The Application of **Companion Planting** for the Management of **Garden Pests**

WARWICK THE UNIVERSITY OF WARWICK
SCHOOL OF LIFE SCIENCES

RHS

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1. INTRODUCTION

- The traditional method of growing **companion plants** alongside **cultivated edibles** is promoted as a **practical non-pesticidal approach** to pest management.
- However, **limited scientific evidence** supports its efficacy in **domestic gardens**, despite the **ubiquitous recommendations and anecdotes** disseminated to gardeners by **popular garden media** and **seed companies.**
- There is also ongoing debate regarding the main **biological mechanisms** contributing to **reduced colonisation of pests** by companion plants.
- Different explanations are suggested, including the **disruption of visual cues**, putatively **repellent/deterrent volatile organic compounds (VOCs)**, and the attraction and retention of **natural pest enemies**.

2. RESEARCH AIMS

The research aim is to test the **efficacy** of popular companion planting recommendations and anecdotes, whilst aiming to **elucidate the underlying biological mechanisms.** Three studies have been established, encompassing the different applications of companion planting. In **Study 1:**

Companion planting with ***non-hosts for directly controlling pests*** through the disruption of host location and acceptance.

3. MODEL SYSTEMS

Many popular companion planting claims are **purported for controlling aphids** in gardens. Consequently, **Aphididae spp**. are the **model pests** for investigating the companion planting effect.

	MODEL SYSTEM 1		MODEL SYSTEM 2
PEST	 Cabbage aphid (*Brevicoryne brassicae*)	 Peach-potato aphid (*Myzus persicae*)	 Black bean aphid (*Aphis fabae*)
HOST PLANT	Brussels sprouts (*Brassica oleracea* var. *gemmifera* 'Doric')		Broad beans (*Vicia faba*)

4. METHODOLOGY

The companion plants **Rosemary** *(Salvia rosmarinus*), **French Marigolds** (*Tagetes patula*) and **Garlic Chives** (*Allium tuberosum*) were selected to represent the families **Lamiaceae**, **Asteraceae** & **Amaryllidaceae**. These families contain many of the '**aromatic**' plants recommended to gardeners for controlling aphids in **companion planting conjecture.**

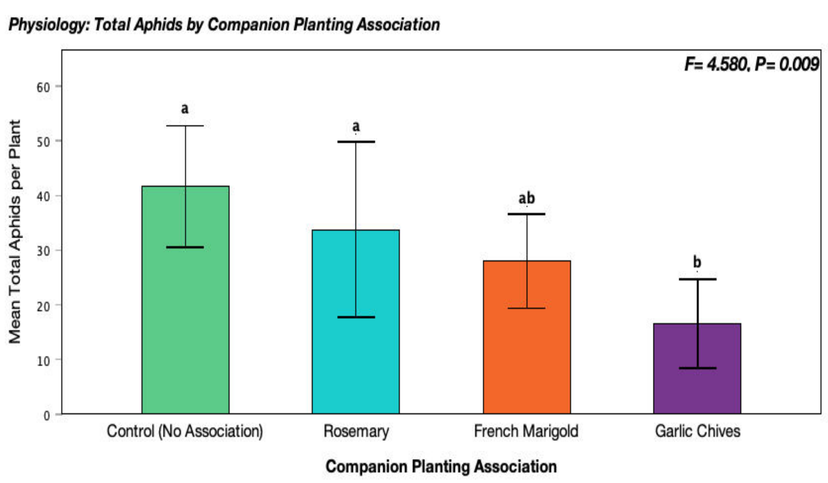
French marigolds
Tagetes patula

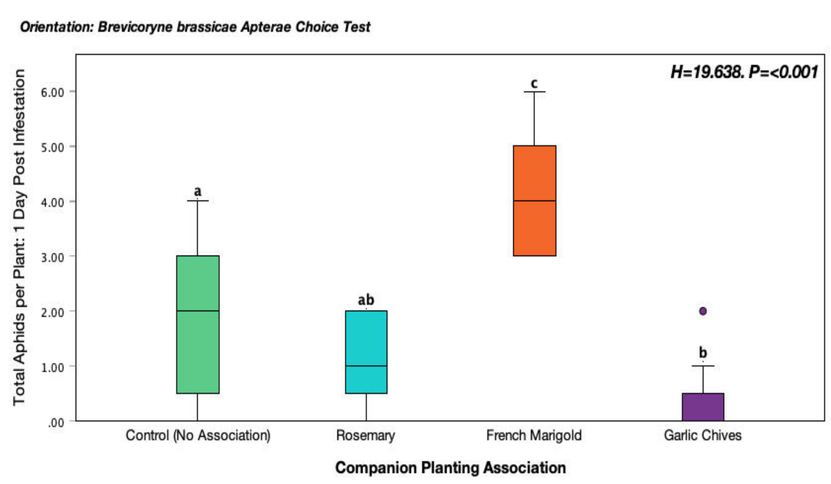
Garlic chives
Allium tuberosum

Rosemary
Salvia rosmarinus

Using **Model System 1,** colonisation/fecundity assays investigate the **underlying effects** of the non-hosts on aphid **physiology** (left). Choice tests of different aphid polymorphisms investigate **orientation** (right).

5. RESULTS and CONCLUSIONS: *Brevicoryne brassicae*





- **Garlic chives** associations provided a **significant companion planting effect** on ***B. brassicae*** **physiology** and **orientation**.
- Results suggest that garlic chives may operate through **semiochemical-based** mechanisms, such as disruptive VOCs.
- **French marigold** associations encouraged **increased pest colonisation**. Apterae (wingless) were **significantly more attracted** to hosts in association with this companion plant, contrary to popular culture.

6. FUTURE WORK

- **EPG experiments** in collaboration with University of Nottingham will elucidate *B. brassicae* feeding behaviours on hosts combined with the non-host companion plants used in Study 1. Ultimately, impact of companion planting associations on the physiology, orientation and feeding behaviour of **brassica specialist, *B. brassicae***, will be compared with the **polyphagous aphid, *Myzus persicae***.
- **Study 2** will investigate the propensity of ***non-hosts*** such as poached egg plants (*Limnanthes douglasii*), alyssum (*Lobularia maritima*), and borage (*Borago officinalis*) to ***indirectly*** control aphids through enhancing **conservation biological control**.
- **Study 3** will explore the efficacy of garden nasturtium (*Tropaeolum majus*) cultivars as ***alternative hosts*** for 'pulling' geographically distinct *Aphis fabae* biotypes away from broad beans.