

ROSA KOKANICA (ROSACEAE) IN BINALOOD MOUNTAINS: A NEW RECORD FOR THE FLORA OF IRAN

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Rosa kokanica (Regel) Regel ex Juz. is reported as a new species for the flora of Iran from Binalood Mountains in Razavi Khorassan Province. This species is morphologically compared with its closely related species, *R. hemisphaerica* Herrm. and *R. foetida* Herrm., previously recorded for Iran. Illustrations, distribution map and notes on biogeography, conservation status and habitats of *R. kokanica* are provided.

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Key words: *Rosa* sect. *Pimpinellifoliae*; biodiversity; conservation; Afghanistan; Khorassan; Iran

گونه *Rosa kokanica* در کوههای بینالود: گزارش جدیدی از تیره گل سرخیان برای فلور ایران

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گونه *Rosa kokanica* (Regel) Regel ex Juz. به عنوان گزارش جدیدی برای فلور ایران از کوههای بینالود در استان خراسان رضوی معرفی می شود. این گونه از نظر ریخت شناسی با نزدیکترین گونه های خویشاوند خود یعنی *R. hemisphaerica* Herrm. و *R. foetida* Herrm. که قبلاً از ایران گزارش شده اند، مورد مقایسه قرار می گیرد. تصاویر، نقشه پراکندگی و اطلاعاتی درباره جغرافیای زیستی، وضعیت حفاظتی و زیستگاه آن ارائه می گردد.

INTRODUCTION

Rosa L. is distributed throughout the temperate and subtropical regions of the northern hemisphere and it comprises about 190 species (Bruneau et al. 2007). Asia is the center of genetic diversity of this genus (Kalkman 2004). The taxonomy of *Rosa* is complicated by its cultivation history, polyploidy, apomixis and hybridization. Among four subgenera of the genus, about 95% of all species are included in subgenus *Rosa* which is subdivided into ten sections (Wissemann and Ritz 2005). In the Flora Iranica area, the subgenus *Rosa* comprises five sections including: sect. *Pimpinellifoliae* (DC.) Sér. (5 species), sect. *Cinnamomeae* (DC.) Sér. (3 species), *Caninae* (DC.) Sér. (6 species), sect. *Rosa* (one species), and sect. *Synstylae* DC. (4 species). Totally, 16 species and 7 hybrids of roses have been

recorded for the flora of Iran (Zielinski 1982; Khatamsaz 1992; Koobaz et al. 2011; Sharghi et al. 2014). In this paper, we record an additional *Rosa* species (sect. *Pimpinellifoliae*) for the flora of Iran based on a revision of herbarium specimens and also newly collected ones from Binalood Mountains, NE Iran.

MATERIALS AND METHODS

During a revision of the genus *Rosa* for the flora of Khorassan in FUMH, the herbarium specimens were examined using relevant literatures (Komarov 1971; Zielinski 1982; Khatamsaz 1992; Mozaffarian 2004; Alam 2011). Some fresh materials for doubtful specimens were re-collected from Binalood Mountains in Razavi Khorassan province. The distribution map of

the species has been provided using geo-referenced distribution data from Flora Iranica (Zielinski 1982) and FUMH in DIVA-GIS 7.3 software. Based on IUCN Red List categories and criteria (IUCN 2010), the threat status of the species has been determined.

RESULTS AND DISCUSSION

New record

Rosa kokanica (Regel) Regel ex Juz., Fl. URSS. 10: 476 (1941), fig. 1.

Type: Middle Asia.

Shrub 1-1.5 (-2) m high. Young branches erect, dark brown, glabrous or more or less densely pubescent. Prickles irregularly distributed along the branches, stout and slightly bent, at base a little enlarged. Leaflets 5-7(-9), about 15-25 mm long, broadly obovate to broadly elliptic, rarely orbicular to oblanceolate, at apex subacute, rotundate to truncate, at base broadly cuneate to rotundate, at beneath glabrous to more or less pubescent, or glandulous, rarely smooth, at margins glandular and doubly serrate, with broad teeth. Flowers mostly solitary, about 50(-60) mm in diameter, bright yellow, generally ebracteate, usually double-flowered. Pedicel 30(-50) mm long, smooth or short glandulous or hairy. Petals 5 to numerous, deep yellow. Sepals not expanded at apex, rarely with 2-3 lobes in superior parts, in fruit persistent, outer sepals with more or less abundant stalked glands. Styles free, densely pubescent. Outer stamens petaloid. Hypanthia globose or flattened, often glandular- hispid. Fruits 12(-15) mm in diameter, subglobose to pyriform, mature ones dark- to violet brown.

Examined specimens: Razavi Khorassan: S Mashhad, between Aghonj and Sharif Abad, Bozveshk, 1500 m, 2.6.1994, Faghinihnia & Mehrvar 24125 (FUMH); S Mashhad, on the old road towards Neyshabour, Aghonj, 1510 m, 10.5.2009, Zangooei 42223 (FUMH); S Mashhad, Sharif Abad, Bozveshk, 1600 m, 24.5.2009, Zangooei 42638 (FUMH); SW Mashhad, Piveh-Zhan Mts., around the old cave, 2300 m, 15.6.2009, Joharchi & Nasseh 43067 (FUMH); SW Mashhad, Piveh-Zhan, 1875 m, 29.5.2015, Arjmandi & Sharghi 45435 & 45436 (FUMH) (in flower); *ibid.*, 11.6.2015, Arjmandi & Sharghi 45434 (FUMH) (in fruit); NW Neyshabour, Sarvelayat, Bahar-Kish, 1908 m, 18.5.2015, Atashgahi 45440 (FUMH).

Morphology and taxonomy: *Rosa kokanica* belongs to section *Pimpinellifoliae*. Members of this section have stipulate compound leaves, free styles, yellow (or white) petals, and usually ebracteate flowers (Zielinski 1982). The closely related species to the new record, *R. kokanica*, are *R. foetida* and *R. hemisphaerica* which all have yellow petals and hairy styles along their whole length up to the below of stigma. *R. kokanica* differs from the related species by some morphological characters (table 1), especially by its non-expanded sepal apex and the color of mature fruits. It can be easily distinguished from *R. hemisphaerica* by its stalked-glandular outer sepals (not smooth ones). Double-flowered forms of *R. kokanica* have been found in cultivation and also in the wild state (Alam 2011). All wild populations recorded from Binalood Mountains are double-flowered (fig. 1).

Table 1. Comparison of morphological characters in *Rosa kokanica*, *R. foetida* and *R. hemisphaerica*.

Character	<i>R. kokanica</i>	<i>R. foetida</i>	<i>R. hemisphaerica</i>
Petals number	5 to numerous	5	5
Petaloid stamens	+	-	-
Diameter of flowers (mm)	50-60	40(-65)	40-50
Pedicel length (mm)	30(-50)	25-30	15-20
Outer sepals	± stalked-glandular	± stalked-glandular	smooth
Sepal apex	not expanded	± expanded	expanded
Fruit shape	subglobose or pyriform	subglobose	subglobose or ovoid
Fruit color (in mature)	dark- to violet brown	red	orange-red
Diameter of fruits (mm)	12-15	≤10	15-18

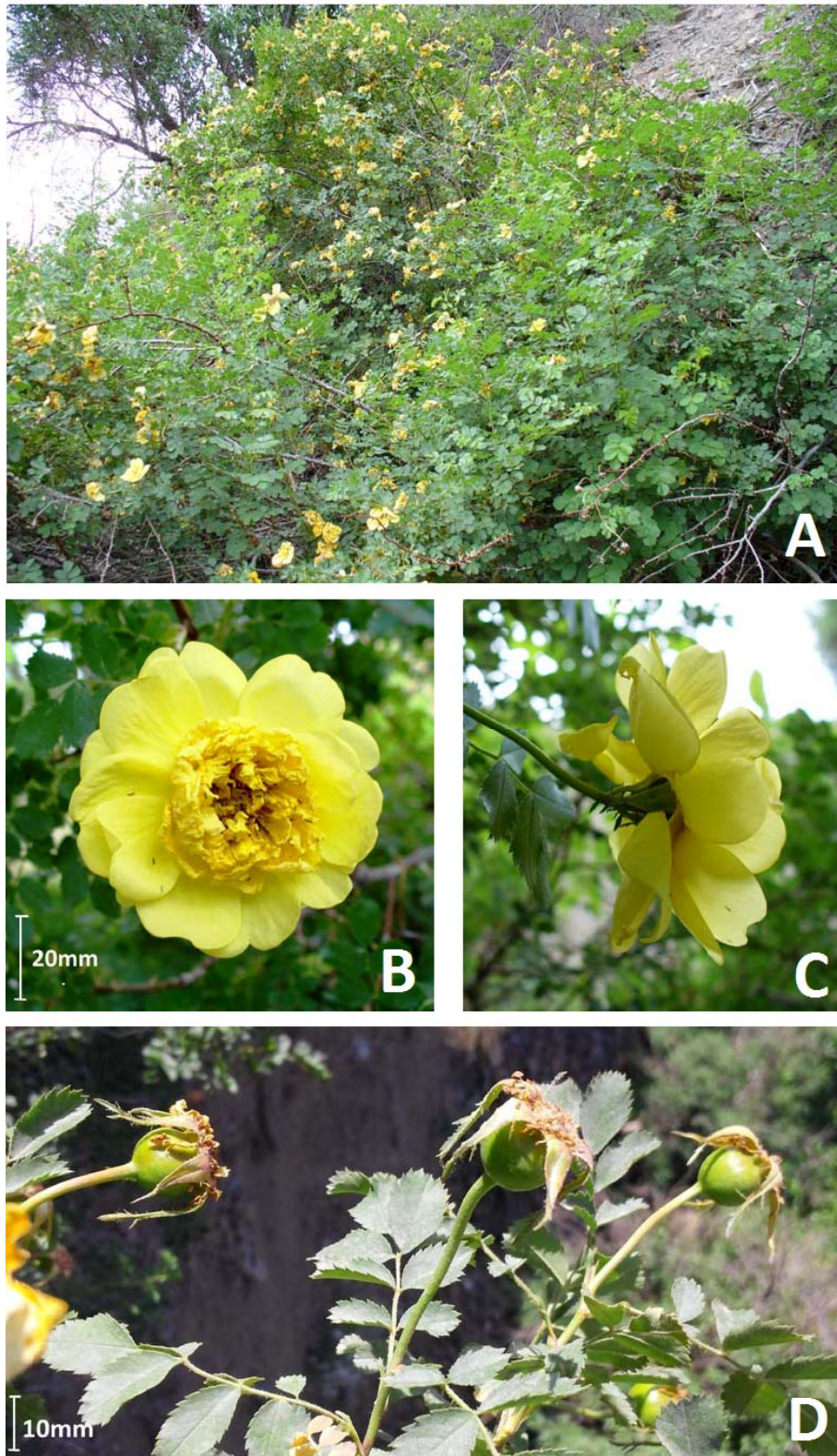


Fig. 1. *Rosa kokanica*. A, the plants in natural habitat; B-C, close-up view of the flowers; D, early fruiting stage.

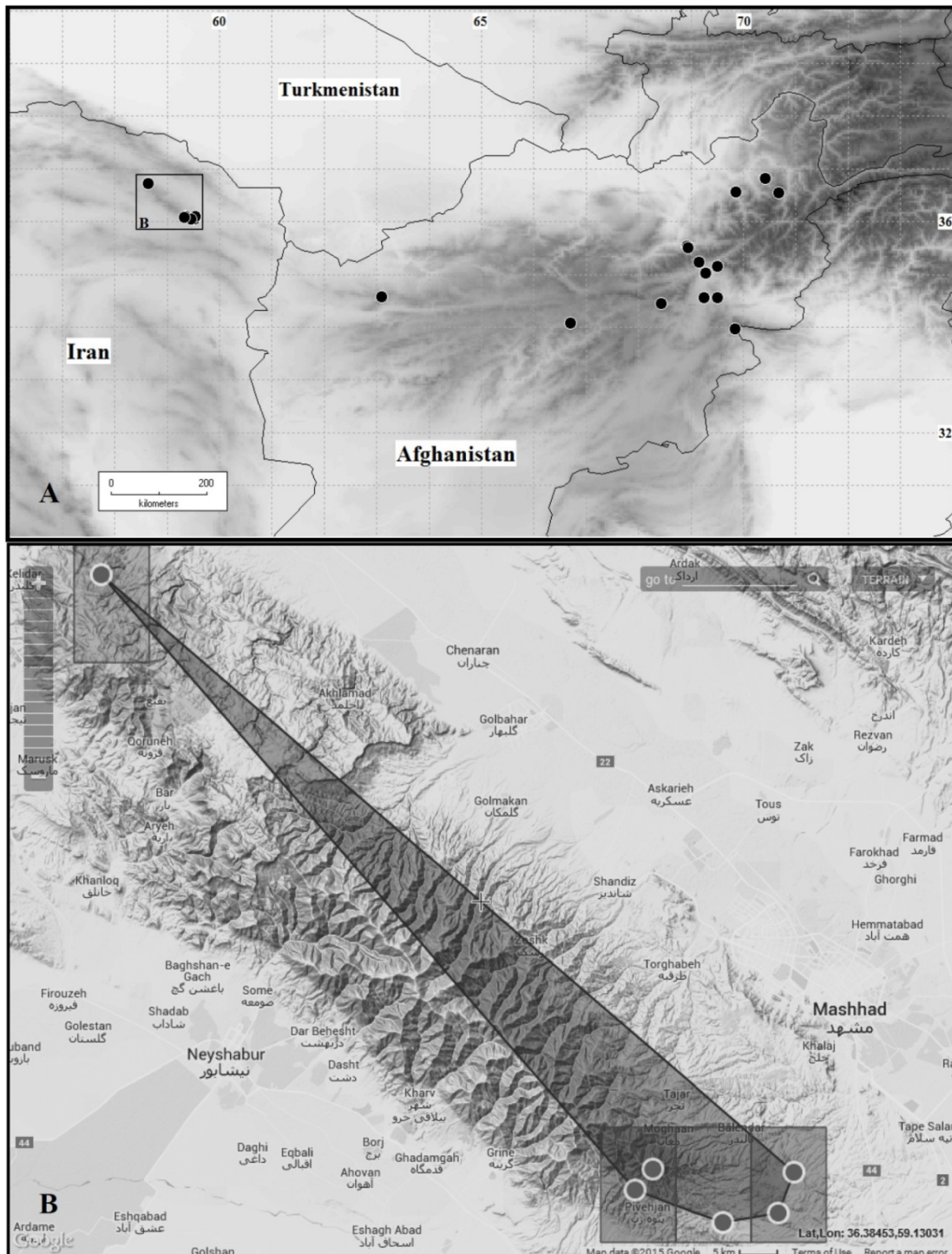


Fig. 2. A: Distribution map of *Rosa kokanica* in Iran (Binalood Mountains) and Afghanistan based on the herbarium records (FUMH) and distribution data in Flora Iranica (Zielinski 1982). B: Estimation of Extent of Occurrence (EOO=811 km²) and Area of Occupancy (AOO=484 km²) for *R. kokanica* in Iran based on IUCN Red List Criteria.

R. pimpinellifolia L. which has been recorded from NW Iran differs from the other species of the section by its white petals, black fruits, and irregular subulate and grayish prickles. Moreover, among five species of the section *Pimpinellifoliae* in the Flora Iranica area, only *R. ecae* Aitch. do not occur in Iran. This Eastern Irano-Turanian species can be easily distinguished from the other species of the section by its glabrous styles below the stigma, and angular-curved branches with dense prickles.

Phytogeography, ecology and conservation: The distribution range of *R. kokanica* covers the Middle Asiatic Republics, Afghanistan, northwestern Pakistan and western China (Zielinski 1982, Browicz and Zielinski 1984, Alam 2011). In Afghanistan, it usually grows in elevations between 1400 to 3000 m on dry stony slopes, in dry gorges, on roadside escarpments and in open forests (Alam 2011). The new record of the species extends its distribution range more westward to Binalood Mountains where it grows singly or forms small thickets on dry stony slopes at elevations 1500-2300 m.

According to the relatively wide distribution range, *R. kokanica* is not evaluated here as a globally threatened species. However, it has a very limited distribution range in Iran. The extent of occurrence (EOO) and area of occupancy (AOO) for the species in the country is 811 and 484 km², respectively, with maximum distance of 110 km between any pair of distribution points (fig. 2). So, based on IUCN Red List categories and criteria (IUCN 2010), it is assessed as an Endangered plant in Iran (EN, B1+2ac(i,iii)). A reduction analysis showed that the loss of the north-westernmost satellite population in Bahar-Kish (45440 FUMH; fig. 2) can reduce the maximum distance and EOO down to 19 km and 84 km² (ca. 90% reduction), respectively, and re-evaluate the threat status up to CR (Critically Endangered) in the country. The habitats of *R. kokanica* are not officially protected in Binalood Mountain range. Therefore, conservation of relict populations of this potentially ornamental species is of great importance in the area.

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