



University of Venda

The edge effects of mango farming on flower visitor insect communities and epigeal ant species in North-Eastern South Africa.

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ABSTRACT

The threat of a global pollination crisis to agricultural productivity has provided a motive for conservation within the context of ecosystem services while the use of predatory insects play a major role as biological control agents of insect pests. The link between biodiversity in natural vegetation and the provision of these ecosystem services was investigated in *Mangifera indica* (Mango) orchards using a network approach. Flower visitor sampling surveys were carried out for six months (June to October 2013 and January 2014) on three farms in plots (25 × 3 m) at varying distances (1 m, 10 m, 50 m, 100 m and 200 m) from the edge with natural vegetation, both into the mango orchard and into the natural vegetation. Epigeal ant communities were investigated using four pitfalls traps at each plot described above. Given that sampling was repeated at the three farms, for six months and in the same plots, generalized linear mixed models (GLMM) were used to assess the effect of distance, habitat and flower diversity on flower visitor and ant abundance and species richness. Flower visitor and epigeal ant species assemblage structure was analysed by the constrained redundancy analysis (RDA). Flower visitor networks were analysed to investigate plant pollinator interactions and how these interactions change with distance in the two habitats. There were more flowering plant species in the natural vegetation (NV) than in the mango orchard, however, there were significantly more flowers within mango orchards that included a combination of agricultural weeds and the mango flowers themselves. Abundance of wild flower resources on farms was positively correlated with mango flower visitation. Flying visitor species increased by 27% after the mango flowering season, but their abundance decreased by over 56%. Ant species richness, abundance and visitation rates increased after the mango flowering season. The abundance and species richness of flying flower visitors decreased with distance from the edge into the natural vegetation and the mango orchard. Flower visitor species composition in the orchard differed from that in the NV. Flower visitation networks in the mango orchards had higher linkage diversity in webs closer to the edge, suggesting that flower visitation tends to be higher in sites closer to the edge than those far from the edge. Epigeal ant abundance was highest in the edge habitat, decreasing into NV and the mango orchard. There were more ant species in the NV than in the mango orchard. The composition of ant assemblages differed significantly between NV and mango orchards. This study highlights how insect communities respond to edge habitats; flower visitation tends to be higher in sites closer to the edge than those far from the edge. Our results suggest that flower visitor diversity and network structure in the NV are more stable than flower