Bees 'n Beans Instructions

Thank you for taking part in Bees 'n Beans. This project will use a simple experiment to look at how much pollination is happening in urban green spaces. We couldn't run it without your support!

In 2016 we will continue to use **Broad Beans** in the experiment. This year we ask volunteers to look at the pollination received by plants growing in pots (the ***container group***) and those growing in the soil (the ***garden group***). This is to compare pot-limited plants to the soil-grown ones to see if the protocol can be improved with either method, and which plants are more robust and pest-resistant.

The Plant

Broad Beans are mostly pollinated by bumblebees. The flowers contain both male pollen and female stigma, and *can* pollinate themselves, without needing to have pollen from another bean plant brought to the flowers. But the pods are larger and contain more beans if the flower has been cross-pollinated, or even if insect visits have moved pollen within the flower, and it is this difference we are interested in.

Project Kit

The kit for this project should contain:

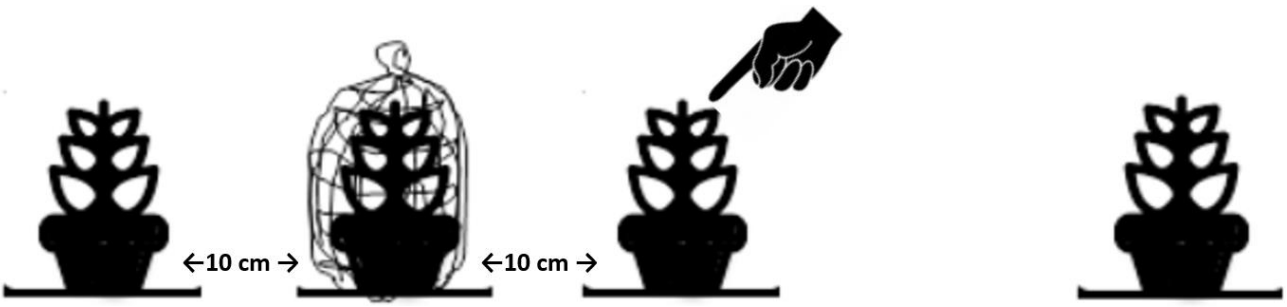
- 18 dried beans ("The Sutton" Dwarf bean)
- Recording sheet & instructions

You will need to supply: **sticks** (or canes) to support the plants; **garden fleece**, at least three **3-litre pots** and **compost**. Well-rotted garden compost or a commercial multi-purpose mix is fine, as long as all pots have the same. You also need some smaller pots (at least 8cm deep) to germinate the seeds in, depending on how much space you have to grow on the young plants.

The Project Plan

This project is to start in **March 2016**. Broad beans are quite hardy, and this start time should miss all but the latest of frosts. The overall setup is similar for the ***container group*** and the ***garden group***:

1) Local plant – this plant is to be left alone, to let the local pollinators have access to the flowers.
2) Bagged plant – this plant will be covered in a light garden fleece to keep pollinators out.
3) Hand-pollinated plant – this plant will be pollinated by you (**details below**).
4) Spare plant(s) – in case of losses.



Plant 1
Local

Plant 2
Bagged

Plant 3
Hand-pollinated

Plant 4
Spare plant(s)

GROWING – BROAD BEANS

You will need **six mature plants** in total for the experiment; three to grow in pots and three to grow in the garden. The kit has 18 seeds so you should be able to get at least six plants at the same stage.

Step 1 – Fill 18 smaller germination pots with compost, leaving 1cm space at the top to help with watering. Make a hole a few cm deep in the soil and put a bean into each one. Fill with compost/soil and water well.

Step 2 - Keep the pots indoors on a warm windowsill (or greenhouse, or conservatory) to give the plants a better start than going outside right away. If you do not have any such space, use a sheltered place in the garden as long as frosts have finished. The plants should appear after about four weeks and can be grown on in the small pots until they reach 10cm high.

Step 3 - All plants should now be moved outside. If these young plants were grown in the house, let them gradually get used to the outdoors by using a cold-frame, cloche or a porch and try to avoid any forecasted frosts.

When flower buds start to form, the plants are ready to use. In each group, the plants should be about the same size, and have the same number of stems. Don't worry if there are not many flowers at first.

EXPERIMENTING – BROAD BEANS

For the *container group,* choose at least three similar sized plants and transfer each one to a three-litre pot, filled up with compost. ***Container group*** plants should be kept 10cm apart, all with the same amount of shade, distance to other flowering plants, and amount of shelter. Keep the plants in trays to help with watering. Apply the treatments as shown below.

For the *garden group,* choose at least three similar sized plants and plant in the garden soil 10 to 20 cm apart. Dig over the soil thoroughly before planting, to make sure that soil conditions are as similar as possible between plants. They should all have the same amount of shade, distance to other flowering plants, and amount of shelter. Apply the treatments as shown below.

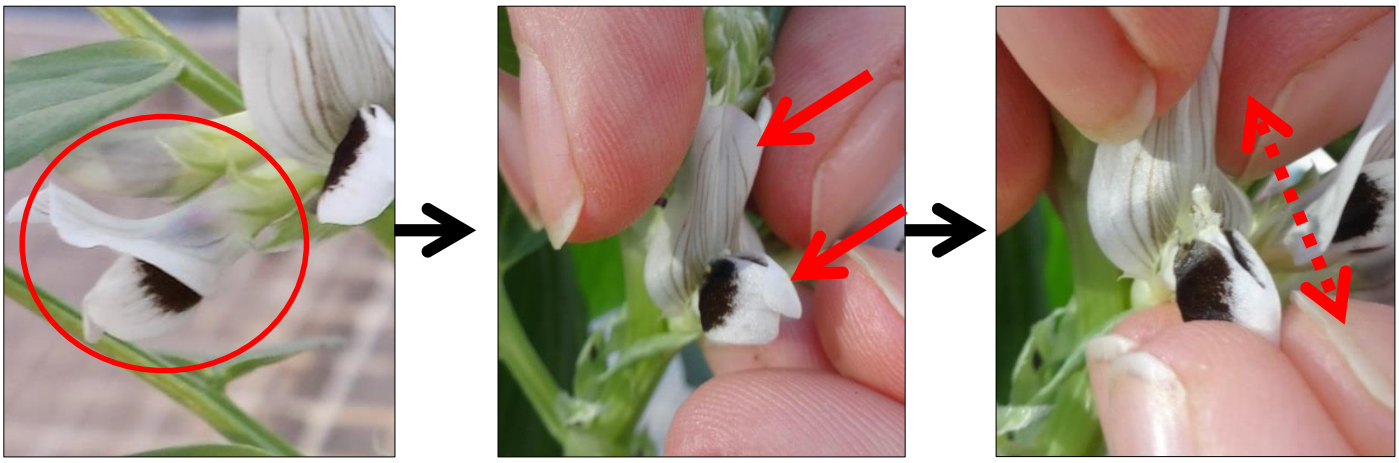
The **treatment** method is shown below for the container group, but it applies to the garden group also:

Plant 1

Plant 2

1. **Local plant**
2. **Bagged plant**
   - Make a tent from net or fleece to keep out pollinators. Gather the net/fleece around a supporting cane; tie in place.
   - Use a couple of sticks around the base of the plant to keep the net away from the flowers.
   - Fold the net/fleece underneath the pot, or gather and tie it securely around the base and stick.
   - Watering can go through the net/fleece.
3. **Hand pollinated plant**
   Hand pollinate twice a week.
   See next page for instructions

Plant 3 - Hand pollination



Step 1.
Find open flowers.
The black part should be visible.

Step 2.
Gently grip the top two petals.
Gently grip the bottom two petals.

Step 3.
Pull gently on the bottom petals opening the flower to show the pollen. Repeat x5 per flower.

Flowers will go dull, greyish and floppy after about a week. **Do not try** to hand pollinate flowers that have 'gone over' like this, as it might damage the flowers and cause them to fall off. **Do not** force flowers open – the petals should move easily. New flowers will open as old ones finish, opening in bunches up the plant as it grows. (See the LJBees web site for hand pollination video.)

HARVESTING – BROAD BEANS

Bean pods should be ready for harvest **16 weeks** after sowing (or a bit later if you are further north).

All pods from all plants should be harvested at the same time, and recorded on the project recording sheets provided:

- **Number of pods** from each plant
- **Weight of pods** from each plant
- **Number of beans** from each plant
- **Weight of beans** from each plant

This will allow us to compare the success of each treatment crop, and give a measure of how well the local insect pollinators are doing in helping pollinate the plants.

And send in the results!

There will be a web form to return the data (at: https://www.surveymonkey.com/s/BnBResults)

Or you can post the recording sheet to us.

If you have any further questions, anything is unclear or you have a problem with experiment, please do contact me either by email (L.Birkin@sussex.ac.uk), or by phone (01273 678509).

Other Observations

During the experiment, there are two other observations you can do with the experimental plants, to see what sort of insect visitors the plants are receiving in your site. The **project recording sheets** have sections for these observations.

1) Robbing

Shorter-tongued bees are known to bite into the base of bean flowers to access the nectar, leaving distinctive holes. These bees have difficulty pollinating the broad bean flowers properly, so if these robbing holes are present, it can indicate that those bees are present in your site.

Please note if the flowers on your plants have been robbed.

2) Flower visitors

There is space on the form to record any insect visitors that you see on the plants. There is no specific time you need to do this, just when you are able to, or when hand-pollinating. We have not provided a specific identification guide with the project documents, but there are many available resources online for identification if you would like to have a go. (http://www.nhm.ac.uk/nature-online/life/insects-spiders/identification-guides-and-keys is a good place to start.)

Please record:

- Type of insect (bumblebee, honeybee, hoverfly, etc).
- **If you can**, record the species of any bumblebees seen (see http://www.nhm.ac.uk/nature-online/life/insects-spiders/identification-guides-and-keys/bumblebees for common UK bees)

DO NOT WORRY if you are not able to identify specific species!

Contact Details and Updates

If you have any further questions, anything is unclear, or you have a problem with experiment, please do contact me either by email (L.Birkin@sussex.ac.uk), or by phone (01273 678509).

The project website is:

www.ljbees.org.uk

The project twitter account is:

https://twitter.com/LJBees

Happy Growing!