Register of Australian Herbage Plant Cultivars

A. Grasses
23. Digitaria
(b) *Digitaria milanjiana* (Rendle) Stapf. (finger grass) cv. Jarra

Reg. No. A-23b-1

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Origin

Jarra (*Digitaria milanjiana* CPI 59745) was collected by Mr R. W. Strickland of CSIRO (No. RWS 465) on 12 February 1972 in Malawi, 46 km west of Blantyre on the Chikwawa Road (latitude 16ºS, altitude 61 m, rainfall 700 mm) on a freely drained loam soil (pH 7.5) with a 10–20 cm surface horizon (Anon. 1973), in a run-on grassland area of *Urochloa, Brachiaria, Rhynchosia, Tephrosia,* and *Alysicarpus* species (R. W. Strickland unpublished data).

Digitaria milanjiana (woolly finger or milanje finger grass in Africa) is a variable, tropical perennial species (Hacker 1983), with rhizomatous and stoloniferous or densely tufted ecotypes (Chippindale 1955). It is distributed in tropical eastern Africa from Kenya to South Africa and in Angola, at altitudes of 0–2070 m. The climatic range is from semi-arid tropics (450 mm rainfall) to wet equatorial (1700 mm). It commonly grows in grasslands in moderate rainfall areas on sandy loam. It also occurs naturally in open woodlands on black heavy soils, as well as on sandy soils, and can be a weed in cultivations. It is readily accepted by cattle (Ibrahim and Kabuye 1987). In trials, *D. milanjiana* has had some success in pure stands (Roberts 1970) and in legume mixtures with *Trifolium repens* and *Lotononis bainesii* (Clatworthy 1970).

Stolons of CPI 59745 were transplanted from CSIRO Lansdown Research Station to the QDPI nursery at Walkamin Research Station in 1982. Stolon material from this nursery was planted in a grass adaptation experiment in a Verano and Seca stylo pasture at Springs Road near Mareeba in 1983. CPI 59745 persisted over 5 years and spread under continuous grazing for the last 3 years.

Seed production of the *Digitaria* collection was assessed in swards at Walkamin, and grasses in the Walkamin nursery were tested for resistance to the burrowing nematode [*Radopholus similis* (Cobb) Thorne], a serious economic pest of bananas (Broadley 1977). As *D. milanjiana* was found resistant to the nematode (W. O'Donnell unpublished data), the 10 most successful accessions from the grazed adaptation and seed production experiments were evaluated at South Johnstone Research Station for growth rate, stolon development, spreading ability, and capacity to compete with weeds (mainly *Mimosa pudica*, sensitive weed) in a banana plantation. CPI 59745 and 2 other stoloniferous lines were selected from this high rainfall site to be evaluated in commercial banana crop rotations at Jarra Creek near Tully, the Palmerston district near Innisfail, and near Mission Beach. CPI 59745 was the most strongly stoloniferous, vigorous, and competitive of the 3 accessions, and release by the Queensland Department of Primary Industries as cultivar Jarra was endorsed by the Queensland Herbage Plant Liaison Committee in August 1991. Planting material has been distributed from Walkamin, South Johnstone, and Jarra Creek.

Morphological description

Jarra is a stoloniferous perennial with long mauvish-coloured stolons 10–15 cm between culms. Basal cataphylls with woolly hairs. Flowering culms erect, tufted, 50–120 cm tall, unbranched, terminated by a solitary inflorescence, 2–4 noded. Nodes glabrous, forming a purple-coloured ring. Internodes spongy, glabrous, longer than associated leaf sheaths at culm base or shorter than these towards culm apex. Leaf sheaths keeled, pilose, with tubercle-based hairs, with finely scaberulous nerves. Ligule a membrane, 2–2.5 mm long, slightly erose, acute. Collar glabrous. Leaf blades flat, 50–200 by 3–8 mm, linear, pilose with tubercle-based hairs, tapering to a narrow apex, attenuate and ciliate at the base, with scabrous margins. Inflorescence of subdigitate racemes. Main axis 15–20 mm long, scabrous. Primary branches with pubescent axils, spreading, with spikelets appressed to the rachis and neatly arranged, 60–130 mm long, 1–2 mm wide, triquetrous and winged, scabrous on the margins. Pedicels 0.2–0.7 mm long, distinctly angled, scabrous. Pedicel apices glabrous, concave, truncate. Disarticulation at the base of the spikelet. Spikelets green to pale brown or purple, abaxial, densely overlapping, paired, with short and long pedicels, 120–180 on a typical primary branch, dorsiventrally compressed, attenuate at base, lanceolate, 2.6–3 by 1 mm. Lower glume 0.2–0.3 mm long, deltoid, nerveless, membranous, smooth, glabrous, acute. Upper glume 0.7–1.2 mm long, lanceolate, 3-nerved, membranous, glabrous or villous on nerves, acute. Lower floret neuter: lemma

2.8–3.2 by 1 mm, lanceolate, membranous, with the first internerve space wider than the second, 5-nerved, the nerves scabrous, with involute margins, glabrous or villous on nerves, smooth or very finely scabrous, acute; palea about 0.2 mm long, vestigial. Upper floret perfect, slightly shorter than the lower floret; lemma shiny, 2.3–2.4 mm long, green to brown, membranous, smooth, elliptic, shiny, glabrous, acute; palea membranous, smooth, enclosed at its apex by the lemma. Stamens 3 with anthers about 1.5 mm long and purple. Caryopsis about 2 mm long, pale brown, ellipsoid (B. K. Simon pers. comm.).

In Africa, *D. milanjiana* has been described by Henrard (1950), Chippindale (1955), Bogdan (1977), Clayton and Renvois (1982), and Ibrahim and Kabuye (1987). Synonyms for *D. milanjiana* include: *D. setivalva* (Stent), *D. boivinii* (Henr.), *D. endlichii* (Mez.), and *D. mombasana* (C. E. Hubbard). Introductions to Australia are highly variable, differing in lemma setigerousness, growth habit, and leaf and stem hairiness (Hacker 1983). *D. milanjiana* is distinguished from the *D. eriantha* group in having scabrid nerves on the lower lemma and in being largely tropical; *D. eriantha* is subtropical (Clayton and Renvois 1982).

Jarra can be distinguished from other *D. milanjiana* accessions (e.g. CPI 59755 and CPI 59749, and *D. eriantha* cv. Premier), by electrophoretic analysis of bulked seed lots (5 seeds) using the SDS-PAGE method (Vieritz 1990).

Agronomic characters

In a grazed stylo pasture at Mareeba, Jarra has been among the better adapted *D. milanjiana* accessions between 1983 and 1987 (T. J. Hall and R. W. Walker in press). Native grasses are not persistent in these sown legume pastures in the dry tropics of northern Australia, and grazing-tolerant grasses are required to withstand increased stocking pressure. Strongly stoloniferous species, such as Jarra, may be useful in this role.

Jarra has persisted and spread on a range of soil types from coarse granitic sandy loams, alluvial loams, and shallow solodics, to a euchrozem. Growth has been greatest on the more fertile soils and at higher rainfall. The species is reported to be intolerant of waterlogging. On a loam soil at Tully, spread and vigour of Jarra were poorest on the lower slope of a seasonally wet creek levee where sedges (*Cyperus* spp.) were prolific. Growth was rapid higher up the slope where soil internal drainage was good.

The banana-cropping system on the wet coast of North Queensland requires a species to rotate with bananas that will break the burrowing nematode (*R. similis*) cycle while maintaining weed control and erosion protection. *D. milanjiana* was found to satisfy these 3 criteria.

Within 3 months of planting stolons of Jarra at Tully on a cultivated soil with little weed competition, plants established and produced multi-branched stolons 2.6 m long, with new plants (mean height 31 cm) established at the first 10 nodes. The spacing of these new plants averaged 12 cm (commonly 7–17 cm). There were commonly 18–32 tillers per original plant, although some had >80. These tillers readily developed into rooted stolons as they elongated on bare soil. There was 100% soil cover within 6 months, and within 12 months, Jarra yielded 10.4 t DM/ha, with 68% green material. This green leaf contained (%) 2.11 N, 0.28 P, 0.16 S, and 0.84 Ca in June. In the second year, dry matter yield was 15.9 t DM/ha. There were scattered *Cassia obtusifolia* (sickle pod) bushes growing above the 1-m-tall grass, but no herbaceous weeds grew under the dense canopy. There were no *R. similis* present.

Seed production of *D. milanjiana* is not well recorded. However, germination improves with >5 months of storage. The removal of the palea and lemma improves germination, and dehulled seeds can germinate soon after harvest. Gibberellin stimulates germination of dehulled, but not intact, seeds (Baskin *et al*. 1969). Poor seed production of the stoloniferous accessions has been a limitation to more widespread testing. Jarra produced commercially acceptable yields (to 100 kg/ha from 1 crop) of good quality seed by header harvesting near Tully. A pure seed sample contains about 2×10^6 seeds/kg. It is not yet known if Jarra propagated by seed would remain true to type. *D. milanjiana* is a diploid (2n = 18).

Vegetative establishment after removing bananas is easily done and provides rapid soil cover. A successful method is ploughing out the banana plants; discing to destroy the butts; planting Jarra stolons in a strip between the old banana rows either by hand or by dropping them in front of a light disc cultivator; discing the grass interrow strip once or twice, to destroy weeds and old banana butts, which reduces source material for the burrowing nematode while the grass is establishing and runners are developing; and spraying for broadleaf weed control if necessary during the grass establishment phase. A complete cover can be produced in 3 months with a summer planting. A grass rotation lasting 2 years with no weed hosts will break the burrowing nematode cycle. The alternative chemical controls (e.g. EDB fumigation) are expensive at $A1600/ha.year. Without nematode control, yield losses occur in ratoon crops due to plants falling over and reduced bunch size (Broadley 1977). Alternative pasture species such as signal grass (*Brachiaria decumbens*) and Guinea grass (*Panicum maximum*) are hosts to the burrowing nematode. Herbicides (glyphosate and Gramoxone) or discing twice can be used to kill Jarra to prepare for planting the following banana crop.

Jarra is the first Australian cultivar of the species and is proposed for use as a pasture ley in banana-cropping areas of Queensland and as a pasture plant in favourable environments of the seasonally dry tropics and wet coastal tropics.

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References

Anon. (1973). Plant Introduction Review 9: 70A. CSIRO Division of Plant Industry, Canberra.

Baskin, J. M., Schank, S. C., and West, S. H. (1969). Seed dormancy in two species of *Digitaria* from Africa. *Crop Science* **9**, 584–6.

Bodgan, A. V. (1977). 'Tropical Pasture and Fodder Plants (Grasses and Legumes).' Tropical Agriculture Series. (Longman: London.)

Broadley, R. A. (1977). Nematode control in bananas and tobacco grown in north Queensland. Ph.D. Thesis. University of London.

Chippindale, L. K. A. (1955). A guide to the identification of grasses in South Africa. *In* 'The Grasses and Pastures of South Africa.' (Ed. D. Meredith.) (Central News Agency: Parov, Cape Province, South Africa.)

Clatworthy, J. N. (1970). A comparison of legume and fertilizer nitrogen in Rhodesia. *In* 'Proceedings of XI International Grassland Congress'. (Ed. M. J. T. Norman.) pp. 408–11. (Queensland University Press: St Lucia, Qld.)

Clayton, W. D., and Renvois, S. A. (1982). 'Flora of Tropical East Africa. Part 3. Gramineae.' (Crown Agents Overseas Governments Administration: London.)

Hacker, J. B. (1983). Inheritance of stolon development, rhizome development and setigerous lemmas in the *Digitaria milanjiana* complex, and its taxonomic significance. *Australian Journal of Botany* **31**, 357–69.

Henrard, J. T. (1950). 'Monograph of the Genus *Digitaria*.' pp. 456–61, 962. (University pers Leiden: Leiden.)

Ibrahim, K. M., and Kabuye, C. H. S. (1987). 'An Illustrated Manual of Kenya Grasses.' pp. 127, 413. (FAO, United Nations: Rome.)

Roberts, O. T. (1970). A review of pasture species in Fiji. I. Grasses. *Tropical Grasslands* **4**, 129–37.

Vieritz, A. M. (1990). Electrophoretic analysis of *Digitaria milanjiana* and *D. smutsii* by SDS-PAGE. Queensland Department of Primary Industries, Brisbane. Seed Research Project Report 9.14.