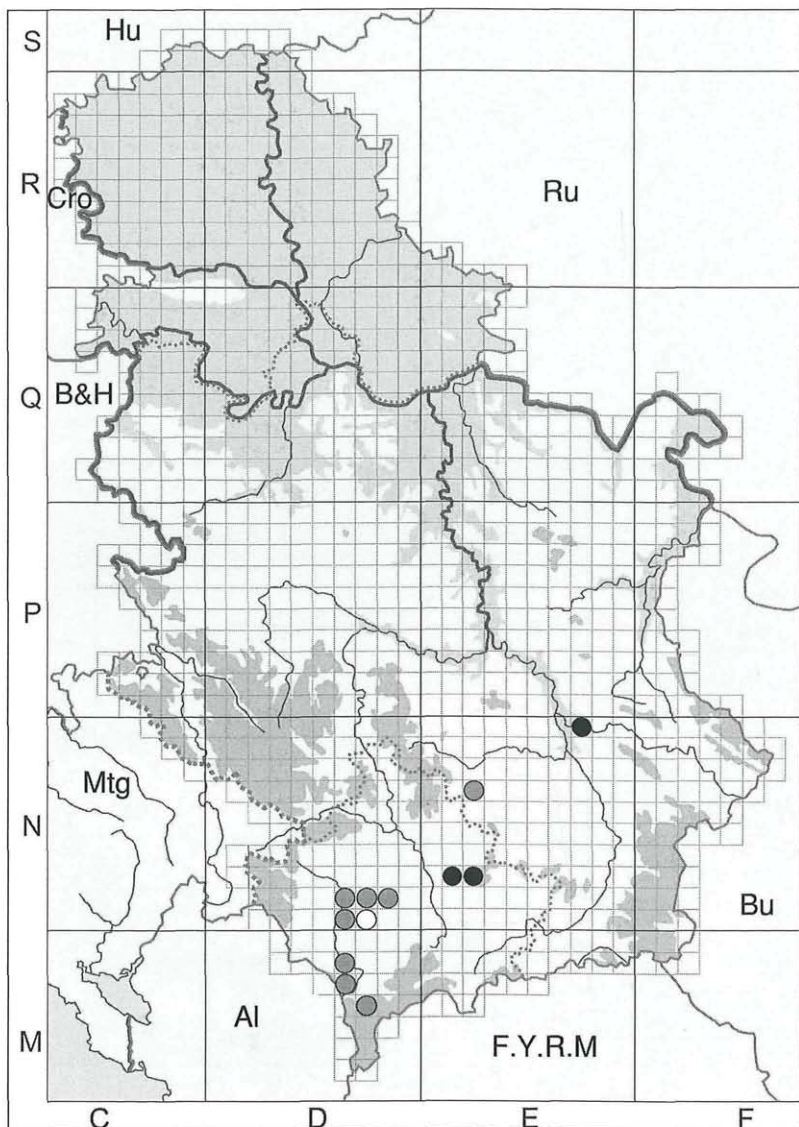


Fig. 4. Distribution of the species *Malosorbus florentina* in Serbia, with threatened status of each locality: black circle – extinct; gray circle – critically endangered; white circle – data deficient.

noticed that *M. florentina* also grew in two more sublocalities in the proximity of the first one: below the trench near Ms. Gorica and in the wood near the village Gabrovac (UTM 34TEN79).

In Flora SR Srbije (JOVANOVIĆ 1972: 142) this relic species was reported only from the Kosovo region, but without any detailed information of its localities. The first detailed information on the distribution of *M. florentina* in the Kosovo region was reported by JOVANOVIĆ 1969: 56-58, who had found that plant in 1967 on Mt. Grmija near Priština (UTM 34TEN12; 34TEN22).

EM & RISTEVSKI 1974: 92 found two more localities in Serbia: the valley of the river Ibar (leg. R. RIZOVSKI) and the basin of the river Beli Drim (UTM 34TDN60; 34TDN61) in the Metochia region (leg. V. BLEČIĆ). According to BLEČIĆ & KRASNIĆI 1972 this species was found in the basin of the river Beli Drim, locality Labučevski stream (UTM 34TDN60).

KRASNIĆI 1972, mentioned several new localities in the Metochia region: between Murga and Dobra Voda (village Seć) (UTM 34TDN71; 34TDN81); Klina (Podgrađ, Markov Kamen) (UTM 34TDN61; 34TDN71); Goma Polje (village Vlašnja) (UTM 34TDM67), as well as Mt. Paštrik (village Kušnin) (UTM 34TDM68); the valley of the Miruša river (village Volujak) (UTM 34TDN60).

REXHEPI 1991: 102 numbered one more record of this plant in Metochia, near the town of Prizren (locality Pašina Česma) (UTM 34TDM76). The only herbarium specimen from the Metochia region, in the collection of The Natural History Museum of Belgrade, was collected on Mt. Koznik – the valley of Miruša river (leg. N. DIKLIĆ, 28-May-1971, BEO) (UTM 34TDN60; 34TDN70).

During the floristic investigations of Mt. Sokolovica (central Serbia), near the village Rudare (locality Veliki Do) (UTM 34TEN26), we discovered several trees (leg. G. TOMOVIĆ & M. NIKETIĆ, 17-Jul-2000, Herb. No. 1619, BEOU; leg. G. TOMOVIĆ & M. NIKETIĆ, 01-May-2002, BEO, BEOU). The oldest exemplar noticed was fertile, 4–5 meters height, with a stem circumference of 60 cm and a diameter of 20 cm BHD (Fig. 2, 3). In spite of the persistent observation of the surrounding stands, we could not find more specimens of such an old age and dimension. In the vicinity of the oldest trunk we could notice only twenty juvenile specimens (about 3 to 10 years old), as well as 7 or 8 specimens that derived from a batted trunk.

Synecological Characteristics

M. florentina occurs in the following (meso-)thermophilous deciduous forest and shrub communities of the alliances *Quercetalia pubescentis* BR.-BL., and *Quercetalia roburi-petraeae* R. Tx. (1931) 1937:

Ass. *Quercetum frainetto-cerris* RUDSKI (1940) 1949, degraded stands

Locality: Veliki Do, near Rudare, Mt. Sokolovica; W- and SW-exposed, rocky slopes; 350–400 m a.s.l.; andesite (own field work 2000, 2002).

Locality: the valley of the Miruša river (village Volujak); N- and NW-exposed slopes; 360–370 m a.s.l.; siliceous rocks (KRASNIĆI 1972).

- Ass. Quercetum frainetto-cerris comandretosum JOVANOVIĆ 1969
 Locality: Mt. Grmija near Priština; SW-exposed slopes; 730 m a.s.l.; clayey soils (JOVANOVIĆ 1969).
- Ass. Carpinetum orientalis anemonetosum KRASNIĆI 1972
 Locality: between Murga and Dobra Voda (village SEĆ); S-exposed slopes; 500 m a.s.l.; siliceous rocks (KRASNIĆI 1972).
 Locality: Klina (Podgrađ, Markov Kamen); N-exposed slopes 450–500 m a.s.l.; serpentine rocks (KRASNIĆI 1972).
- Ass. Dioscoreo-Carpinetum orientalis BLEČIĆ & LAKUŠIĆ 1966
 Locality: Goma Polje (village Vlašnja); N- and W-exposed slopes; 400–430 m a.s.l.; limestones (KRASNIĆI 1972).
 Locality: Mt. Paštrik (village Kušnin); E-exposed slopes; 600–620 m a.s.l.; limestones (KRASNIĆI 1972).
- Ass. Polygalo-Forsythietum europaeae BLEČIĆ & KRASNIĆI 1972
 Locality: Labučevski stream (valley of the Beli Drim river); N-, NE- and W-exposed slopes; 410–615 m a.s.l.; serpentine rocks (BLEČIĆ & KRASNIĆI 1972).
- Ass. Juglando-Castanetum sativae REXHEPI 1990
 Locality: Pašina Česma (near Prizren); N-exposed slopes; 600 m a.s.l.; siliceous rocks (REXHEPI 1990).

IUCN Threatened Status

The taxon *M. florentina* (sub *Malus florentina*) is included in the global 1997 IUCN Red List of Threatened Plants under the rare (R) category (WALTER & GILLET 1998: 493) and in the European Red List of Globally Threatened Animals and Plants (ECE 1991) in the same category (R). It also belongs to various threat categories in the countries of SE Europe and W Asia (Table 1). The species is unfortunately no longer included in the 2002 IUCN list.

Threatened Status in Serbia

Applying the new IUCN Red List Categories and Criteria 2001 and all available data, we can estimate the threatened status for each population (Table 2) as well as the threatened status of *M. florentina* in Serbia as: endangered to vulnerable – EN B₁;B₂c;C₂a – VU D₁;D₂.

Table 1. Threatened status of *Malosorbus florentina* in SE Europe and W Asia.

COUNTRY	CATEGORY	AUTHOR
Italy	DD-VU	CONTI & al. 1997: 68
Greece	VU	CHRISTENSEN 1995: 358
Turkey	R	BROWICZ 1972: 159
Albania	R	VANGJELI & al. 1994: 101

Table 2. *Malosorbus florentina* in Serbia.

LOCALITY	FIRST FINDING	LAST FINDING	CAUSES OF POPULATION EXTINCTION / REDUCTION	POPULATION STATUS	IUCN RED LIST CATEGORY
Ms. Gorica (near Niš)	BORNHÜLLER 1888	JURIŠIĆ 1901	habitat destroyed by enlargement of the settlement		EX
Gabrovac (near Niš)	JURIŠIĆ 1901		habitat destroyed by enlargement of the settlement		EX
Mt. Grmija near Priština	JOVANOVIĆ 1969		habitat destroyed and replaced by a black pine monoculture		EX
Seć (near Murga)	KRASNIĆI 1972		excessive deforestation	few scrub individuals	CR
Podgrađ (near Klina)	KRASNIĆI 1972		excessive deforestation	few scrub individuals	CR
Vlašnja (near Goma Polje)	KRASNIĆI 1972		excessive deforestation	few scrub individuals	CR
Mt. Paštrik (village Kušnin)	KRASNIĆI 1972		excessive deforestation	few scrub individuals	CR
Pašina Česma (near Prizren)	REXHETI 1991		deforestation	few trees	CR
Mt. Sokolovica (near Rudare)	leg. TOMOVIĆ, NIKETIĆ 2000	leg. TOMOVIĆ, NIKETIĆ 2002	excessive deforestation and exploitation for expanding pasture	1 fertile; 20 juvenile; 7-8 specimens that derived from a batted trunk	CR
basin of the river Beli Drim	BLEČIĆ & KRASNIĆI 1972		deforestation	few trees	CR
valley of the river Ibar	EM & RISTEVSKI 1974		deforestation	few trees	CR
valley of the Miruša river	leg. DIKLJIĆ 1971	KRASNIĆI 1972	no available data	no available data	DD

The IUCN 2001 category EN means that the population of a species is facing a very high risk of extinction in its natural habitats in the near future as defined by the criterion: B – Extent of occurrence estimated to be between 100 to 5000 sq. km and area of occupancy estimated to be between 10 to 100 sq. km, and estimated indicating to: 1. Severely fragmented locations; 2c – Continuing decline, inferred, observed or projected in area, extent and/or quality of habitats.

The IUCN 2001 category VU means that the population of a species is facing a high risk of extinction in the medium-term future as defined by the criterion: D – Population very small or restricted in the form of the following: 1. Population estimated to number between 250 to 1000 mature individuals; 2. Population is characterized by acute restriction in its area of occupancy (less than 100 sq. km).

Undertaken and Proposed Conservation Measures

M. florentina has been protected by law as a natural rarity in Serbia (gazette under the N^o 66/91, 83/92, 50/93). It is on the list of plant species of International Importance (STEVANOVIĆ & al. 1995).

The entire region of the Miruša river Canyon and Mt. Koznik, are an exceedingly important nature reserve, and the population of *M. florentina* within the boundaries of that protected area is relatively protected from the human impact. The only chance for *M. florentina* to be protected in Mt. Sokolovica, lies in the fact that this area is in the process of protection (initiated by the Institute of Natural Protection of the Republic of Serbia), as a Natural Area with National Importance.

Taking into account this threatened status, as well as negative human impacts on the populations of *M. florentina*, its habitats should be placed under strict and urgent protection. Although this species is under protection by the law, this is not enough for the conservation and protection of this endangered representative of Serbian dendroflora. Efforts should be made to collect fruits and seeds of *M. florentina* from the natural habitat in Mt. Sokolovica, to propagate this species ex situ and subsequently reintroduce it to natural habitats in the vicinity of Niš and Priština.

Acknowledgement

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References

- BLEČIĆ V. & KRASNIĆI F. 1972. Zajednica endemičnog šibljaka forzicije i krstušca (Polygalo-Forsythietum europaeae BLEČIĆ & KRASNIĆI) u jugozapadnoj Srbiji. – Glas. Republ. Zavoda Zašt. Prirode - Prirodnjačkog Muzeja Titograd 4: 34–40.

- BORNMÜLLER J. 1888. [Floristische Mitteilungen aus Dalmatien und Serbien]. – Österr. bot. Z. 38: 289–290.
- 1926. Beiträge zur Flora Mazedoniens II. Sammlungen in den Kriegsjahren 1916–1918. – Bot. Jahrb. 60, Beibl. 136: 1–125.
 - 1940. Symbolae ad Floram Anatolicam. – Repert. Spec. nov. Reg. veg., 89(1/4–5): 165–259.
- BROWICZ K. 1970. „*Malus florentina*“ – its history, systematic position and geographical distribution. – Fragm. florist. geobot. 16 (1): 61–83.
- 1972. × *Malosorbus* BROWICZ. (*Malus* MILLER × *Sorbus* L.). – In: DAVIS P. H. (Ed.), Flora of Turkey and the East Aegean Islands, p. 159. – Edinburgh University Press, Edinburgh.
 - 1983. × *Malosorbus florentina* (ZUCCAGNI) BROWICZ (*Rosaceae*) in Greece. – Ann. Musei Goulandris. 6: 27–35.
- CHRISTENSEN I.B. 1995. X *Malosorbus florentina* (ZUCCAGNI) BROWICZ. – In: PHITOS D., STRID A., SNOGERUP S. & GREUTER W. (Eds.), The Red Data Book of rare and threatened plants in Greece, pp. 358–359. – The World Wide Fund for Nature, Athens.
- CONTI F., MANZI A. & PEDROTI F. 1997. Liste rosse regionali delle piante d'Italia. – Associazione Italiana per il World Wildlife Fund, Societa Botanica Italiana, Camerino.
- ECE 1991 = Economic Commission for Europe 1991. European Red List of globally threatened animals and plants and recommendations on its application as adopted by the Economic Commission for Europe at its forty-sixth session (1991) by decision D (46). – United Nations, New York. ECE/ ENVWA/20.
- EM H. & RISTEVSKI B. 1974. *Malus florentina* (ZUCCAGNI) C. K. SCHNEID. Collections, special edition „Wild fruit Flora in SR Macedonia“, pp. 91–100. – Faculty of Agriculture and Forestry of the University Skopje, Skopje.
- GREUTER W., McNEILL J., BARRIE F. R., BURDET H.-M., DEMOULIN V., FILGUEIRAS T. S., NICOLSON D. H., SILVA P. C., SKOG J. E., TREHANE P., TURLAND N. J., HAWKSWORTH D. L. 2000. International Code of Botanical Nomenclature (Saint Louis Code). – Regnum Veg. 138: 1–474.
- HAYEK A. 1926. Prodrromus Florae peninsulae Balcanicae, 1. – Feddes Repert. (Beih.) 30(1/5–6): 673–960.
- HOLUB J. 1998. Reclassifications and new names in vascular plants 1. – Preslia 70 (2): 97–122.
- IUCN – The World Conservation Union (Ed.) 2001. IUCN Red List Categories and Criteria: Version 3.1. IUCN Species Survival Commission. – IUCN, Gland, Switzerland and Cambridge, UK. II + 30 pp.
- IUCN 2002 = 2002 IUCN Red List of threatened species. Downloaded 25. 2. 2003. – <http://www.redlist.org/>
- JOVANOVIĆ B. 1969. Novi naogališta na vidovite *Malus florentina* i *Crataegus orientalis* na Kosovo. – Šumarski pregled 1–2: 55–60.
- 1972. Fam. *Malaceae* LOIS.-DESLONGCH. – In: JOSIFOVIĆ M. (Ed.), Flora Socijalističke Republike Srbije, 6: 127–178. – Srpska Akademija Nauka i Umetnosti. Odeljenje prirodno-matematičkih nauka, Beograd.
- JURIŠIĆ Ž. 1894. *Crataegus florentina* ZUCC. novo drvo za floru Srbije. – Nastavnik 5(1–6): 417–418.
- 1901. Prinove za floru Kraljevine Srbije. – Prosvetni glasnik 22 (5): 612–625.

- KRASNIĆI F. 1972. Šumska vegetacija brdskog regiona Kosova. – Zajednica naučnih ustanova Kosova, Studije, Knjiga 27, Priština.
- MICEVSKI K. 1998. Flora Republike Makedonije 1(4). – Makedonska Akademija Nauka i Umetnosti, Skopje.
- PIGNATTI S. 1982. Flora d'Italia 1. – Edagricole, Bologna.
- REXHEPI F. 1991. Fitocenoza oraha i pitomog kestena (*Juglando-Castanetum sativae* REXHEPI 1990) na Kosovu, Zbornik radova sa Simpozijuma Nedeljko Košanin i botaničke nauke", pp. 98–105. – Srpska Akademija Nauka i Umetnosti, Institut za botaniku i botanička bašta PMF, JP za gazdovanje šumama "Golija" Ivanjica, Beograd-Ivanjica.
- RONNIGER K. 1927. *Sorbus florentina* (ZUCCAGNI) NYMAN in Albanien. – Verh. zool.-bot. Ges. Wien. 77: 99–102.
- STEVANOVIĆ V., JOVANOVIĆ S., LAKUŠIĆ D. & NIKETIĆ M. 1995. Diverzitet vaskularne flore Jugoslavije sa pregledom vrsta od međunarodnog značaja. – In: STEVANOVIĆ V. & VASIĆ V. (Eds.), Biodiverzitet Jugoslavije sa pregledom vrsta od međunarodnog značaja, pp. 183–218. – Ecolibri, Beograd, Biološki fakultet, Beograd.
- TERPÓ A. 1968. *Malus* MILLER. – In: TUTIN T. G., HEYWOOD H. D., BURGESS N. A., MOORE D. M., VALENTINE D. H., WALTERS S. M. & WEBB D. A. (Eds.), *Flora Europaea* 2: 66–67. – University Press, Cambridge.
- VANGJELI J., RUCI B. & MULLAJ A. 1994. Libri i kuq. Bimët e kërcënuara e të rralla të Shqipërisë. – Akademi e shelcave e Republikë së Shqipërisë, Tiranë.
- WALTER K. S. & GILLETT H. J. (Eds.) 1998. 1997 IUCN Red List of threatened plants. – IUCN Publication Services Unit, Cambridge.
- ZUCCAGNI A. 1809. *Crataegus florentina*. – In: ROEMER J. J. (Ed.), *Collectanea ad omnem rem botanicam spectantia*, p. 142. – Turici.

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