

Successes We Might Never Have Had: A Retrospective Comparison of Predicted Versus Realized Host Range of Established Weed Biological Control Agents in North America

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Abstract

The aim of host range testing for biological control agents prior to their release is to assess the risk of non-target effects. The most robust tests are conducted under no-choice conditions and describe the fundamental host range of a species, which is generally broader than the realized host range assessed following the release of the agent. Therefore, it may overestimate the risk of non-target attack. Retrospective analyses of predicted versus realized host range of successfully established agents can provide insights into 1) the accuracy of pre-release predictions and 2) which test designs best predict an agent's realized host range. This in turn may not only improve pre-release testing procedures and further increase safety but should also be acknowledged in current regulatory policies for the evaluation of classical biological control agent releases. We review examples of several successful biological control agents in North America and compare results of pre-release studies (predicted host range) with post-release results (realized host range) as far as data exists. We conclude that predictions on potential non-target effects were generally accurate to conservative. In most instances non-target attack was transitory, and either ceased with distance from mass outbreak areas of the agent or after successful control of the target. Under the current more stringent regulations with regard to weed biological control, many of the successful agents we reviewed would most likely not be released in the USA. Often, systematic post-release monitoring on potential non-target impacts or even target impacts has not been conducted. These data are limited because their collection is not necessarily mandated in regulatory policies or it may be mandated but without resource allocation. Systematic post-release monitoring of target and potential non-target impacts is, however, critical for balanced data-driven benefit-risk decisions regarding biological control implementation.