Register of Australian Herbage Plant Cultivars

A. Grasses
3. Phalaris
(*a*) *Phalaris aquatica* L. (phalaris) cv. Landmaster

Reg. No. A-3a-9

Registered 2 July 1996

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Origin

Landmaster is based on 18 parental genotypes which were chosen from a set of 60 on the performance of their half-sib progeny on hilly, groundwater recharge sites at Molyullah, near Benalla, and Axe Creek, near Bendigo, Victoria, where soils are shallow, stony, and moderately acid and infertile, and the average annual rainfall is about 600 mm (Oram *et al*. 1993). The 18 parental genotypes consist of 4 of the 45 parents of cv. Holdfast, and 14 selections made from a population of half-sib families evaluated for 2.25 years in drill-sown rows on an acid, skeletal recharge site at Axe Creek. One selection came from a summer-dormant breeding population code-named Perla Retainer and the other 13 from Holdfast or from the diverse population BP 83 from which Holdfast was selected 2 generations later (Oram and Schroeder 1992).

The 60 half-sib families were evaluated for plant density and herbage yield over 3 growing seasons at the 2 sites in comparison with phalaris and cocksfoot controls. Plots were grazed periodically by sheep to simulate rotational grazing, which is thought to be the most appropriate grazing management practice for winter-active phalaris on acid, infertile soils (Conroy 1995).

Landmaster was recommended for registration by the Victorian Plant Variety Committee. Prebasic seed will be maintained by CSIRO Division of Plant Industry. An application for Plant Breeders Rights has been accepted under the Breeder's code-name for the cultivar, BP 92 (Anon. 1995).

Morphological description

Landmaster is morphologically similar to other members of the winter-active phalaris group, e.g. Sirosa and Holdfast, in having fewer, thicker, longer culms and longer, broader leaves than semi-winter dormant cultivars such as Australian. In a spaced plant trial in 1994, a dry year, culm lengths (± s.e.) to the base of the panicles of Landmaster, Holdfast, Sirosa and Australian were 1.10 ± 0.01, 1.08 ± 0.02, 1.08 ± 0.05 and 0.99 ± 0.04 m, respectively, and the corresponding culm diameters (± s.e.) 10 cm above ground were 5.4 ± 0.1, 5.5 ± 0.1, 5.2 ± 0.4 and 4.2 ± 0.3 mm. Flag leaf lengths (± s.e.) for these cultivars were 79.3 ± 2.7, 81.1 ± 3.8, 76.0 ± 9.2 and 74.6 ± 11.1 mm, respectively, and flag leaf widths (± s.e.) were 3.4 ± 0.09, 3.5 ± 0.12, 3.1 ± 0.20 and 2.4 ± 0.28 mm.

The percentages (± s.e.) of plants with hairy outer glumes in Landmaster, Holdfast, Sirosa and Australian are 58 ± 2, 46 ± 4, 47 ± 11 and 0, respectively, and the corresponding percentages (± s.e.) of seedlings with red root tips are 48 ± 3, 38 ± 4, 10 ± 3 and 0.

Landmaster and Holdfast are currently the only 2 seed-retaining, winter-active cultivars. This combination of traits distinguishes them from previous cultivars. They can be distinguished from each other by the frequencies of plants with hairy outer glumes and red root tips, and by toxin concentrations.

Agronomic characteristics

Landmaster was 20% more productive on average than Sirosa and Holdfast at Molyullah and Axe Creek during autumn and winter of 1993 and 1994 in trials sown in 1992. After the 1994 drought, the advantage of Landmaster over the other 2 cultivars was 9%. There were no significant interactions between cultivars and sites, with Sirosa not significantly inferior to Landmaster at both sites, Holdfast similar to Landmaster at Molyullah, and Holdfast significantly less productive than Landmaster on 2 of the 4 assessment dates at Axe Creek. Australian phalaris was inferior to Landmaster on all dates at both sites, but only 1 difference was significant. Porto cocksfoot was significantly more productive than Landmaster at both sites and at all dates except on one occasion at Axe Creek. The advantage of cocksfoot over phalaris appeared to depend on the greater tolerance of cocksfoot to soil acidity (Culvenor *et al*. 1986), but also on higher than usual rainfall in the summers of 1992–93 and 1993–94, Porto cocksfoot being more responsive than phalaris to summer rain. The superiority of Porto was reduced after the drought of 1994.

Landmaster is somewhat later flowering than Holdfast, for example in Canberra in 1994, the mean November flowering date in second year plants of Landmaster was 25.3, Holdfast 21.6, Sirosa 22.5 and Australian 26.8. The vernalisation requirement for flowering in Landmaster is similar to that of

Holdfast, somewhat higher than in the other winter-active cultivars, but much less than in the semi-winter dormant cultivars, as is shown by the proportions of plants able to flower after transplantation in spring—Landmaster 92.5%, Holdfast 92.7%, Sirosa and Sirolan 100%, Australian 15%, and Uneta and Grasslands Maku 25%.

Concentrations of compounds thought to cause phalaris staggers (Bourke 1992), *N*,*N*-dimethyltryptamine, its 5-hydroxy and 5-methoxy derivatives, and corresponding beta-carbolines, are significantly higher in Landmaster than in Holdfast (Anon. 1995) and Sirolan, but appreciably lower than in Sirosa and Australian (R. N. Oram unpublished data). However, Landmaster has a lower concentration of *N*-methyltyramine than Holdfast (Anon. 1995); this compound appears to be responsible for at least some cases of sudden death (Anderton *et al*. 1994). Because the latter form of phalaris poisoning appears to have several different causes, it is not possible to predict the toxicity of Landmaster relative to previous cultivars: in districts with a history of phalaris sudden death, hungry sheep should not be put onto short, phalaris-dominant pastures, especially during the autumn and early winter danger periods. In areas where phalaris poisoning is very common, cobalt ruminal pellets and/or pasture sprays should be used when grazing any cultivar, even Sirolan, Holdfast and Landmaster, which usually have relatively low concentrations of the causal agents of phalaris staggers.

It is expected that the area of adaptation of Landmaster phalaris will be undulating and hilly land with moderately infertile, acid and shallow soils in the tablelands of southern New South Wales, on the inland slopes of the Great Dividing Range in Victoria and in comparable environments in the other southern states.

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