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## An Assessment of the Effect of Human-Caused Disturbance on Pollination Services in a Highlands Landscape of Guatemala, Using *Brassica rapa* L. as Model

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### Abstract

Habitat fragmentation is known to cause isolation of natural populations and promote the propagation of invasive species, with drastic effects on biodiversity. Animal-mediated pollination is necessary for sexual reproduction of many wild and cultivated plants. Several studies have reported the negative effects of fragmentation on natural pollinator communities, and consequently on the fruit set of many plant species; also an increase of productivity in crops that are surrounded by forests that provides them with natural pollinators. Given the high estimations of the value of pollination services, the assessment of the effect of fragmentation in agriculture lands is imperative. In this study, we hypothesised that pollination is significantly reduced in highly disturbed areas Guatemalan highlands. We used an experimental treatment-treatment approach (“human-modified” and “forest protection” treatments), using *Brassica rapa* L. as the model species. We installed 22 experimental plots in agricultural areas that were classified within 6 sites, three for each treatment: three sites with forest protection areas and three sites that are predominantly used for agriculture and urbanized areas. Insect floral visits were recorded and fruit set was quantified for each plot. There was no significant difference among floral visits among treatments, but “predominantly natural” plots had 17% more visits from native bees, and double the fly visits compared to the “human-modified” treatment. Also, a significant effect of flower density on bee floral visits was found. Fruit set was significantly higher in the “predominantly natural” treatment. The results suggest an important role of natural pollinators in the availability of pollination services in Guatemalan highlands.

**Keywords:** *Brassica rapa*, Guatemala, habitat disturbance, highlands, pollination services