

Cultivar release

‘Grasslands Lakota’ prairie grass (*Bromus catharticus* Vahl.)

W. RUMBALL

J. E. MILLER

AgResearch Grasslands
Private Bag 11 008
Palmerston North, New Zealand

Abstract ‘Grasslands Lakota’ prairie grass (*Bromus catharticus* Vahl.) was selected from 72 *Bromus* breeding lines and accessions evaluated in Oregon and Pennsylvania, United States, between 1995 and 1998. The aim was to produce a cultivar of *B. catharticus* that was better adapted to the northern regions of the United States than the currently available cultivar ‘Grasslands Matua’. From 1996, all 72 lines were screened in New Zealand for seed production, and for uniformity and distinctness. In March 1998, the data at all three sites were collated and Cb 1307 was selected as the preferred line. It was discovered in a sandframe at Palmerston North, but the ancestry is unknown. Since 1998, this selection has been certified and commercialised, and has been named ‘Grasslands Lakota’. (In the United States it will be registered simply as ‘Lakota’.) It was given Plant Variety Rights in New Zealand in 1999 and Plant Variety Protection in the United States in 2001. Compared with the standard New Zealand cultivar ‘Grasslands Matua’, ‘Grasslands Lakota’ is less erect, and later to head. It also has a wider and more open crown, a feature that may help to explain the much lower susceptibility to powdery mildew (*Blumeria graminis* (DC) Speer) in the United States.

Keywords ‘Grasslands Lakota’; prairie grass; *Bromus catharticus* Vahl.

INTRODUCTION

Although ‘Grasslands Matua’ prairie grass (*Bromus catharticus* Vahl.) was selected in New Zealand for local use and was released over 30 years ago (Rumball 1974), it has been sold in considerable quantities in the United States in recent decades. It was apparently successful in the United States because of its ability to produce large amounts of palatable forage after a short establishment period, and to regrow rapidly after defoliation or stress periods. Although not persistent under frequent grazing, the sward survival of ‘Matua’ was aided by its propensity to head freely for long periods and produce much viable seed for self-sowing.

Since ‘Matua’ was not bred in the United States, it was considered likely that a better cultivar could be produced from a breeding programme located in that country. Over such a diverse continent, it was unlikely that just one new cultivar of this self-fertilised species would be sufficiently adaptable to cater for all the specific regional needs. Particularly, there was a need in the northern United States for this species to survive the intense cold of winter and the associated disease problem of powdery mildew (*Blumeria graminis* (DC) Speer (synonym *Erysiphe graminis* (DC))). In the southern region it was considered more important to achieve tolerance of the intense heat and dryness of summer.

Accordingly, a breeding programme was set up, starting from a common genetic pool sown at one southern and two northern sites, to select cultivars of *B. catharticus* particularly adapted to those two regions. This paper presents the “northern” programme. An adjacent paper (Rumball & Miller 2003) describes results from the southern programme.

ORIGIN

In April 1995, a set of 72 seed samples of *B. catharticus* and closely-related species was sown

by Dr K. T. Leath at Pennsylvania State University, State College, Pennsylvania. Twenty-one of the samples were sown as pure 2×1.3 m plots replicated in three randomised blocks; the remaining 51 samples were sown alongside as 1.3 m rows (less seed was available), also in a triplicated randomised layout. In May 1995, the same 72 lines were sown in similar fashion by Dr R. Lovell at the Klamath Experiment Station, Oregon State University.

Virtually all lines established well, and thereafter were maintained according to the local protocols for fertiliser, defoliation, and weed and pest control. Over the next 33 months, observations and measurements were made on each plot for the selection characters of importance. These included seasonal productivity, onset and amount of heading, pathogens and pests, and sward density and survival. In April 1996, all 72 lines were sown as duplicated rows at Palmerston North, New Zealand. Observations were made over the next 2 years on timing and prolificacy of heading, and on distinctness and uniformity within each line.

In April 1998, the data from all three sites were collated. It was clear that the high-yielding and most persistent lines at both United States sites were not of *B. catharticus* itself, but of the closely-related species *B. marginatus*. This was a consistent result from both the *B. marginatus* cultivar 'Grasslands Hakari' and three other lines of similar taxonomic origin and probably indicates that their lower cool-season activity made them more tolerant of winter stress. However, since there was already a New Zealand cultivar of *B. marginatus* available, and since the replacement for 'Grasslands Matua' had to be within *B. catharticus*, a decision was made to choose the line Cb 1307 as the new cultivar to serve northern United States. Its ancestry is unknown, as it was noticed and saved as "stray" material growing in sandframes at AgResearch Grasslands, Palmerston North, New Zealand in 1984. Seed of this selection was increased at Lincoln, Canterbury over the summer of 1998–99. The selection has now been released and certified, named 'Grasslands Lakota', and was granted Plant Variety Rights in New Zealand on 26 April 1999 and Plant Variety Protection in the United States on 12 September 2001. (In the United States, it will be registered simply as 'Lakota'.) The New Zealand Plant Variety Rights application contains a full quantitative description of the cultivar.

DESCRIPTION

Being largely self-fertilised, 'Lakota' prairie grass is uniform, and also stable between generations. It is a semi-erect, tufted grass typical of *B. catharticus*, inherently perennial but liable to gradually lose tiller numbers and die under close and frequent grazing.

Compared with 'Grasslands Matua', 'Lakota' has significantly wider culm leaves (11.8 versus 9.3 mm), and thicker reproductive stems (4.9 versus 4.6 mm) with longer internodes (18.9 versus 14.9 cm). The stems are significantly more pubescent. In spaced plant trials at Palmerston North (10 m a.s.l. latitude 40°23'S), 'Lakota' was c. 10 days later in mean heading date (only 4 days later further south at Lincoln). The plant crowns are wider and more open than those of 'Grasslands Matua', reflecting a more open plant structure. 'Lakota' is also consistently less erect than 'Grasslands Matua'.

The other recently released cultivar 'Grasslands Dixon' (Rumball & Miller 2003) is lighter green than 'Lakota', and has significantly shorter panicles (31.3 versus 32.8 cm). It is c. 2 days later than 'Lakota' in mean heading date at Lincoln, and is also more erect at Lincoln.

In the trials in Pennsylvania, both 'Lakota' and 'Grasslands Dixon' were scored as only lightly affected by powdery mildew infestations, whereas 'Grasslands Matua' was scored as severely affected.

USE AND PERFORMANCE

'Grasslands Lakota' is intended for use in the northern regions of the United States. When compared with several lines of 'Grasslands Matua' ancestry in Pennsylvania during the programme, 'Lakota' was consistently only lightly infested with powdery mildew, while all lines closely related to 'Grasslands Matua' were heavily infested. It has been suggested by local observers that this may reflect the tighter and less open crown of 'Grasslands Matua', since powdery mildew appears to build up more strongly in dense and rank swards. 'Lakota' was also less severely affected by heat stress in the late summer of 1995 than were the 'Grasslands Matua' lines. 'Lakota' did not appear to be as high yielding as 'Grasslands Matua' in Pennsylvania in some seasons, and it was no less affected by winter kill. However, it was a consistently good yielder, and winter kill was not severe on most lines during the course of the trial. Primarily, 'Lakota' was chosen because of good all-

round performance, with a particularly low susceptibility to powdery mildew.

In the Oregon trial, powdery mildew was less noticeable on all lines and so was not a major selection criterion. Similarly, winter stress was less severe in Oregon and so did not greatly affect sward survival. Selection was based more on the yield scores, and 'Lakota' outyielded all five lines of 'Grasslands Matua' ancestry.

It is expected that the new cultivar will have to be managed in swards with care to avoid overgrazing, and grazed or mown so it enters winter without rank growth (which appears to favour both powdery mildew and winter kill). Although the evidence collected at both sites suggests that 'Lakota' is a more consistent performer than 'Grasslands Matua', and also less susceptible to powdery mildew, it still retains the basic feature of winter activity typical of the species as a whole, and therefore will be at risk from sudden severe

cold. In seasons other than winter, it is best managed by allowing enough time between grazings for regrowth to reach at least 20 cm.

ACKNOWLEDGMENTS

We thank Drs Ken Leath and Randy Dovell, from Pennsylvania and Oregon respectively, for management of the trials and processing of the data.

REFERENCES

- Rumball, W. 1974: 'Grasslands Matua' prairie grass (*Bromus catharticus* Vahl.). *New Zealand Journal of Experimental Agriculture* 2: 1–5.
- Rumball, W.; Miller, J. E. 2003: 'Grasslands Dixon' prairie grass (*Bromus catharticus* Vahl.). *New Zealand Journal of Agricultural Research* 46: 65–66.