NOTES ON THE GENUS BROMUS L. (POACEAE) IN IRAN

R. Naderi, M. R. Rahiminejad, M. Assadi & H. Saeidi

Received 23.11.2011. Accepted for publication 21.02.2012.

As a result of our study on the genus *Bromus*, *B. rigidus* and *B. sewerzowii* are reported as new records for the flora of Iran. *Bromus diandrus-rigidus* complex comprises a group of species ranging from tetra- to octaploid levels, which have been treated in different ways. Based on a specimen from Golestan National Park, *B. rigidus* is reported along with its illustration and a comparison with its closely related taxa. Furthermore, *B. sewerzowii* is the second record that is based on a specimen from North Khorasan (Sarakhs). In addition, a taxonomic key to two the species and their allies has been presented.

Reza Naderi, Mohammad Reza Rahiminejad (correspondence <mrr@sci.ui.ac.ir>) & Hojjatollah Saeidi, Department of Biology, University of Isfahan, Isfahan, Iran. Mostafa Assadi, Research Institute of Forests and Rangelands, P. O. Box 13185-116, Tehran, Iran.

Key words. *Bromus rigidus*, *Bromus sewerzowii*, *Bromus diandrus-rigidus* complex, Poaceae, new records, Iran.

INTRODUCTION

Taxonomically, *Bromus* is a complicated genus containing diverse annual to perennial plants (Fortune et al. 2008, Smith 1970). The taxonomic status and infra generic relationships of *Bromus* particularly sections *Bromus* and *Genea* Dumort. were the subject of some recent studies (e.g., Sales 1991, 1993; Scholz 1998). Bor (1970) in his account of the Flora Iranica area recognized 29 species occurring in Iran. Later on, this number was increased to about 45 species by adding *B. gedrosianus* Pénzes, *B. pulchellus* Figari & De Notaris, *B. pseudojaponicus* H. Scholz (Scholz 1981a), *B. borianus* H. Scholz (Scholz 1981b), *B. adjaricus* Sommier & Levier (was accounted by Smith (1985b) as a synonym of *B. variegatus* subsp. *villosulus* (Steud.) P. M. Smith), *B. ramosus* Hudson (Assadi 1988), *B. diandrus* Roth, *B. tigridis* Boiss. & Nöe, *B. pectinatus* Thunb. (with the synonym *B. pulchellus* Figari & De Notaris), *B. racemosus* L., *B. paulsenii* Hack. (Termeh 1987), *B. mollis* L. (Hamzeh’ee 2000; although was accounted as a synonym of *B. hordeaceus* L. by Smith 1968), *B. arvensis* L. (Noori et al. 2004), *B. secalinus* L. (Nourouzi et al. 2005) and *B. catharticus* Vahl (Hamzeh’ee et al. 2007) to this list. In addition, Ghahreman et al. (2006) and Alemi et al. (2007) reported *B. riparius* Rehmann and *B. inermis* Leyss. for the flora of Iran. As a part of comprehensive and general study of the genus *Bromus* in Iran two new
species to the flora of Iran are recorded and added to the list of Bromus species in this country: B. rigidus Roth belonging to sect. Genea Dumort. and B. sewerzowii Regel from section Bromus.

RESULTS AND DISCUSSION

**Bromus rigidus** Roth, Bot. Mag. (Römer & Usteri) 10: 21-23 (1790). Fig 1.

*Specimen seen.* Iran, Golestan province, Golestan National Park. 751 m, 25.5.2011, Naderi 17727 (Herbarium of the University of Isfahan, HUI).

Annual, 30-50 cm tall, erect or decumbent. Leaves 10-25 cm × 2-6 mm, covered with short hairs. Panicles 10-20 cm long, dense, stiffly erect, and slightly lax; branches never spreading or drooping. Spikelets excluding awns 30-50 mm long, glabrous or hairy; lower glumes 14-20 mm × 2 mm; the uppers 22-27.5 mm × 3.2-4 mm; lemmas 24-28 mm × 4-5 mm; awns rigid, 33-56 mm; palea 15-16.5 mm; anthers 0.5-0.6 mm.

*Habitat.* Roadside.


Taxonomic status of the pair closely related species *B. diandrus* Roth (8x) and *B. rigidus* Roth (6x) from sect. *Genea* has been the matter of controversy for a long time. While some workers like Oja & Jaaska (1996) using isozyme data, Oja & Laarman (2002) relying on cytological observations, and Sales (1993, 1994) using morphological reasoning (e.g. regarding a state transformation of callus/scar shapes) considered them as a pair of closely related species, others (Smith 1980, 1985a; Liang et al. 2006; Fortune et al. 2008) argued in contrast. The latter workers analysing the sequence data of the low copy nuclear gene (Waxy) and the multi copy one (ITS) argued that *B. rigidus* (6x) along with *B. sterilis* (2x) have taken part as the progenitors in the origin of *B. diandrus* (8x). Therefore, they split and kept the two polyploids as two distinct species; a notion followed by the authors of this study. However, it is worth of mention that Termeh (1987) reported *B. diandrus* as having partly loose, open and compressed (sect. *Bromus*) progenitors in the origin of *B. sterilis*. Therefore, the presence authenticity of *B. hordeaceus* L. and *B. scoparius* L. in having dense panicles in which branches and pedicels are being shorter than spikelets. The two last species morphologically are similar, differing in lemmas/caryopsis width and shape which have been cited in many floras such as Smith (1980, 1985a) and Liang et al. (2006). Hamzeh’ee (2000) also reported *B. mollis* L. based on a depauperate material and no identifiable herbarium sheet “Azimi 80076 (TARI)” for the flora of Iran. This species has been generally known as a synonym of *B. hordeaceus* L. subsp. *hordeaceus* (Smith 1968). Thus, the presence authenticity of *B. hordeaceus* for the flora of Iran will be unresolved.

**Key to the species**

A key to the taxa belonging to the sections concerned including sect. *Genea* Dumort. and *Bromus* are provided and presented here.

1. Spikelets cuneate, with wide apex (sect. *Genea* Dumort.)
   - Spikelets ovate to ovate-lanceolate, terete to slightly compressed (sect. *Bromus*)
   - Lower glume 6-10 mm long; the upper 10-16 mm long. Lemma less than 20 mm long  
     - *B. sterilis* L.
     - Lower glume 15-23 mm long; the upper 20-32 mm long. Lemma at least 20 mm long  
2. Lower glume 15-23 mm long; the upper 10-16 mm long. Lemma less than 20 mm long  
3. Panicle dense, stiffly erect, narrowly ovate; branches

**Specimen seen.** Iran, Khurasan province, Sarakhs. 250 m, 27.4.1989, Mozaffarian 67633 (TARI).

Annual, culms ca. 1 m tall, puberulent, erect or decumbent, stout. Leaf sheaths pubescent or villouse; leaf blade flat, pubescent, 20-25 cm × (4-)7-8 mm. Panicles contracted, oblong in outline, erect, up to 17 × 2.4 cm; branches very shorter than spikelets or subsessile. Spikelets including awns 3 cm long, scaborous-striose; lower glumes 7.5 mm × 1.6-1.7 mm, 3 veined; the uppers 10.5 mm × 3.8 mm, 7 veined; lemmas 11.5 mm × 4 mm, 7 veined, apical lemma lobes bifid, acute, 0.5-1 mm; awns 8-13 mm, straight; insertion of awns 1.5-2 mm below lemma apex; anthers 1.5 mm long.

*Habitat.*? Perhaps in desert grasslands.

*Distribution.* Afghanistan, Kazakhstan, Kyrgyzstan, Magnolia, Russia, Tajikistan, SW Asia, particularly NE of Iran.

*B. sewerzowii* Regel (a wrong spelled name as “B. sewerzovii” in Bor, 1970) of section *Bromus* was reported with no specific locality or herbarium sheet within a general distribution by Tzvelev (1976) and Liang et al. (2006) from Afghanistan, Kazakhstan, Kyrgyzstan, Magnolia, Russia, Tajikistan and SW Asia (NE Iran). This species was discovered and reported here from Khurasan, Sarakhs based on the herbarium sheet Mozaffarian 67633 (TARI). *B. sewerzowii* resembles *B. hordeaceus* L. and *B. scoparius* L. in having dense panicles in which branches and pedicels are being shorter than spikelets. The two last species morphologically are similar, differing in lemmas/caryopsis width and shape which have been cited in many floras such as Smith (1980, 1985a) and Liang et al. (2006). Hamzeh’ee (2000) also reported *B. mollis* L. based on a depauperate material and no identifiable herbarium sheet “Azimi 80076 (TARI)” for the flora of Iran. This species has been generally known as a synonym of *B. hordeaceus* L. subsp. *hordeaceus* (Smith 1968). Thus, the presence authenticity of *B. hordeaceus* for the flora of Iran will be unresolved.

**Bromus in Iran**

**IRAN. J. BOT.** 18 (1), 2012
Fig. 1. *Bromus rigidus*. 1, habit; 2, spikelet; 3, lower glume; 4, upper glume; 5, lemma including awn; 6, lemma excluding awn; 7, caryopsis; 8, node; 9, leaf; 10, ligule – Naderi 17727 (HUI).
Fig. 2. *Bromus sewerzowii*, Mozaffarian 67633 (TARI).
mainly shorter than the spikelets

B. rigidus Roth

3. Panicle lax, spreading, broadly ovate; branches mainly longer than the spikelets

B. diandrus Roth

4. Panicle 10-17 cm long. Lower glume 7-7.5 mm long; upper glume 10.5 mm long

B. sewerzowii Regel

- Panicle less than 7 cm long. Lower glume up to 6.5 mm long; upper glume up to 7 mm long

5. Lemma with margin conspicuously angled about 2/3 up. Grains oblanceolate

B. hordeaceus L.

- Lemmas with margin rounded or very obscurely angled. Grains narrowly elliptical

B. scoparius L.

ACKNOWLEDGMENT

We thank graduate department of the University of Isfahan for necessary guidance and support. The authors appreciate Mrs. Mohaghegh for her precise hand drawing.

REFERENCES


Smith, P. M. 1968: The Bromus mollis aggregate in Britain. –Watsonia 6 (6), 327–344.


