

Coreopsis lanceolata L. (Asteraceae): another environmental weed for Queensland and Australia

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Summary

Coreopsis lanceolata L. is native to the south-eastern United States. Currently it is naturalized in Queensland, New South Wales and Victoria. It is reported to be an environmental weed in and around Stanthorpe shire (New England Tableland). This attractive ornamental is spreading from roadsides to agricultural land and into natural and semi-natural habitats. Summary botanical information is provided for this potentially serious weed in temperate to sub-tropical regions of Australia.

Introduction

The North American genus *Coreopsis* L. contains about 45 species (Cosner and Crawford 1990, Kim *et al.* 1999). Two species of *Coreopsis* L. have been recorded as naturalized in Australia. *Coreopsis lanceolata* L. has naturalized in New South Wales, Victoria and Queensland, and *Coreopsis grandiflora* Hogg ex Sweet is reported spreading in Western Australia around the Perth region (Lazarides *et al.* 1997). According to Wells *et al.* (1986) *C. lanceolata* is a weed of agriculture and wasteland in South Africa. In North America it has escaped from cultivation and is established throughout most States including southern parts of Canada (Smith 1975, Cronquist 1980).

In Queensland *C. lanceolata* is used as an ornamental ground cover in low maintenance garden beds. The first known record of naturalization in Queensland is based on a specimen collected in 1944 by M.S. Clemens in grassland on the outskirts of Kingaroy. By the late 1970s it was reported as a weed of roadsides and waste areas occurring from Tin Can Bay south to the New South Wales border (Kleinschmidt and Johnson 1977, Queensland Herbarium records 2002). Humphries *et al.* (1991) and Csurhes and Edwards (1998) listed *C. lanceolata* as a potentially invasive plant of south-eastern Queensland and southern Australia. Three years later this species was listed by Randall (2001) as an environmental weed in New South Wales and Queensland.

In this report an environmental weed is defined as an invasive introduced plant species, which is capable of establishing self-sustaining populations in areas of

natural and semi-natural habitats. These species compete strongly with indigenous plant species and have the capacity to replace diverse vegetation with single species stands.

Description

Herbaceous perennial, clustered or clump forming, 20–70 cm tall, sparsely pubescent to hirsute forms. Stems foliose towards the base, elongate, passing into peduncles. Leaves opposite, 5–25 cm long and 1–2 cm wide; the lower leaves are larger, mostly simple and entire; blades spatulate to lanceolate with long petiole-like base; upper leaves smaller, becoming sessile with 1 to 2 small lateral lobes (Figure 1). Peduncles up to 30 cm long; heads mostly solitary, 4–6 cm diameter; outer bracts lanceolate, herbaceous about 1 cm long and ciliate near apex; inner bracts with membranous margins. Ray florets c. 8, bright yellow and toothed, disk florets numerous and



Figure 1. *Coreopsis lanceolata*.

A. Branchlet with flowers and fruit (from Jobson 5246 (BRI)).

B. Adaxial view of seed (from Batianoff and Collyer 210711 (BRI)). Del. W. Smith.

yellow. Achenes variable texture, black, compressed, 2–3 mm long, and 2-winged, pappus of 2 awns or teeth.

Ecology

This species spreads rapidly from seeds and by vegetative growth. American populations are capable of flowering in the second year after germination (Internet 2002). Banovetz and Scheiner (1994a) reported *C. lanceolata* seed was not dormant at maturity and did not require cold stratification for germination, rather cold temperatures caused secondary dormancy. Seed can survive for as long as 13 years in the soil seed bank (Banovetz and Scheiner 1994b). Dispersal vectors are water, wind, possibly animals/insects and anthropogenic activities (e.g. slashing roadsides, refuse dumping and cultivating).

In Australia, *C. lanceolata* occurs in a relatively wide range of climates from temperate to sub-tropical areas. In New South Wales, it is recorded as a vigorous weed capable of invading along tracks and stormwater drainage lines in bushland areas of the Sydney Region (Benson and McDougall 1994). In Victoria, it is recorded on disturbed ground near an alpine settlement (Jeanes 1999). In Queensland, in a relatively short time (about 60 years) the species has become abundant from Wallangarra to c. 40 km N of Stanthorpe along the New England Highway and c. 37 km WNW of Stanthorpe along the Inglewood Road covering about 1000 ha. It also naturalized in a few places in the Moreton (including Stradbroke Island, Pollock personal communication), Wide Bay and Darling Downs Pastoral Districts (Stanley and Ross 1986).

Coreopsis lanceolata invades roadsides, wasteland, creek banks (including alluvial lowlands), natural forest remnants and granitic hillsides. The plants form dense stands through vigorous vegetative rhizomatous growth. However, the species is not conspicuous except during its peak flowering period. Detrimental economic effects include decreasing pasture productivity following the replacement of grasses and reduced crop growth after agricultural land is invaded. *C. lanceolata* produces large amounts of viable seed and threatens biodiversity by building up large clumps and displacing native plants. It can cause allergic reactions in humans where density is high (Benson and McDougall 1994).

Recommendations

Currently, this species is not recognized as a weed of importance in Queensland. In Stanthorpe shire it appears that this exotic species has found an acceptance as being part of the local flora, probably due to the appeal of its attractive flowers. Apart from mechanical removal we are not aware of any other control measures. It is essential

to inform and educate people that *C. lanceolata* has the capability of being a significant environmental weed in temperate to sub-tropical Australia, particularly in the New England Tableland.

Acknowledgments

We thank Laurie Jessup, Ailsa Holland and Megan Thomas for providing constructive comments. Will Smith provided the illustrations. Judy Batianoff and Halina Winters assisted in library searches. Gordon Guymmer and John Neldner are acknowledged for their support and encouragement.

References

- Banovetz, S.J. and Scheiner, S.M. (1994a). Secondary seed dormancy in *Coreopsis lanceolata*. *The American Midland Naturalist* 131, 75-83.
- Banovetz, S.J. and Scheiner, S.M. (1994b). The effects of seed mass on the seed ecology of *Coreopsis lanceolata*. *The American Midland Naturalist* 131, 65-74.
- Benson, D. and McDougall, L. (1994). Ecology of Sydney plant species: part 2: Dicotyledon families Asteraceae to Buddlejaceae. *Cunninghamia* 3, 789-995.
- Cosner, M.B. and Crawford, D.J. (1990). Allozyme variation in *Coreopsis* sect. *Coreopsis* (Compositae). *Systematic Botany* 15, 256-65.
- Cronquist, A. (1980). 'Vascular flora of the southeastern United States', Volume I ASTERACEAE. (The University of North Carolina Press, Chapel Hill).
- Csurhes, S. and Edwards, R. (1998). Potential environmental weeds in Australia, candidate species for preventative control. Canberra: Environment Australia.
- Internet (2002). Easy living wildflowers. <http://www.easywildflowers.com/quality/cor.lanc.htm>
- Humphries, S.E., Groves, R.H. and Mitchell, D.S. (1991). Plant invasions of Australian ecosystems. A status review and management directions. *Kowari* 2, 1-127.
- Jeanes, J.A. (1999). *Coreopsis*. In 'Flora of Victoria', Volume 4, eds N.G. Walsh and T.J. Entwisle. (Inkata Press Melbourne).
- Lazarides, M., Cowley, K. and Hohnen, P. (1997). 'CSIRO handbook of Australian weeds'. (CSIRO Publishing, Collingwood, Victoria).
- Kim, S.C., Crawford, D.J., Tadesse, M., Berbee, M. Ganders, F.R., Pirseyedi, M. and Esselman, E.J. (1999). Its sequences and phylogenetic relationships in *Bidens* and *Coreopsis* (Asteraceae). *Systematic Botany* 24, 480-93.
- Kleinschmidt, H.E. and Johnson, R.W. (1977). 'Weeds of Queensland'. (Queensland Department of Primary Industries, Brisbane).
- Randall, R. (2001). Garden thugs, a national list of invasive and potentially

invasive garden plants. *Plant Protection Quarterly* 16, 138-71.

Smith, E.B. (1975). A biosystematic survey of *Coreopsis* in eastern United States and Canada. *Sida* 6, 123-215.

Stanley, T.D. and Ross, E.M. (1986). 'Flora of south-eastern Queensland'. Volume 2. (Department of Primary Industries, Brisbane).

Wells, M.J., Balsinhas, A.A., Joffe, H., Engelbrecht, V.M., Harding, G. and Stirton, C.H. (1986). A catalogue of problem plants in Southern Africa. *Memoirs of the Botanical Survey of South Africa* No. 53, Pretoria, South Africa.