

**A new attempt to introduce the lacy-winged seed fly  
*Mesoclanis magnipalpis* to Australia for biological control of boneseed  
*Chrysanthemoides monilifera* subsp. *monilifera***

Tom Morley

Department of Primary Industries, PO Box 48, Frankston, Victoria 3199, Australia

Corresponding author: Tom.Morley@dpi.vic.gov.au

**Summary** *Mesoclanis magnipalpis* Bezzi (lacy-winged seed fly) is a tephritid fly whose larvae live and pupate in the flowers and developing fruit of shrubs of the southern African genus *Chrysanthemoides* Tourn. ex Medik (Munro 1950, Edwards and Brown 1997). Under glasshouse conditions Adair and Bruzese (2000) estimated it to have a development time (egg to adult) of 47 (SD = 4.2, n = 2) days. *M. magnipalpis* is approved for use in Australia as a biological control agent for *Chrysanthemoides monilifera* (L.) T.Norl. *C. monilifera* comprises six subspecies (Norlindh 1943) of which subsp. *monilifera* (L.) T.Norl. (boneseed) is serious weeds in Australia and subsp. *pisifera* (L.) T.Norl. is restricted to South Africa. *M. magnipalpis* utilises both of these as hosts (Edwards and Brown 1997). There is also evidence of a multitude of further undescribed infraspecific *Chrysanthemoides* entities (Barker *et al.* 2009, Griffioen 1995). One of the ways in which *Chrysanthemoides* infraspecific entities differ is in flowering phenology. The boneseed flowering/fruiting season extends from late winter through to early summer while that of *C. m.* subsp. *pisifera* extends from late autumn through to late winter.

From 1998 to 2005 four attempts (Robin Adair unpublished data, Morley 2005) were made to establish *M. magnipalpis* on boneseed in Australia. These attempts were made with *M. magnipalpis* collected from *C. m.* subsp. *pisifera* at De Hoop Nature Reserve and Arniston in South Africa. Those introductions failed. While *M. magnipalpis* from those introductions readily oviposited into boneseed capitula following release in Australia and boneseed sustained development from egg to adult, *M. magnipalpis* has not been recovered except in the boneseed flowering/fruiting season of release. The reason that those introductions were made with collections from *C. m.* subsp. *pisifera* instead of boneseed was that *M. magnipalpis* was much more abundant on subsp. *pisifera* and numbers peaked at a time of year (July and August) that enabled large numbers to be imported and released at the start of the boneseed flowering season. It was also thought that, because *M. magnipalpis* utilises boneseed and *C. m.* subsp. *pisifera* in South Africa, introductions

from subsp. *pisifera* would have a reasonable chance of establishing on boneseed in Australia.

A possible explanation for failure of those introductions is that they represented a biotype of *M. magnipalpis* whose life cycle was not synchronised with boneseed flowering and that this resulted in extinction between successive boneseed flowering/fruiting seasons (Morley and Morin 2008). It may be that different biotypes of *M. magnipalpis* exist that utilise different *Chrysanthemoides* hosts exclusively and are incapable of sustaining a population on an alternate host. Another possibility for the failures could be that the *M. magnipalpis* relies on multiple *Chrysanthemoides* entities whose flowering phenologies are distributed over the seasons in such a way that the species can survive by utilising the different *Chrysanthemoides* entities successively.

To address the possibility that previous *M. magnipalpis* introductions failed because of biotypism as speculated above, boneseed fruit harbouring fly larvae and pupae were collected from around Stellenbosch in South Africa in spring 2009. This material was incubated in quarantine in Australia and 62 of the emergent *M. magnipalpis* flies were released (mostly in late October 2009) in accordance with a direct release protocol (approved by the Australian Quarantine and Inspection Service) onto 100 flowering potted boneseed plants in a fly-proof field cage at Frankston, Victoria. In November 2009 one *M. magnipalpis* maggot was recovered from the cage, indicating the presence of offspring of the imported flies. In January 2010 emergence of five cage-reared *M. magnipalpis* adults was observed. No signs of *M. magnipalpis* were observed from February to June 2010.

Whether this introduction attempt is likely to succeed will be assessed further by monitoring the emergence and oviposition of the caged *M. magnipalpis* through winter 2010. The emergence of adults in January 2010 possibly indicates that pupal aestivation, a behaviour that could sustain *M. magnipalpis* between boneseed flowering seasons, does not occur in this species. However, whether the five flies that emerged in January 2010 represented the only

emergence of *M. magnipalpis* that will occur in the cage or whether they will survive and become active or more will emerge during winter was unknown at the time writing (June 2010).

**Keywords** *Mesoclanis*, *Chrysanthemoides*.

#### ACKNOWLEDGMENTS

Thanks to Keith Appollis, Abraham Adonis and Tony Gordon for assistance to collect and consign boneseed fruit from South Africa in 2009 and to CapeNature for permission to collect and export this material. This work was financed by the Australian and Victorian Governments.

#### REFERENCES

- Adair, R.J. and Bruzese, A. (2000). Evaluation and host specificity of two seed flies *Mesoclanis polana* and *M. magnipalpis* (Diptera: Tephritidae) biological control agents for *Chrysanthemoides monilifera* (Asteraceae) in Australia. *Bulletin of Entomological Research* 90, 467-74.
- Barker, N.P., Howis, S., Nordenstam, B., Kallersjo, M., Eldenas, P., Griffioen, C. *et al.* (2009). Nuclear and chloroplast DNA-based phylogenies of *Chrysanthemoides* Tourn. ex Medik. (Calenduleae: Asteraceae) reveal extensive incongruence and generic paraphyly, but support the recognition of infraspecific taxa in *C. monilifera*. *South African Journal of Botany* 75, 560-72.
- Edwards, P.B. and Brown, E.M. (1997). *Mesoclanis* seed flies (Diptera: Tephritidae) on *Chrysanthemoides* (Asteraceae) in South Africa: distribution, attack strategy and impact on seed production. *Bulletin of Entomological Research* 87, 127-35.
- Griffioen, R.C. (1995). A taxonomic study of *Chrysanthemoides* Tourn. ex Medik. Compositae. University of Cape Town.
- Morley, T. (2005). Lacy-winged seed fly releases for biological control of boneseed and bitou bush. *Under Control – Pest Plant and Animal News* 31, 19-20.
- Morley, T.B. and Morin, L. (2008). Progress on boneseed (*Chrysanthemoides monilifera* subsp. *monilifera* (L.) Norlindh) biological control: the boneseed leaf buckle mite *Aceria* (Keifer) sp., the lacy-winged seed fly *Mesoclanis magnipalpis* Bezzi and the boneseed rust *Endophyllum osteospermi* (Doige) A.R.Wood. *Plant Protection Quarterly* 23, 29-31.
- Munro, H.K. (1950). Trypetid flies (Diptera) associated with the Calendulae, plants of the family Compositae in South Africa. I. A bio-taxonomic study of the genus *Mesoclanis*. *Journal of the Entomological Society of Southern Africa* 13, 37-52.
- Norlindh, T. (1943). Studies in the Calendulaeae. 1. Monograph of the genera *Dimorphotheca*, *Castalis*, *Osteospermum*, *Gibbaria* and *Chrysanthemoides*, pp. 367-423. (C.W.K. Gleerup, Lund).