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Bromus lepidus and *Bromus pseudothominii*, two new records for the Iberian Peninsula

Abstract

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Bromus lepidus and *B. pseudothominii* are reported for the first time from the Iberian Peninsula. A comparative morphological and anatomical study of these closely related species belonging to the *Bromus hordeaceus* complex has been carried out.

Introduction

This is a continuation of our former contributions to the Iberian brome-grasses. The quotation of new records (Acedo & Llamas 1994) and the discovery of two new species (Acedo & Llamas in press).

The genus *Bromus* is widely distributed in the Iberian Peninsula being represented by near thirty of the mediterranean species, belonging to four subgenera, being subgenus *Bromus* the most difficult to understand because the great morphological similarity among the different species. We think this is the reason to find easily misidentified specimens in some herbaria.

Material and Methods

Plant material studied includes about one thousand herbarium sheets belonging to the *Bromus hordeaceus* complex (from BCF, COI, E, GDA, GDAC, LEB, LD, LINN, LISI, LISU, MA, MAF, SALAF, SANT, and VAB) and fresh material, with special attention to the Iberian Peninsula. The herbarium abbreviations following Holmberg & al. (1990).

All measurements of the spikelets and lemmas are taken in full mature spikelets excluding awns.

For anatomical studies fresh and rehidrated samples were fixed in F.A.A. The sections were made with a freezing microtome, and then cleared and stained with safranin and fast green. The epidermis were studied after a clearing process of little pieces of the blade and then stained as above. The anatomical descriptions are made following the terminology used by Metcalfe (1960) and Ellis (1976, 1979). The drawings are original and were made with the aid of a camera lucida.

Results and Discussion

The *Bromus hordeaceus* complex includes four Iberian species with pubescent sheath-leaf, panicles with short branches, generally hairy spikelets and herbaceous nerved lemmas. Some of them are hard to identify because of these similarities. According to Smith (1973) it is because their diagnostic characters are difficult to communicate in written descriptions. On the other hand, some species of this complex have high morphological variability: in *B. hordeaceus* there is variation in the development of spikelets and its indumentum. This variation has been discussed by Smith (1968). As a consequence, other closely morphological species are generally overlooked and confused with it, but there are several characteristics that can be used to discriminate the different taxa of the complex. In this case *Bromus lepidus* and *B. pseudothominii*. The fourth Iberian species is *Bromus cabrerensis* Acedo & Llamas, that is the most different species of the complex.

The differential morphological characteristics among those three closely related taxa are referring to the spikelet and lemma size and the relation between the length of the lemma and the caryopsis (Table 1). According to Smith & Sales (1993), the spikelet size is a very interesting character in *Bromus*, and we think it has high diagnostic value in this complex.

In the Iberian Peninsula, as well as in the remainder of its native distribution, *Bromus hordeaceus* is widely distributed, often living in grassy places with anthropozoic influence. It is the species having the biggest spikelets (12-20 x 5-8 mm) and lemmas (7-10 x 4-5 mm) and the smallest caryopsis in relation with the palea size (up to 8/10) of the complex. In general, *B. hordeaceus* is, in all its parts, larger than *B. lepidus* and *B. pseudothominii*, but in some cases these robust specimens live with other more depauperate that are harder to identify.

Table 1. Morphological characteristics of the studied species.

	B. hordeaceus	*B. lepidus*	*B. pseudothominii*
Plant length (cm)	15-100	15-55	30-80
Lamina size (cm)	4-22 x 0.5-0.9	3-7 x 0.2-0.4	3-13 x 0.3-0.6
Panicle length (cm)	2-14	3-5	5-12
Spikelet = S			
size (mm)	15-20 x 3-8	10-12 x 3-5	12-15 x 4-7
shape	ovate-oblong	ovate	ovate
nº florets / S	7-13	6-8	7-11
Lower glume = G1			
size (mm)	5-7 x 1.5-4	4-4.5 x 1.5-2.5	5.5-7 x 1.5-3
G1 width/G1 length	3/10-3/4	1/3-2/3	1/4-1/2
shape	ovate	ovate	triangular-ovate
Upper glume = G2			
size (mm)	5-7 x 3-5	4.5-5.5 x 2.25-3.5	6.5-8 x 3-4
G2 width/G2 length	3/4-4/4	1/2-3/4	2/5-3/5
shape	ovate	ovate	ovate
Lemma = L			
size (mm)	7-10 x 4-5	5.5-6.5 x 2.5-3	6.5-8 x 3-4
shape	obrhomboid	obrhomboid	obrhomboid
rachilla length (mm)	1-2	0.75-1	0.75-1

	B. hordeaceus	*B. lepidus*	*B. pseudothominii*
awn length (mm)	4-9	5-6	5-9
distance from L apex to awn insertion (mm)	0.5-1.5	c. 0.5	0.5-1.5
awn length/L length	5/10-9/10	7/10-11/10	8/10-10/10
Palea = P			
size (mm)	5.5-7.5 x 1-2	5-6 x 1-1.5	6-7.5 x 1.5-2
P width/P length	1/10-4/10	1/5-1/4	2/10-2/6
shape	± lanceolate	± obovate	± lanceolate
P length/L length	2/3-3/4	3/4-4/4	3/4-8/9
Anther lenght	0.5-2.5	0.5-1.5	1-2
Caryopsis = C			
size	4.5-7 x 1.5-2	5-6.5 x 1-2	6-7.5 x 1.3-1.6
C length/P length	3/4-9/10	10/10-11/10	c. 10/10

The anatomical structure of the leaves of these grasses indicates that they belong to the group of annual brome grasses characterized by the presence of scarce sclerenchymatic tissue. The sclerenchyma that is associated with some primary vascular bundles forms girders between the bundles and the epidermis and in some cases only with the adaxial epidermis (Figs. 1, 2). On the other hand, there are interesting anatomic differences in the transverse section of the leaf-blade, that we will comment afterwards. Other anatomical characteristics are summarised in Table 2.

Table 2. Anatomical characteristics of the studied species.

	B. hordeaceus	*B. lepidus*	*B. pseudothominii*
Transection of the Leaf-Blade			
transection shape	flat or V-shaped	± chanelled	flat or V-shaped
nº vascular bundles = VB	19-27	7-11	15-29
nº first order VB	7-10	3-5	7-11
adaxial surface	slighty or not ribbed	deeply ribbed	slighty ribbed
thickness at central VB level (µm)	250-375	125-170	250-300
thickness at ribs level (µm)	170-240	125-170	150-170
thickness at furrows level (µm)	170-240	85-150	150-170
central structure	central abaxial rib	central VB	central abaxial rib
Leaf Epidermis			
nº bulliform cell rows	2-4	2-3	3-5
length of the macrohairs (µm)	300-2000	50-300	400-1000
nº cell rows with stomata/intercostal zone	1-2	1-2	1-2
adaxial stomata length (µm)	40-58	40-52	44-52
abaxial stomata length (µm)	48-56	36-50	44-52
Transection of the culm			
culm diametre (µm)	1200-2700	500-600	700-1800
culm thickness (µm)	500-600	150-200	300-650
fundamental parenchyma thickness (µm)	30-65	20-25	21-130
subepidermic sclerenchyma thickness (µm)	20-40	30-100	40-55
medular parenchyma thickness (µm)	425-550	100-110	200-225
central cavity diametre (µm)	900-1200	100-110	105-640
nº VB	20-50	10-15	11-30

***Bromus lepidus* Holmb.**

It is a very rare plant whose diagnostic characteristics permit an easy identification when a specimen is found, although until now it has been overlooked. Its representation in the herbaria is very poor, probably because it is very scarce in the nature, otherwise it would be better represented, even misidentified. It lives in sown grassland, in W. Europe, and according to more recent literature its distribution is imperfectly known (Smith & Sales 1993). This species has been recorded from the following European countries: Belgium, Britain, Czechoslovakia, Denmark, France, Germany, Ireland, Netherlands, and Sweden (Smith 1980) and recently in Egypt (Smith & Sales 1993). The two Spanish localities quoted here extend southwards the known European distribution of this species.

The differential characteristics of *Bromus lepidus* are the small size of the spikelets (in our specimens 10-12 x 3-5 mm), small lemmas (5.5-6.5 x 2.5-3 mm) with broad hyaline margins and the caryopsis exceeding the palea and often the lemmas.

In *Bromus lepidus* the leaf-blade is ± channelled (Fig. 1a). Adaxial side with prominent ribs (more than one third of the total thickness) and furrows, abaxial side without them. Central structure not developed; the central vascular bundle is recognized only by its central position. Leaf-blade 125-170 µm thick at the middle and the ribs, and 85-150 at the furrows. Sclerenchyma frequently associated only with the central vascular bundle. Bulliform cells occur in groups of 2-3 on the adaxial furrows. 7-11 vascular bundles, 3-5 of basic type. Macrohairs up to 300 µm present on the adaxial epidermis, shorter on the abaxial epidermis.

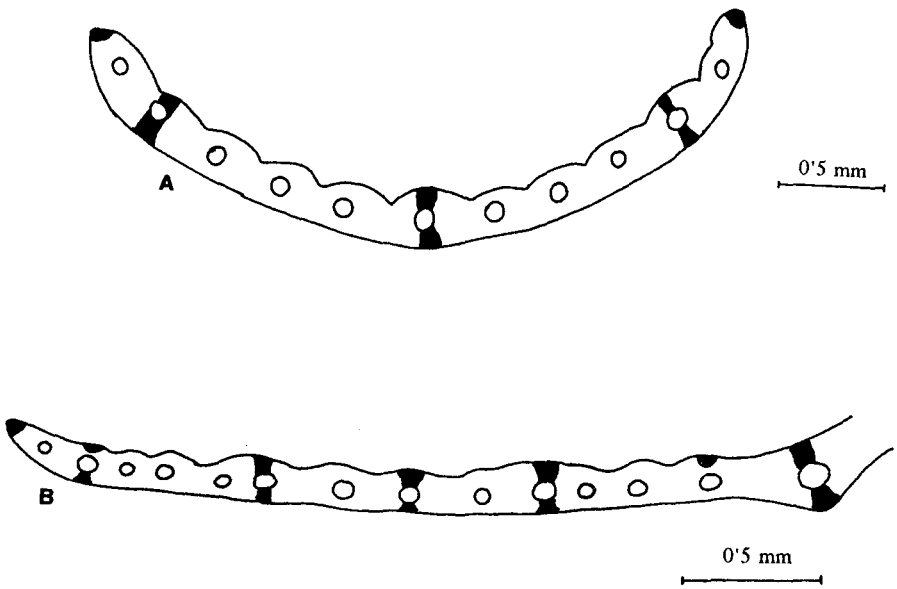

Fig. 1. Trasverse section of the leaf: **A**, *B. lepidus* LEB 52331; **B**, *B. pseudothominii* LEB 52572.

Spanish specimens seen (Fig. 2). - Lugo: Lugo, alrededores 29TPH16, 10 Jul 1992, *E. Carreira, SANT 24998/1, SANT 24998/2;* Zamora: Sanabria, Jul 1944, *Losa & Vieitez, LEB 52331, SANT 2415.*

Fig. 2. Distribution of *Bromus lepidus* (o) and *Bromus pseudothominii* (*) in the Iberian Peninsula.

***Bromus pseudothominii* P. M. Smith**

All our specimens from the Iberian Peninsula (Spain and Portugal) correspond by their characters to *Bromus pseudothominii*: short panicles, up to 13 cm, spikelets 12-15 x 4-7 mm, lemmas 6.5-8 mm with bluntly angled and narrow hyaline margin; awn straight 5-7 mm long and caryopsis equalling the palea.

This taxon was described by Smith (1968) as a natural hybrid between *Bromus hordeaceus* and *B. lepidus* probably because he found its morphology was very similar to that of the experimental hybrid between those two species.

In the Iberian Peninsula, we found *Bromus pseudothominii* in anthropogenic habitats and frequently in sandy soils.

The leaf-blade of *Bromus pseudothominii* is opn V-shaped (Fig. 1b). Adaxial side with slight ribs (up to one quarter of the total thickness) and furrows, abaxial side without them. Central structure a developed midrib formed by the abaxial projection of the sclerenchyma associated with the central vascular bundle. Leaf-blade 250-300 µm thick at the middle and 150-170 µm at the side. Sclerenchyma frequently associated some vascular bundles of basic type. Bulliform cells occur in groups of 3-5 in the adaxial furrows. 15-29 vascular bundles, 7-11 of basic type. Macrohairs 400-1000 µm present.

Iberian specimens seen (Fig. 2). - Spain: Avila: Moraleja de Matacabras, 30TUL35, 12 May 1990, Bordes de campo de cereal, *A. Ubeda, LEB 49086;* Cáceres: Saucedilla, Las

Cabezas, 30STK71, 20 May 1983, *D. Belmonte, MAF 117714;* Cantabria: Muñorodero, 30TUP80, May 1992, on sandy soils, 5 m., *F. Llamas, R. Mª Valencia & C. Acedo, LEB 52562;* Coruña: Puente de Mera-Ortigueira, 29TNJ8735, margin of the road, 2 May 1992, *F. Llamas, R. Mª Valencia & C. Acedo, LEB 52573; LEB 52562;* León: León, Campus Universitario de Vegazana 10 Sep 1994, sown grassland, *C. Acedo, LEB 52506;* Madrid: Madrid: Casa de Campo, 30TVK37, 12 Jun 1935, *M. L. Figueiras, MA 191846;* Valladolid: San Cebrian de Mazote, 30TUM21, 19 Jun 1980, *Fernández Díez, MA 246412;* Zamora: Fornillos de Fermoselle, 29TQF27, 13 Jun 1990, pastizal; *G. Gonzalez Sierra, LEB 52311*; Puebla de Sanabria, 29TPG95, Jun 1964, *M. Mayor López, MAF 100445;* Portugal: Beira Litoral: Coimbra, Penacova, 29TNE65, 6 Jun 1982, solos da margen da oliveira do Mondego, *A. Marques, MA 373931.*

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