Persistence of a moth – yucca mutualism at the northern edge of range.

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The "Threatened" Soapweed (Yucca glauca) and its "Endangered" pollinator, the yucca moth (Tegeticula yuccasella), exist in two small populations at the northern periphery of their ranges in southeastern Alberta. These two species engage in a mutualistic relationship and can not survive without each other over the long-term. Moth larvae only feed on yucca seeds and yuccas can only produce seed if flowers are pollinated by yucca moths. Such a relationship is risky at ecological and marginal range edges because neither moth emergence, nor flowering can be ensured in any particular flowering/emergence season. We examined elements of population dynamics, phenology and plant breeding system in Alberta and northern Montana to determine how both species and the interaction persist in the face of unpredictability and low partner densities. Results suggest that moths and yuccas have evolved unique strategies to survive at the periphery of their ranges. Yuccas in Alberta and Montana have a higher potential for population growth relative to other populations because 1) they have higher production of viable seeds due to lower densities of seed-eating yucca moth larvae in fruit and 2) they experience higher levels of asexual reproduction which serves to stabilize populations in times of failed reproduction. 3) Northern yuccas exhibit longer flowering and moth emergence periods which appears to enhance the probability of reproduction. 4) Finally, unlike most other populations of yuccas, northern populations are tolerant of self-fertilization by moths and will equally retain selfed and crossed flowers. This study demonstrates that peripheral populations are not necessarily doomed for extinction and that they are often well adapted to their seemingly unfavorable conditions. Further, this project is unique because studies investigating the preservation of species interactions are uncommon, as biologists tend to focus on single species.