F1 sterility: a novel approach for risk assessment of biocontrol agents in open-field trials

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Because of the growing concern of the potential risk of non-target effects, more stringent host-specificity testing is required to import and release exotic biological control agents. Appropriate host-specificity testing beyond quarantine conditions could reduce the risks of releasing biological control agents that cause negative ecological effects, and also reduce the risk that a valuable and safe biological control agent would not be approved for release. The use of reproductively inactivated insects could allow in-field host-specificity and geographical-range testing to assess the safety of exotic lepidopterans being considered as biological control agents against invasive weeds. The outstanding control of invasive cacti by Cactoblastis cactorum (Berg) (Lepidoptera: Pyralidae), is a classic example of successful biological control. However, C. cactorum became an invasive pest after its recent unintentional arrival in Florida, and currently a major effort is being developed to mitigate its negative impact. Nevertheless, the presence of C. cactorum in the United States and its status as both a beneficial insect and pest species provided us a unique model system to conduct proof-of-concept studies on the use of inherited (F1) sterility as a new risk management tool for assessing the safety of exotic lepidopterans being considered as biological control agents for invasive weeds.

Impact of biocontrol agents on native biodiversity: the case of Mesoclanis polana

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The safety of biocontrol is a contentious issue, with particular concerns about the interactions between biocontrol agents and ‘non-target’ species. Such interactions can occur either directly, if an agent attacks a non-target host, or indirectly, when the agent affects non-target species via shared natural enemies. While there are some data on direct effects, there are very little data on indirect effects. In this talk we ask how a native food web is affected by a recently introduced biocontrol agent, Mesoclanis polana (Diptera: Tephritidae). While this agent will not directly affect native species (it feeds only on the target weed), it can potentially affect food-web structure indirectly via native parasitoids shared with native herbivores. Nearly 9000 seed predators were reared at the 18 field sites; 17 parasitoid species were reared from herbivores in Chrysantomoides monilifera seeds, with Mesoclanis polana the most probable host. Using a food-web approach, we ask: How does M. polana influence the native plant–herbivore–parasitoid community?