Post-pollination barriers contribute to coexistence of partially pollinator-sharing Arisaema species (Araceae)

Luo Zeng[1], Wei-Jie Shu[1], Hua He[1], Tao Li[1], Xiao-Chen Yang[1], and Li Li[1]

[1]Jishou University

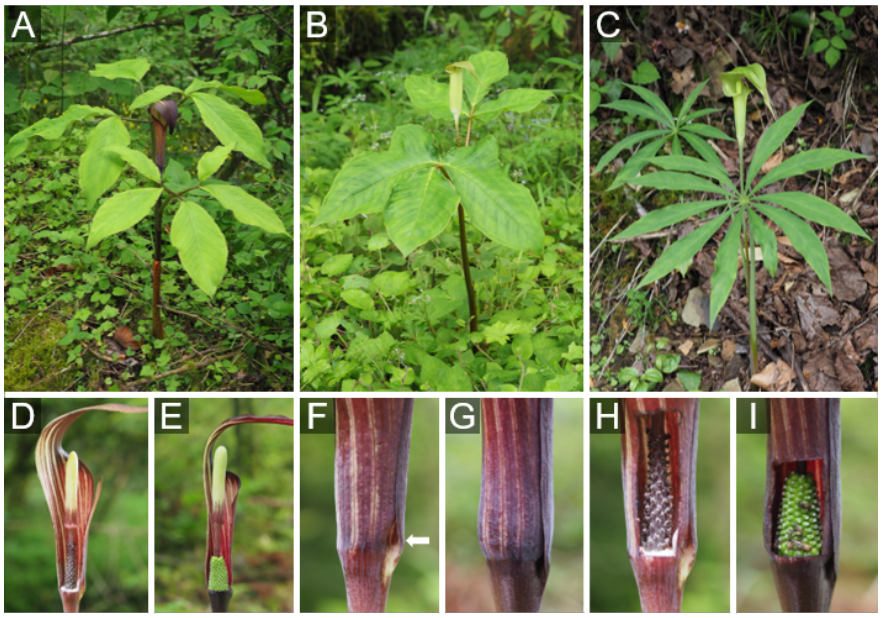
March 20, 2023

Abstract

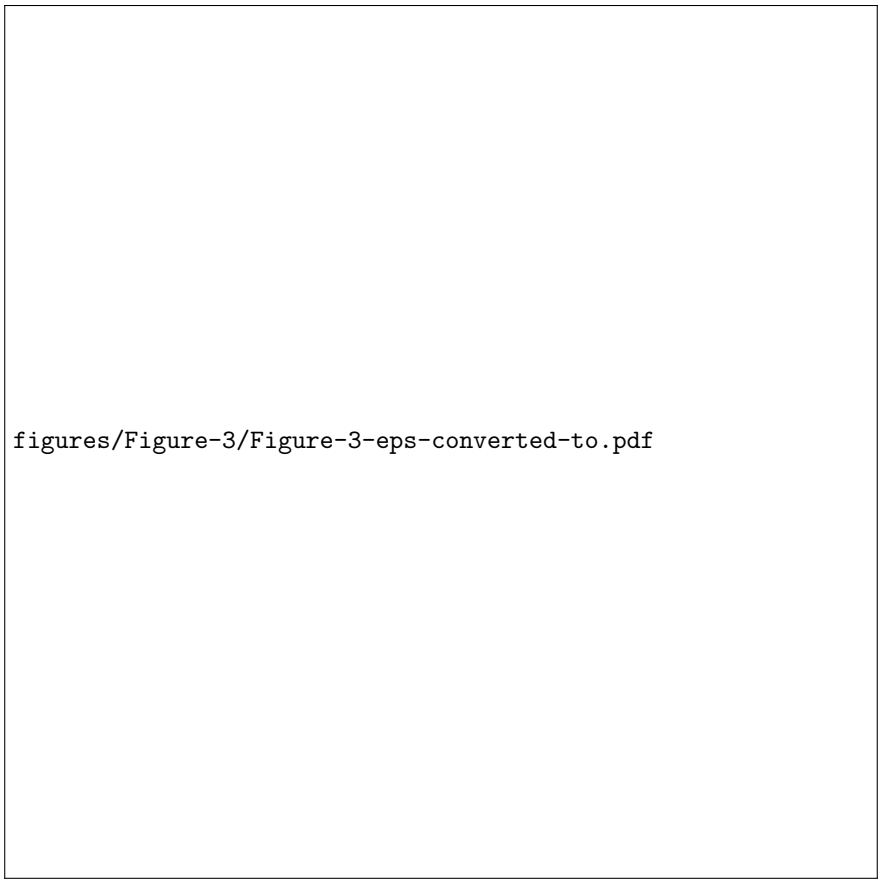
Reproductive isolation plays an important role in maintaining the species integrity of sympatric close relatives. For sympatric Arisaema species, interspecific gene flow is expected to be effectively prevented by pre-pollination barriers, particularly strong pollinator isolation mediated by fungus gnats. However, due to the lack of quantitative studies combining multiple pre- and post-pollination barriers, it is not known whether pre-pollination isolation is complete, and whether post-pollination barriers also contribute to reproductive isolation among some Arisaema species. We studied five pre- and post-pollination barriers (geographic isolation, phenological isolation, pollinator isolation, hybrid fruit production, and hybrid seed formation) among three sympatric Arisaema species (A. bockii, A. lobatum, and A. erubescens). The strength of individual barriers and their contribution to total isolation were quantified.The habitat elevations of the three Arisaema species mostly overlapped. Although phenological isolation and pollinator isolation reduced the frequencies of interspecific pollen transfer among these species, the partial overlap of flowering times and pollinator assemblages resulted in pre-pollination isolation that does not adequately prevent interspecific hybridization. Post-pollination barriers also contributed to reproductive isolation at the hybrid fruit and seed formation stages.We propose that, although pre-pollination barriers are expected to contribute more to total isolation than post-pollination barriers in Arisaema, pre-pollination barriers may not completely prevent interspecific pollen transfer among some Arisaema species. Post-pollination barriers, which are generally ignored, may also have contributed significantly to reproductive isolation in Arisaema.

Hosted file

Post-pollination barriers contribute to coexistence of partially pollinator-sharing Arisaema species (A
available at https://authorea.com/users/597631/articles/630570-post-pollination-barriers-contribute-to-coexistence-of-partially-pollinator-sharing-arisaema-species-araceae



figures/Figure-2/Figure-2-eps-converted-to.pdf



figures/Figure-4/Figure-4-eps-converted-to.pdf