Diversity Matters: How Landscape Related Resource Diversity Boosts Bee Fitness

DIVERSITY MATTERS: HOW LANDSCAPE RELATED RESOURCE DIVERSITY BOOSTS BEE FITNESS

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Global declines of pollinators raise concerns about the stability of pollination services to wild and crop plants. Bees are highly important pollinators and strongly depend on (flowering) plants that provide their key resources (pollen, nectar, resin). How variations in landscape related resource diversity affect the foraging behaviour and colony fitness of bees is however largely unknown. We investigated long term resource effects on the colony development of the subtropical, perennial Australian stingless bee species *Tetragonula carbonaria* (Apidae: Meliponini). Colonies were experimentally placed in three landscape types with increasing levels of resource diversity: plantations, forests and gardens. Pollen, nectar and resin intake, the nutritional quality of pollen and honey storages as well as overall colony growth and reproduction were recorded and compared over a three years time period.

We found foraging patterns to be largely similar across landscapes. Resource amounts and availability as well as pollen diversity were highest in gardens but low in forests and plantations. Likewise, nutritional quality of honey was highest in gardens, whereas pollen quality was equally high in gardens and plantations. Accordingly, colony growth rates and reproduction were highest in gardens but highly variable in forests and plantations.
Our findings confirm the importance of resource availability, diversity and composition in determining colony growth and hence fitness of social bees. However, highest resource diversity is not necessarily associated with large natural habitats. Bees may thrive in landscapes with even small patches of high resource diversity, as frequently found in disturbed landscapes.