

***CALYCOMYZA EUPATORIVORA*, A NEW AGENT FOR BIOLOGICAL CONTROL OF *CHROMOLAENA ODORATA* IN SOUTH AFRICA**

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Chromolaena odorata (L.) RM King & H Robinson is a large scrambling shrub originating from the Americas that was first recorded as naturalised in the KwaZulu-Natal province of South Africa in the late 1940s. Since then it has invaded most of the tropical and subtropical parts of southern Africa and continues to spread at a rapid rate. Its high growth rate and reproductive potential allows it to compete successfully with native vegetation, threaten biodiversity conservation and impact on agriculture and forestry (Goodall and Erasmus, 1996). *C. odorata* is invasive also in many other humid tropical and subtropical parts of the Old World, and is considered to be one of the world's worst alien invasive weeds (Holm *et al.*, 1977).

Biological control is essential to the success of an integrated control strategy for *C. odorata*. A culture of the small leaf-mining fly, *Calycomyza eupatorivora* Spencer (Diptera: Agromyzidae), was imported from Jamaica in 1997 (Zachariades *et al.*, 2002). The larvae of this fly form damaging blotch mines on the upper surfaces of the leaves of *C. odorata*.

Females insert their eggs into the under-surface of the leaf, usually between the central and lateral veins, in the region of the palisade parenchyma. Two days later the eggs hatch, and transparent to whitish larvae emerge and feed on the mesophyll tissues of the leaf. Larval feeding damage begins as a short linear mine, and increases to a large blotch mine as feeding progresses. By the time the larvae reach the dark yellow-coloured final instar, they will have mined approximately 50-100% of the leaf surface, depending on the size of the leaf. It takes about two weeks for the larvae to reach final instar. At this stage, they exit the leaf to pupate on the ground. The adults that emerge about two weeks later have a short lifespan of approximately two weeks. Mating occurs within two days of emergence. *C. eupatorivora* has the potential to increase the size of its population quite rapidly, due to its short generation time and high fecundity.

Host-specificity tests were set up, initially using about 30 test plant species in multi-choice trials. Multi-choice tests involved the use of pots containing the target weed, *C. odorata*, interspersed with several closely related species, within a single large cage. These tests were set up to obtain an indication of the leaf-miner's behavioural responses to other plant species, in terms of feeding and oviposition, in the presence of the target weed, i.e. a measure of the 'behavioural host range'.

To measure the 'physiological host range' of *C. eupatorivora*, no-choice tests were set up using a selection of eight test plants from the initial set of 30. These tests gave an indication of the plant species that *C. eupatorivora* is physically capable of feeding and ovipositing on.

Results from these tests indicated that larval development is confined to *C. odorata* and no other species. The tests were complemented by a literature search to confirm that the species had not been recorded as a pest on any crop species in the Americas. Laboratory-based damage trials showing the effect of leaf-mines on decreasing the growth and reproductive rates of *C. odorata* will be conducted, although data from the host-specificity tests are sufficient to prove that *C. eupatorivora* is suitable for release as a biological control agent because of its complete host-specificity.

Historically, the National Department of Agriculture (NDA) was the government department responsible for granting permission to release weed biocontrol agents into the field in South Africa, reaching its decisions via a panel of experts. The NDA has already approved the release of *C. eupatorivora*. Over the past five years, however, the Department of Environmental Affairs and Tourism (DEAT) has also become a player, and their lack of experience in biocontrol has led to substantial bureaucratic delays in granting permission to release agents. In the case of *C. eupatorivora*, despite the release report being completed in May 2001, permission for its release was obtained from the DEAT only in April 2003. Such delays are undesirable, given the urgent need for biological control of *C. odorata*.

Field trials to measure the effects of larval parasitism by native Hymenoptera, and of predation on the population growth of *C. eupatorivora*, can only be conducted after it has been released into the field in South Africa. The fly's range may also be limited by low rainfall and humidity.

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