

Plants for Bugs



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Gardens as habitats for pollinators

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RHS Plants for Bugs

A study into the garden plant origin preferences of invertebrates

Supported by the **Wildlife Gardening Forum**

The **Plants for Bugs** project was a four-year field study, undertaken by the RHS Science Department at RHS Garden Wisley and supported and inspired by the Wildlife Gardening Forum. **Plants for Bugs** is unique as it is the first ever designed field experiment to test whether the geographical origin ('nativeness') of garden plants affects the abundance and diversity of invertebrates (wildlife) they support. Views differ on whether only native plants should be planted in a wildlife-friendly garden or whether non-native species also have a place.



Above: RHS / Paul Debois (*Verbena bonariensis* with hoverfly). Opposite: RHS / Helen Bostock (honeybee on *Alstroemeria psittacina*); RHS / Paul Debois (recording); RHS / Georgi Mabee (Vortis suction sampler).

Background

Studies in recent decades* have conclusively shown that gardens are a rich habitat for wildlife. Plants are a key factor in this, but it is unclear how the roles of native and non-native plants for wildlife compare. Guidance for those gardeners wishing to plant to encourage wildlife can be confusing and is largely based on assumptions or anecdotal evidence. An average garden, excluding the lawn, contains around 70% non-native and 30% UK native plants. Data from the Plants for Bugs study is revealing if there are any measurable differences in invertebrate numbers and species between these plant groups.

Experimental design and set up

The project consisted of 36 plots (each 3x3m; the size of a typical garden border) on two sites, one within RHS Garden Wisley and the other at the adjacent Deers Farm research field. Planting was divided into three categories (treatments): one native and two non-native. Each plot was planted with a mixture (assemblage) of 14 plant species native to one of three geographical zones:

- ▶ UK (native)
- ▶ The Northern Hemisphere excluding the UK (non-native – Northern)
- ▶ The Southern Hemisphere (non-native – Southern)

Each plant assemblage included bulbs, perennials, shrubs, a climber, grasses

or ferns, and was designed to appear as similar as possible in terms of plant height, density and position in the plots.

The plots were managed as typical garden borders and were hand-weeded, watered, and cut back or staked where required. The timber-edged plots were separated by 1m-wide woodchip paths. No pesticides were used on the plots.

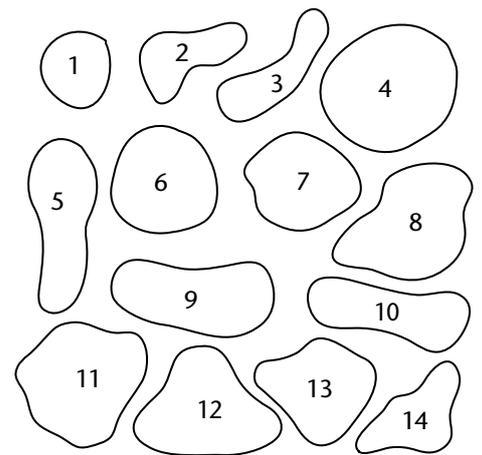
The study is scientifically designed to remove bias and all protocols were developed along rigorous scientific lines. The research is being published in peer-reviewed scientific journals and so will have been independently reviewed to ensure impartiality and accuracy.

Sampling

Invertebrates were recorded from all plots by several methods: from the ground using pitfall and gastropod (slug and snail) traps, from the foliage using a Vortis suction sampler (below right) and from the flowers (pollinators) by visual observation (below). Sampling finished at the end of 2013 and the first four years of data are being published.

Tens of thousands of invertebrates were recorded from the plots, including eight species of bumblebee, more than 50 species of spider, and more than 40 species of ground beetle.

The soil fauna and function was also assessed as part of a PhD project in association with the University of Roehampton.



The Plants for Bugs plot planting plan. Each 3x3 plot contains 14 plant species belonging to one of three treatments (Native, Northern Hemisphere or Southern Hemisphere), in a mix of climbers, shrubs, perennials, bulbs, grasses and / or ferns.



* The two main studies that inform this view are Biodiversity in Urban Gardens Sheffield (BUGS) by the University of Sheffield and Jennifer Owen's case study of a Leicester garden, *Wildlife of a Garden: A Thirty-Year Study*.

Findings from paper one

This bulletin deals with the findings from the first results paper of the Plants for Bugs project. It addresses the data relating to the pollinating (aka ‘flower-visiting’) insects only. Findings for other invertebrate groups studied will be published in further papers and bulletins.

The importance of pollinating insects

Most flying insects such as honeybees, wild bees and hoverflies which visit flowers for their nectar and pollen perform a vitally important pollination service. Pollination is where the pollen from one flower is transferred to another flower of the same species, leading to fertilisation. Some flowering plants are pollinated by the wind but the majority rely on insects for this service, and without it many plants would fail to produce seed and, in some cases, fruit.

The National Pollinator Strategy (England), launched in November 2014, recognises the importance of pollinators to the economy and environment. Our 1500 species of pollinator in the UK are under pressures such as loss of habitat and food sources and many are considered to be in decline. The RHS is committed to helping to deliver the aims of the strategy and safeguard our bees and other pollinators for the future. The **Plants for Bugs** first paper gives us a better understanding of the value of garden plants of different geographical origin to pollinating insects in the UK.

Key messages: paper one

The following guidance is designed for those planting in a garden setting. It is hoped that it will be of use to private and professional gardeners, community gardeners, garden designers, landscapers, ecologists and

others working in horticulture. It is not intended that these recommendations are followed outside the ‘artificially’ managed garden environment especially when considering the management of semi-natural habitats where the conservation of ‘native’ habitat and species is paramount.

- ▶ The best strategy for gardeners wanting to support pollinating insects in gardens is to **plant a mix of flowering plants** from different countries and regions.
- ▶ Emphasis should be given to plants native to the UK* and the Northern Hemisphere†, though exotic plants from the Southern Hemisphere‡ can be used to **extend the season** (there are a greater proportion of exotic plants flowering later in the season compared to UK native and Northern Hemisphere plants) and provide **nectar and pollen** for some specific pollinators.
- ▶ Regardless of plant origin (native or non-native), the **more flowers a garden can offer** throughout the year, the greater the number of bees, hoverflies and other pollinating insects it will attract and support.

* Examples of UK native plants: primrose (*Primula vulgaris*), common honeysuckle (*Lonicera periclymenum*) and betony (*Stachys officinalis*).

† Examples of non-native Northern Hemisphere plants: lamb’s ears (*Stachys byzantina*), *Knautia macedonica* and Christmas box (*Sarcococca confusa*).

‡ Examples of non-native Southern Hemisphere plants: *Fuchsia magellanica* var. *gracilis*, *Verbena bonariensis* and *Eryngium agavifolium*.

However, it should be noted this study did not test individual plants and the examples above do not equate to recommendations of wildlife-friendly plants.



The Bowes-Lyon Rose Garden at RHS Garden Wisley (3, right) includes plantings of *Helenium* from the Northern Hemisphere, *Agapanthus* from the Southern Hemisphere, and cultivars of *Lythrum salicaria*, a UK native.

“The best strategy for gardeners wanting to support pollinating insects in gardens is to plant a mix of flowering plants from different countries and regions.”

How to apply this in the garden

The findings from this first paper support what many gardeners are already doing. This is because an average garden in the UK is planted predominantly with Native and Northern Hemisphere plants (usually very reliable in a UK climate), with a selection of plants from the Southern Hemisphere (often offering a wider choice of flower shape, colour and extension of season). But gardens can still be enhanced for pollinators through plant choice:

- 1** Consider the seasons, especially early and late when there is less in flower for insects to forage, and try to have plants flowering every month.
- 2** Don't skimp on the flowers – pack them in wherever they will thrive, usually best in sun or part shade.
- 3** Plant a mixture of plants – gardens that are themed on plants from just one region may not be the optimum strategy for supporting our pollinating insects.
- 4** Observe the plants in your garden and other gardens, and grow more of whatever is popular with pollinators in your neighbourhood.
- 5** Allotment holders can make a huge contribution to pollinator conservation by allowing a small proportion of herbs and vegetables to flower, or by planting flowers for cutting on their plots.

And lastly, if you need some help on where to start, choose plants that are Perfect for Pollinators (rhs.org.uk/perfectforpollinators).



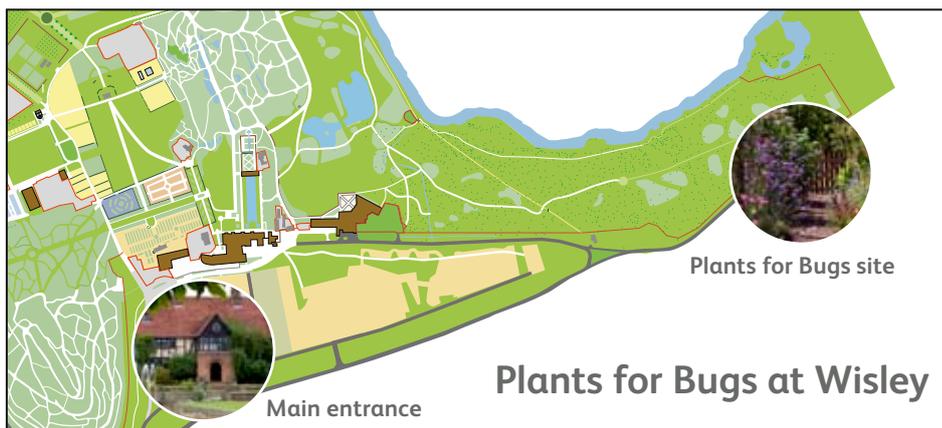
Learn more about Plants for Bugs

► Visit the trial site at RHS Garden Wisley, Woking, Surrey GU23 6QB. The plots are being maintained until at least 2016 to enable the public to visit them and further research to be carried out

► Download plant lists, a handout and other information about the project at rhs.org.uk/plants4bugs

► Follow life on the plots by reading the **Plants for Bugs** blog written by Helen Bostock at rhs.org.uk/science/science-blogs/plants-for-bugs

To read the scientific paper in full, visit rhs.org.uk/plants4bugs: Salisbury, A., Armitage, J., Bostock, H., Perry, J., Tatchell, M., Thompson, K. (2015). Enhancing gardens as habitats for flower-visiting aerial insects (pollinators): should we plant native or exotic species? *Journal of Applied Ecology*.



Left. A Plants for Bugs plot at RHS Garden Wisley, and one set of three corresponding plants: *Stachys officinalis* (native, with green shieldbug, top); *S. byzantina* (non-native Northern, with gatekeeper butterfly, middle); and *Lobelia tupa* (non-native Southern, with honeybee probing for nectar at the base of the flower, below).

RHS Perfect for Pollinators

Choose plants that provide resources for pollinators by selecting them from the **RHS Perfect for Pollinators** and **RHS Perfect for Pollinators Plants of the World** plant lists (endorsed by The National Pollinator Strategy). Look out for the Perfect for Pollinators logo in nurseries and garden centres (right) and visit rhs.org.uk/perfectforpollinators for plant lists and more ideas.



This research has been paid for by the RHS through internal funding and through fund-raising campaigns that support broader RHS Science activities. However, the work would also not have been possible without the dedication of RHS volunteers and help from expert individuals and organisations outside the RHS. The RHS Science team would like to thank all who have been involved in the project and especially the Wildlife Gardening Forum (www.wlgf.org) for their inspiration and support. The soil fauna PhD was jointly funded by the RHS and The University of Roehampton.

To find out more about Plants for Bugs or RHS Perfect for Pollinators, email science@rhs.org.uk or write to RHS Gardening Advice, RHS Garden Wisley, Woking, Surrey GU23 6QB.

The Royal Horticultural Society (RHS) is the UK's leading gardening charity dedicated to advancing horticulture and promoting good gardening. Anyone with an interest in gardening can enjoy the benefits of RHS Membership and help us to secure a healthy future for gardening. For more information call 0845 130 4646, or visit rhs.org.uk



Photos, above: RHS / Carol Sheppard (Plants for Bugs plot); RHS / Entomology (insects on plants); RHS / Paul Debois (RHS Plant Centre). Cover: RHS / Carol Sheppard (thick-legged flower beetle *Oedemera nobilis* on *Geranium sanguineum*).