



Twelfth International Symposium on Pollination (ISPXII)



16 - 20 October 2023

Kirstenbosch Botanic Gardens, Cape Town, South Africa

SOIL AND ATMOSPHERIC NUTRIENT ENRICHMENT ALTER HOW LARGER PLANT-POLLINATOR NETWORKS ORGANIZED ACROSS THE GLOBE

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ABSTRACT

Plant-pollinator networks have been shown to respond to environmental drivers and stressors, but a less studied factor but highly common is pollution. Atmospheric and soil nutrient enrichment are known to affect plant development, flowering phenology, and plant volatiles, which can affect animal behavior and potentially impact mutualistic interactions. We perform a meta-analysis of plant-pollinator networks across the world to assess whether Nitrogen, Nitrogen dioxide, Phosphorus or Ozone can predict the structure of plant-pollinator networks, by considering the relative abundance of plants and pollinators and controlling by the network size. We consistently found pollutant concentrations to affect network structure namely generality and vulnerability, especially in large size communities. Increments of Nitrogen, a limiting factor for plant growth, has resulted in highly generalized behavior of pollinators, but potentially associated to the loss of highly specific interactions, such as leguminous plants which are adapted to environments with low Nitrogen concentrations. On the other hand, ozone has reduced the community generality potentially through the reduction of plant attractiveness, remaining only those highly specialized interactions. Overall, we show that nutrient enrichment is highly pervasive negatively affecting native's communities, and potentially disrupting more specialized interactions through different mechanism. We call the attention on the use of fertilizer and ozone liberation into the atmosphere as more preserved environments may be experiencing alterations through environmental eutrophication due to human activities.