Seed feeders: why do so few work and can we improve our selection decisions?

R.D. van Klinken, R. Colasanti and G. Maywald
CSIRO Entomology, 120 Meiers Road, Indooroopilly, Brisbane, QLD 4068, Australia

Seed feeders have a mixed record in weed biological control. They are typically easy to test, rear, release and establish and can be particularly useful when targeting beneficial plants. However, seed predation rates are often relatively low. Also, evaluating the impacts of seed predation on the population dynamics of the plant, particularly on rates of spread, is difficult. In this paper, we present the results from the field assessment and modelling of a seed-feeding bruchid (Penthobruchus germaini) on the woody legume Parkinsonia aculeata. The seed feeder is typically abundant, and both the target and the seed feeder occur across diverse climate zone (from the wet–dry tropics to the arid interior) and habitats (including upland and wetlands). In particular, we (1) determine seed predation rates and identify factors that were limiting seed predation rates and impacts through national field surveys and (2) estimate the effect of seed predation on rates of population increase (using DYMEX, a simulation population model) and rates of spread (using a cellular automata model). The modelling work and field evaluations both highlighted general factors that may limit the impact of seed feeders on plant populations. We discuss whether agent selection decisions involving seed-feeding insects can be improved to identify potential agents that will have the greatest impact and avoid releasing ineffective agents.