PREDATORY ARTHROPODS ASSOCAITED WITH POTENTIAL LOCALLY-ADAPTED NATIVE INSECTARY PLANTS FOR AUSTRALIAN VINEYARDS

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Abstract:

Context and purpose of the study - Three locally-adapted native plants were evaluated to determine their capacity to provide insectary benefits to predatory arthropods in association with vineyards, and thereby to enhance biological control of insect pests. Native plants are preferred as supplementary flora, as they are naturally adapted to Australia's climatic conditions.

Materials and methods - Stands of mature *Bursaria spinosa*, *Leptospermum continentale*and *Rytidosperma* ssp. located adjacent to or in the mid-rows of Adelaide Hills, Barossa Valley and Eden Valley vineyards were sampled for arthropods in 2013/14. *Vitis vinifera*was also sampled.

Results - Twenty seven thousand and ninety-one individual invertebrate specimens were collected, comprising 20 orders and 287 morphospecies. Eight thousand, eight hundred and eighty predators, 6,790 herbivores and 11,421 other specimens were collected. Predatory arthropods dominated the diversity of morphospecies present on each plant. Out of a total of 98 predatory morphospecies, 67 were found on *B. spinosa*, 63 on *L. continentale*, 56 on *V. vinifera* and 38 in association with *Rytidosperma* ssp. The difference between predatory and herbivore morphospecies was highest on *Rytidosperma* ssp. (2:1 predators: herbivores), followed by *L. continentale*, *V. vinifera* and *B. spinosa.* The richness of predator morphospecies across all plant types was nearly double the number found in association with grapevines. It may be possible to increase the functional diversity of predatory arthropods by more than 3x when either *B. spinosa* or *L. continentale* is present versus grapevines only, and increase the net number of predator morphospecies by around 27% when *Rytidosperma* ssp. are planted in combination with the grapevines. The selected plants provide a suitable habitat to support diverse and functional populations of predatory arthropods. The opportunity to plant selected native insectary species could help wine grape growers save time and resources by producing fruit with lower pest incidence, while enhancing biodiversity of their vineyards.

Keywords: *Bursaria spinosa*, *Leptospermum continentale*,insectary, *Rytidosperma* ssp., predatory arthropods, vineyards

1. Introduction.

Predatory arthropods associated with potential locally-adapted native insectary plants for Australian vineyards

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Introduction

- Predatory arthropods contribute to the biocontrol of pests of grapevine, *Vitis vinifera*, each season.
- Three native plants were evaluated to determine their capacity to provide insectary benefits to predatory arthropods in Australian vineyards, and thereby to enhance biological control of insect pests.
- Native plants are preferred as supplementary flora, as they are locally-adapted to Australia's climatic conditions.

Aims

To determine if selected candidate insectary plants:

- Have the capacity to support populations of natural enemies throughout the year,
- Could provide habitat for economically damaging vineyard pests.

Fig 1. Australian native plants that provide insectary benefits

Methodology

- Stands of mature Christmas bush, *Bursaria spinosa*, prickly tea-tree, *Leptospermum continentale*, and wallaby grasses *Rytidosperma* ssp., located adjacent to or in vineyards in the Adelaide Hills and Barossa were sampled for arthropods in 2013/14.
- Grapevines were also sampled to explore relationships between each plant and associated arthropods using diversity indices.
- A total of 27,091 individual invertebrate specimens were collected, comprising 20 orders and 287 morphospecies. They were categorised into different functional groups including predators, herbivores and other.

Results

- The richness of predator morphospecies across all plant types (S = 98) was nearly double the number found in association with grapevines. Predators dominated the diversity of morphospecies present on each plant by an average of **2:1 (predator: herbivore)**.
- It may be possible to increase the functional diversity of predators **by more than 3x** when *B. spinosa* or *L. continentale* is planted versus grapevines only, and increase the net number of predator morphospecies **by around 27%** when wallaby grasses are planted in combination with the woody perennial plants.

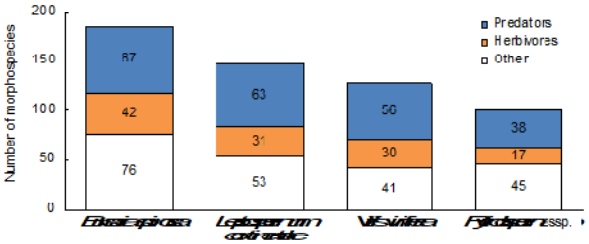

Fig 2. Number of arthropod morphospecies recorded over a 12-month period on each plant. The ratio of predator to herbivore morphospecies was 1.6:1 on *B. spinosa*, 2.1:1 on *L. continentale*, 1.8:1 on *V. vinifera*, and 2.2:1 on *Rytidosperma* spp.

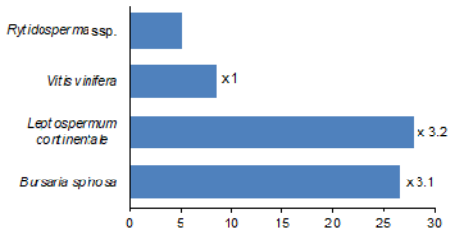

Fig 3. Predatory arthropod morphospecies diversity (Shannon's index) for each plant.

Conclusion

Bursaria spinosa, *L. continentale* and *Rytidosperma* ssp. provide a suitable habitat to support diverse and functional populations of predatory arthropods. These native insectary plants were not found to be breeding sites for vineyard herbivores and are not considered a threat when planting them in and around mature vineyards. Vineyard managers are encouraged to explore the use of these and other native insectary plants in association with vineyards.

The opportunity to plant native insectary species could help grape growers save time and resources by producing fruit with lower pest incidence, while enhancing biodiversity of their vineyards

Acknowledgements

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