

Tūi pollination of flax: a microbial perspective

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Global pollinator decline has been touted as one of the worst biological tragedies in modern times – threatening pollination services and food production. Hidden components of the plant-pollinator interaction that could explain some of the discord in pollinator behaviour are the microbes that occupy floral nectar. Microbes can change nectar chemistry in ways that either promote or deter pollination, thereby shaping pollinator behaviour. Pollinators, already under duress from anthropogenic disturbances, may therefore negatively interact with plants containing undesirable microbes. However, we understand little about how these microbes exert their influence on pollinator behaviour, especially in anthropogenically disturbed environments.

Tūi (*Prothemadera novaeseelandiae*), an iconic New Zealand species, play a critical role in the cross pollination of flax (*Phormium tenax*). Flax produces copious amounts of nectar and is widespread throughout New Zealand. The tūi-flax partnership is an ideal system to question the importance of nectar microbes in exacerbating or mitigating the impact of environmental change on the plant-pollinator relationship. First, we identified the microbial signatures of tūi pollination to flax in urban and rural sites. We then compared diversity of these microbial signatures and found that bacterial species richness and variability were similar across samples from urban and rural settings. In contrast to this, we found that fungal species richness and variability were higher in urban compared to rural settings. We are continuing to analyse the data to determine if specific microbial taxa are primarily associated with tūi and flax in urban vs rural settings.

Overall, our data will ascertain whether the tūi-flax relationship has a characteristic microbiome and whether this microbiome is altered due to anthropogenic disturbances such as urbanisation. Together, these outcomes allow for deeper understanding of how nectar microbes and land-use type may jointly affect pollinator foraging behaviour.



Photos: Tūi (left) are a dominant pollinator of flax plants and bring microorganisms, such as bacteria and yeast, (right) to the nectar filled flowers. Image credits: John Hunt, Manaaki Whenua Landcare Research (tūi photo) and Manpreet Dhani, Manaaki Whenua Landcare research (nectar microorganism photo).