

Wild, Native Pollinators Forage in Forest Canopies: Evidence of Canopy Pollen Consumption in Digestive Tracts of Forest Bees

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The contiguous United States is home to over 4,000 species of native, wild bees in addition to the European honeybee (*Apis mellifera*). Although a natural area is often positively correlated with increased wild bee diversity, abundance, and species richness, forests have historically been ignored as potential bee habitat due to their dense canopy cover and dominance by wind-pollinated trees. Yet increased forest sampling has revealed higher than expected numbers of wild pollinators active in deciduous hardwood forests. Over 3 years, we deployed canopy and understory traps in second-growth woodlots and orchard-adjacent forest plots in the early spring. We found over one-fifth of New York's 417 wild bee species active in forest canopies and understories. Canopies were particularly dominated by solitary female bees whose primary activity is foraging pollen for nest provisioning. We describe the nest habits of canopy-active bees, including a focus on wood-nesting bees who may benefit from coarse woody debris in forest habitats. Finally, we dissected over 4,000 canopy- and understory-caught wild bee pollinators and identified the pollen in their digestive tracts. In addition to pollen from understory herbs, shrubs, and adjacent orchards, bee digestive tracts also held large amounts of maple (*Acer* spp.) pollen, as well as oak (*Quercus* spp.), hickory (*Carya* spp.), birch (*Betula* spp.), and ash (*Fraxinus* spp.). Pollen consumption tracked mast bloom (e.g., pollen availability) of different years, and we discuss the implications of wind-pollinated tree pollen consumption for wild bees. We explore avenues for considering ecological forest management for vibrant forest bee pollinator populations. We particularly suggest landscape scale maintenance of multiple successional stages and tree diversity across the landscape, vertical structure, and an emphasis on downed and standing deadwood as nest habitat.

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