

## Parasitoid family planning: How can we help?

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Initiatives to increase biological control efficacy by sowing flowering plants for use by parasitoid wasps are based on the assumption that parasitoid reproduction is limited by floral resources such as nectar and pollen. Depending on the parasitoid and plant species involved, feeding on a floral resource has potential to extend the parasitoid female's lifespan, and sometimes also to increase the lifetime complement of eggs she has available for oviposition. The first of these potential benefits can only arise if, without the floral resource, the female will reach the end of her lifespan before she lays all of her eggs (time limitation), and the second can only arise if she is destined to run out of eggs before she reaches the end of her lifespan (egg limitation). The question of whether parasitoid females should be expected to be predominantly time limited, or predominantly egg limited, has long been debated because models both of parasitoid reproductive behaviour and of parasitoid-host population dynamics can produce widely differing predictions depending on which of these two potential limitations is assumed to be most important. From a biological control perspective, it is interesting that field studies of parasitoid ecology have generally been of limited assistance in resolving the debate. This apparently weak connection between field studies and modeling to advance ecological theory is noteworthy, partly because the scarcity of empirically derived insights about the reproductive constraints experienced by parasitoids suggests a requirement for ongoing careful scrutiny of the assumption that floral resource availability is a critical limitation. Our presentation outlines some reasons why it has proved difficult to obtain clear insights about the relative importance of egg and time limitation from empirical studies, then evaluates several seasons of field data on oviposition by *Microctonus hyperodae* (Hymenoptera: Braconidae), a biological control agent of a pest of pasture grasses, *Listronotus bonariensis* (Coleoptera: Curculionidae). It discusses the data both in the context of recent theoretical advances in understanding constraints to parasitoid reproduction, and with a view to increasing biological control efficacy.

