Coolati or tambookie grass (*Hyparrhenia hirta* (L.) Stapf) – an introduced pasture grass with environmental weed potential

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Summary Coolati grass (*Hyparrhenia hirta* (L.) Stapf) is an introduced, usually perennial, pasture grass that has naturalised and appears to be spreading in the south-west of Western Australia. This paper reviews the literature on its biology and control and documents the status of this plant in Western Australia.
Keywords Biology, coolati grass, control, herbicide, history, *Hyparrhenia hirta*, tambookie grass, weed.

INTRODUCTION

Coolati grass is a pasture grass that was introduced into Western Australia in the 1940s. It has not been successful as a pasture species, but has naturalised in many places. Over the past decade the number of requests for identification indicates that is starting to spread and it may be worth exercising some control or surveillance while infestations are still localised and relatively easy to contain.

This paper summarises the biology and history of coolati grass with the aim of increasing public awareness of this plant and its potential to become an environmental weed.

MATERIALS AND METHODS

Commonwealth Agricultural Bureau abstracts from 1987 to 2000 were searched for references to *Hyparrhenia hirta.* People involved in the early cultivation and trials on the plant and with an interest in incursions were interviewed and anecdotal evidence collected. Files and databases from the Department of Agriculture and CALM were scanned for references to the plant and its history. This information was then collated into a format similar to The Biology of Australian Weeds (Groves *et al.* 1995).

RESULTS AND DISCUSSION

Name *Hyparrhenia hirta* (L.) Stapf. The Latin name *Hyparrhenia* is derived from the Greek *hypo* meaning below and *arrhenos* meaning male and refers to the lower male floret of the fertile spikelet. *Hirta* means hairy and again refers to the hairy florets. Coolati grass is the preferred common name (Lazarides *et al.* 1997), but it is popularly known as tambookie grass in Western Australia (Paczkowska and Chapman 2000).

Description It is a densely tufted, annual, or more usually perennial, grass, 0.3–1.5 m tall with awned, hairy, grey green spikelets carried in many pairs of racemes, in an open panicle. Each raceme has a leaf-like bract at the base.

History It was one of the many potential pasture grasses introduced to Western Australia by CSIRO and the Western Australian Department of Agriculture between 1943 and 1970 (Rogers *et al.* 1979). Some of the species introduced in this well-intentioned but, in hindsight, misguided venture are now recognised as serious weeds. Indeed, Chilean needlegrass (*Nassella neesiana* (Trin. & Rupr.) Barkworth) is now a Weed Of National Significance (WONS). Fortunately this species does not appear to have naturalised in WA.

Coolati grass was in cultivation at the University of Western Australia trial plots in Crawley in 1948 (James Carpenter, pers. comm.). It was also planted in trials at the CSIRO Plant Introduction Station at Kelmscott, and at Kojonup and Muresk (Rogers *et al.* 1979). The first record of naturalisation in WA was at Gosnells, a Perth suburb close to Kelmscott, in 1959 (Western Australian Herbarium 2002).

In the mid 1980s, coolati grass was enough of an oddity in the WA grainbelt and south-west that it was pointed out when observed on field trips. By 2001, however, coolati grass had spread significantly – to the south from Albany to Esperance, as far east as Merredin and as far north as Geraldton. It is also common in Kalamunda and other suburbs on the scarp immediately east of Perth. Some large infestations of coolati grass were also observed by the first author and Tim Low on the Old Coast Road between Perth and Mandurah and in the vicinity of Northam during National Weedbuster Week in October 2001.

Distribution Coolati grass is native to Africa, the Mediterranean and Pakistan. Infestations are mainly found along roadsides, stock routes and railway lines, from which it invades adjacent patches of remnant vegetation and grazing lands in Western Australia, southern Queensland and northern New South Wales (Lodge *et al.* 1994). In Western Australia it has been collected from the south-west in the Avon wheatbelt, Esperance plains, Geraldton sandplain, Jarrah forest, Swan coastal plain and Warren biogeographic regions

(Paczkowska and Chapman 2000). The Queensland Herbarium holds specimens from the Burke, Cook, Darling Downs, Leichhard, Maranoa and Moreton pastoral districts (Henderson 2002) and it appears to be increasing in the Mareeba district (Barbara Waterhouse pers. comm.).

In South Australia, it is common around northern Adelaide where it appears to be spread by council mowing (John Virtue pers. comm.). In Victoria, it has been collected from irrigated areas near Piangil (Swan Hill district), Kyabram, Numurkah and Springhurst but populations are increasing rapidly at each site (Walsh and Entwisle 1994).

Most recordings of large stands in Australia and overseas occur in the 175–600 mm annual rainfall belt (Rubin and Palmer 1996, Van Gils 1988).

It prefers *Acacia* wooded grasslands (Perkins *et al.* 1999), but will grow in a wide range of temperate habitats from full sun to semi-shade.

It grows on a wide range of soils from shallow sands to clays and floodplains (Smith *et al.* 1995) and has a preference for clay soils (Mentis 1999), dolerite hills, disturbed and shallow soils (Smit *et al.* 1992) in South Africa.

It is associated with buffel grass (*Cenchrus ciliaris* L.) (Rubin and Palmer 1996), topped lavender (*Lavandula stoechas* L.) (Kyriakakis and Papanastasis 1993) and African lovegrass (*Eragrostis curvula* (Shrad.) Nees) (Smit *et al.* 1993) overseas. These plants have also naturalised across large areas of WA (Moore and Moore 2002) indicating the potential for spread of coolati grass.

Growth and development Coolati grass is a C4, usually perennial plant, however under good nitrogen conditions and in a Mediterranean environment it is not expected to be more productive than the cool season C3 plants (Cresswell and Prophet 1985). In Saudi Arabia Bokhari *et al.* (1987) found that the strategies employed by coolati grass favoured survival rather than high productivity.

Reproduction It reproduces by seed and has a chromosome number of 2n = 60 (Spies and Du Plessis 1988).

Population dynamics It is an invasive species, and generally builds up with overgrazing. In South Africa it is used as an indicator of poor rangeland condition (Hurt *et al.* 1993).

Importance Many plants deliberately introduced to Australia as pasture or forage plants have since been documented as weeds. Well into the 1980s, any species that was seen as having pasture potential would have been allowed freely into Australia and used in field trials with little consideration given to its weed potential or invasiveness. However, since the introduction of the Permitted list system, all exotic plant imports must pass risk assessment before being imported.

The open fluffy panicles of coolati grass are likely to be highly flammable and we predict this species will become of increasing importance as a fire hazard and environmental weed in south-western Australia. Further studies into the distribution and ecology under local conditions are needed.

In South Africa it is a native pasture grass of moderate productivity in rangelands. Sheep and cattle made greater liveweight gains on coolati grass than the equally palatable couch (*Cynodon dactylon* (L.) Pers.) (O' Reagain 1996). Intake rates of 5 g dry matter min^{-1} for sheep and 25 g dry matter min^{-1} for cattle are quoted (O' Reagain and Goetsch 1996) and it has good rumen digestibility (O' Reagain *et al.* 1995). Young growth in spring is quite palatable, especially after burning. Older growth is less palatable and the palatability is inversely proportional to the tuft diameter (O' Reagain and Mentis 1989). Overall it is more palatable than African lovegrass (O' Reagain 1993).

Management and control Mowing and burning are not effective control techniques but may improve herbicidal control. Herbicides generally only provide 70-80% control. Glyphosate at 2.16 kg a.i. ha^{-1} applied in autumn or flupropanate at 4.4 kg a.i. ha^{-1} applied in autumn or spring provided the best control in trials conducted in NSW (Lodge *et al.* 1994). Burning or mowing then treating the regrowth improved the levels of control in some instances.

Nir and Arenstein (1987) found that imazapyr at 0.5-1.25 kg a.i. ha^{-1} provided control and it was tolerant to triazine herbicides and sulfometuron.

Burning in autumn followed by grazing in winter to spring is expected to keep it under control (Tukel and Hatipoglu 1989). Heavy grazing is likely to lead to greater infestations.

Application of nitrogen will probably increase cool season grasses and reduce the proportion but not the absolute level of coolati grass (Tukel and Hatipoglu 1990).

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