photo: C. Miller

Bothriochloa macra

photo: G. Fifield

***Bothriochloa macra* is a low-growing, perennial tussock grass. Slender reddish flowering stems up to 1 m high are produced during summer and early autumn, giving it the common name of Red Grass or Red-Leg Grass [6, 12]. The sparsely hairy leaves are green with some maroon colouring at the tips and margins during warmer months [12].**

Population map:

www.ala.org.au/explore/species-maps/

Natural Populations

Bothriochloa macra occurs in the Qld, NSW, Vic. and S.A. [4]. It grows on a variety of soil types in humid areas but in drier areas is restricted to run-on areas on clay [6] or loamy soils [11]. It has a low to moderate frost tolerance, high drought tolerance, can resprout after fire and has a life-span of 5-25 years. [7, 10, 11].

B. macra is one of the native grasses that benefits from livestock grazing and is widespread in overgrazed pastures [4]. It is considered to be an increaser species [8] and an indicator of degraded sites [3]. Although reported as being an uncommon component of the original woodland pastures, *B. macra* is often associated with *Themeda australis* (kangaroo grass) in lightly grazed grasslands [6]. In derived grasslands of the slopes and tablelands of NSW it is more commonly associated with the genera *Microlaena*, *Eragrostis*, *Aristida* and *Austrodanthonia* [6].

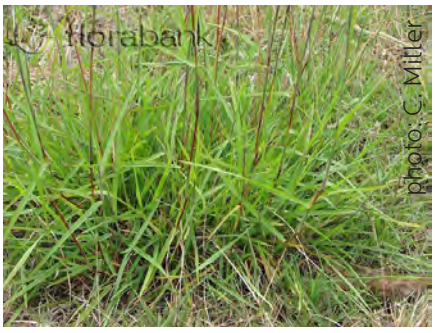


photo: C. Miller

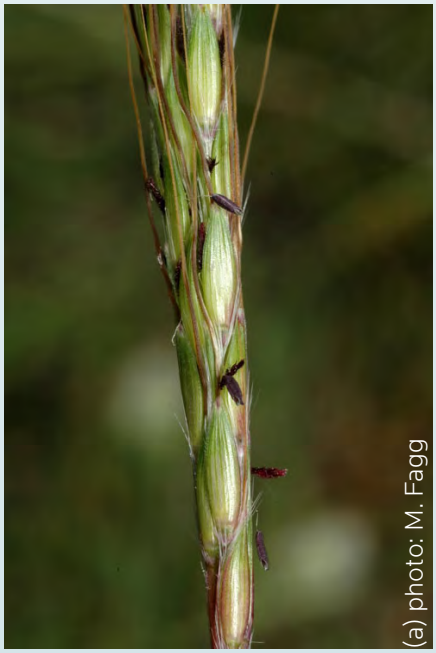
Greening Australia

Flowering and Seeds

B. macra flowers from summer to early autumn [4, 7]. Flowering stems are produced continuously in response to rainfall, and in wet summers may be prolific [6]. This species is wind pollinated, and the seed is dispersed locally or sometimes transported by adhesion [7].

Seeds can be collected from December to February [9]. Due to continuous seeding in many seasons, seed with varying levels of maturity is likely to be present at any one time, although mature seed is not held on the plant for long [6]. The optimum time for seed collection is when the culms (grass stems) are reddish-purple in colour and when spikelets at the tips of the seed heads are just beginning to fall off [6].

Because seed is borne well above the plants and easily detaches when mature, relatively clean seed can be obtained with a brush harvester [6]. Prior to harvesting, seedheads should be inspected for the presence of smut, a common occurrence in some seasons, particularly towards the end of summer [6]. Newly harvested seed can contain up to 35% moisture and requires immediate drying to prevent deterioration [6]. *B. macra* seed can be difficult to handle because the seeds can cling together [2]. See Florabank Guidelines 2 and 9 for more information about how to collect, treat and store native grass seed: **http://www.florabank.org.au/default.asp?V_DOC_ID=755.**



(a) photo: M. Fagg

Cultivation and Uses

Seed will germinate between 20 and 40°C, with optimal germination at 25–30°C [6]. *B. macra* can be sown in spring or early autumn, but late autumn sown seedlings may be damaged by frosts [6]. Field experiments at Canberra found that October - November was the optimum sowing time, mulching increased emergence (probably due to moisture conservation) and the application of fertiliser appeared to have little benefit in terms of establishment [6].

Reported germination rates vary. *B. macra* seed harvested from wild stands generally had a germination percentage of between 40 and 90% and a short period of dormancy (a few months) that can be overcome to some extent if seed is germinated in the presence of light. In contrast, another trial reported that 100% germination can be achieved in 3 days given suitable conditions, and that *B. macra* seed shows very little or no dormancy [5]. Greening Australia Vic. reported approximately 36 days to full germination, with a typical germination rate per gram of 309 seeds [9]. Smoke has no effect on the germination of *B. macra* [5]. *Bothriochloa* seed remains viable for at least 2 years at room temperature [5] but a significant reduction in germination can occur after storage for 56 months [6]. Long-term storage with intact lemma and palea (the bracts of a grass floret enclosing the flower) is recommended. Removal of the seed coat increases the speed of germination but does not result in greater % germination [5] and does not give consistent results [6], so is probably not necessary for most applications of *B. macra*.

B. macra is highly regarded for its persistence and production during droughts, and for its soil conservation value in waterways and in heavily grazed summer pastures. In eastern Australia, it is most productive in January and February and hays off after frost [6].

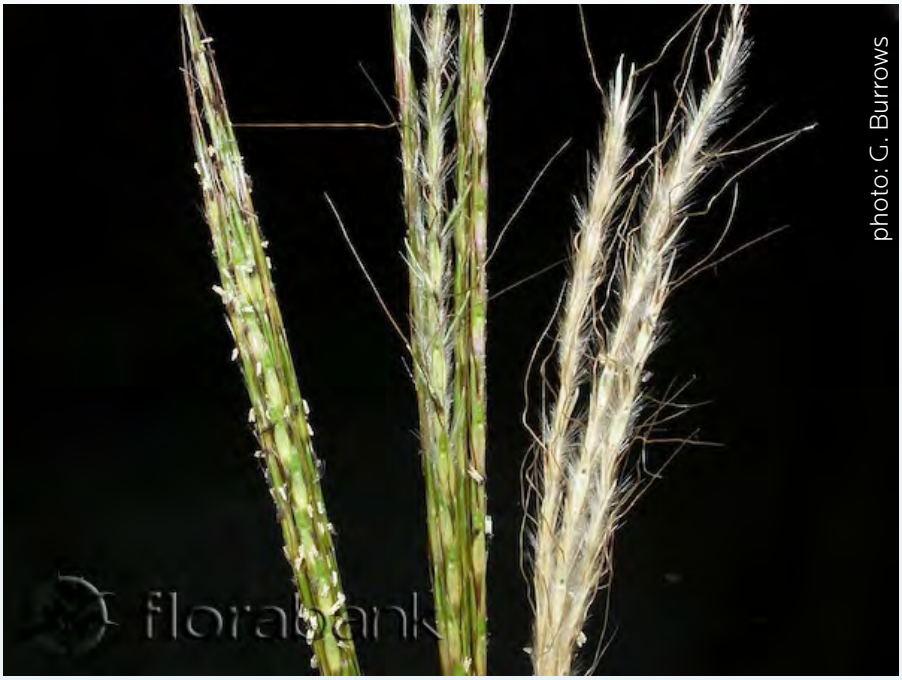
The spreading of seed-bearing hay appears to be a reliable method for establishing red grass, and the collection and spreading of seed-bearing hay on newly constructed waterways was a relatively common soil conservation practice at one time [6]. Some success has also been achieved following application of a seed-bearing mulch to weed-free mine overburden on the Central Tablelands of NSW [6]. *B. macra* can be used to establish groundcover quickly in sunny positions but it does not appear to compete well in the longer term and mixed sowings with other species may be appropriate [6].

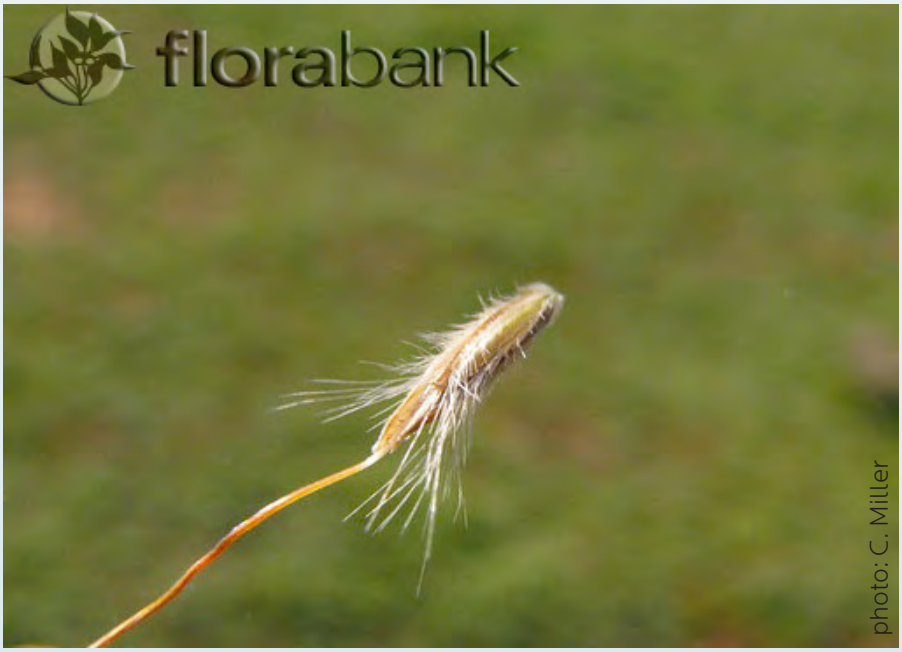
B. macra establishment was found to be relatively tolerant to weeds compared to some other native grasses. The percentage emergence was not affected despite 3500 weeds per m^2 in a glasshouse trial,

and the percentage reduction in dry matter production after 8 weeks in the presence of weeds was less for *Bothriochloa* than for *Stipa*, ryegrass and *Austrodanthonia* [1].

B. macra grows particularly well in unfertilised areas and may eventually dominate pastures of 'improved' species that are in decline due to drought and/or the lack of regular applications of superphosphate [6]. The mechanism by which it dominates native pastures is unclear but it is generally considered that species such as *Austrodanthonia* would have to be considerably weakened by overgrazing for this to occur [6]. In a *Bothriochloa* / *Austrodanthonia* pasture in the Central Tablelands of NSW, it was found that gaps present in the pasture were more readily occupied by the growth of existing *Austrodanthonia* plants than by red grass when grazing was removed. After gaps were filled however, the relative proportions of these species remained constant [6].

In terms of stock grazing and management, the stems are of low acceptability and digestibility, but the high quality leaves are readily eaten when green [10]. *B. macra* appears to be avoided by stock once the seeding culms become evident so that even grazed stands may produce sufficient seeds for harvesting, although heavily grazed stands produce few seeding culms [6]. Reports of its forage value vary but it is generally not highly regarded, though the adverse reports may relate more to palatability than to feed quality [6]. The production value of *B. macra* is 3.8 to 10.4 t/ha, it has a moderate to low forage value, a crude protein level of 4-15% and 48-59% digestibility [10]. Nitrogen analyses indicate that its protein content is similar to or better than many other summer-growing species such as bambatsi panic (*Panicum coloratum*), Rhodes grass (*Chloris gayana*) and Mitchell grass (*Astrebla* spp.) [6].





To source seeds or plants:
www.grassywoodlands.org.au

References

(a) Pictures under licence from The Australian National Botanic Gardens.

[1] Hagon, M. W. (1997). Effects of competition, herbicides and activated carbon on establishment of Australian grasses. *Weed Research*, Vol. 17, Issue 5, pp. 297 – 301.

[2] Loch, D. and Clark, M. (1996). Production, harvesting and processing of native grass and herbaceous legume seed: the reality and the challenge. In: Waters, C. M. and Noad, W. J. *Proceedings of the Native Grass and Legume Seed Industry Workshop*, Roma, 26-27 March, 1996. pp. 29-50.

[3] Prober, S. M., Thiele, K. R., Lunt, I. D. and Koen, T. B. (2005). Restoring ecological function in temperate grassy woodlands: manipulating soil nutrients, exotic annuals and native perennial grasses through carbon supplements and spring burns. *Journal of Applied Ecology*. Vol. 42, Issue 6, pages 1073-1085. Online: **http://www.csu.edu.au/herbarium/FullText/Prober%20et%20al%202005%20sugar.pdf**

Internet Links

[4] PlantNET National Herbarium of New South Wales: **http://plantnet.rbgsyd.nsw.gov.au/cgi-bin/NSWfl.pl?page=nswfl&lvl=sp&name=Bothriochloa~macra**

[5] Australian National Botanic Gardens – ACT Grass Project: **http://www.anbg.gov.au/gardens/research/hort.research/grass-project/nht2.html**

[6] NSW Department of Primary Industry: **http://www.dpi.nsw.gov.au/agriculture/field/pastures-and-rangelands/rangelands/publications/grassedup/species/red-grass**

[7] Botanic Gardens Trust: **http://www.rbgsyd.nsw.gov.au/science/Evolutionary_Ecology_Research/Ecology_of_Cumberland_Plain_Woodland/woodland_plants/bothriochloa_macra**

[8] Friends of Grasslands, Grassland Quality Indicator Species List: **http://www.fog.org.au/indicator_species.htm**

[9] Seed Germination Data Sheet: Indigenous Grasses, by Greening Australia Vic, 1996.: **http://www.florabank.org.au/files/documents/seedgerminationanddo/20070801-18.pdf**

[10] Ever Graze, Victorian Department of Primary Industries: **http://www.evergraze.com.au/LiteratureRetrieve.aspx?ID=18052**

[11] Grain and Graze, Native Perennial Grasses, Fact Sheet #2: **http://www.grainandgraze.com.au/library/pdf/87/62.pdf**

[12] Australian National Botanic Gardens & Australian National Herbarium, Harden Species List: **http://www.anbg.gov.au/greening-grainbelt/harden-species-list.xls.**

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