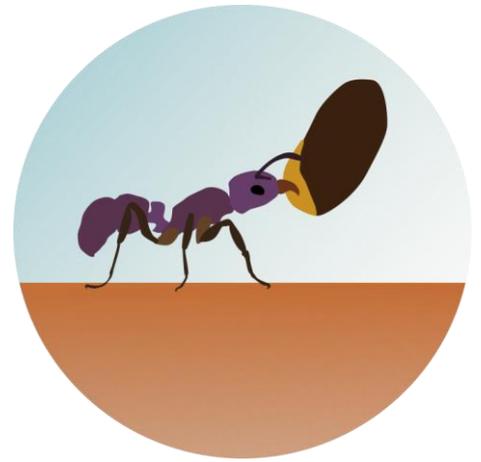


THE TINY GARDENERS PROJECT

Thank you for joining the Tiny Gardener's Project! This project gives you the opportunity to contribute to an Australia wide effort in understanding how important ants are to maintaining healthy ecosystems. By helping us describe how ants collect and transport tree seeds in your garden at home or school, you'll learn a bit more about ant behaviour and hopefully have fun doing some real science! It's a pleasure to have you on the team!



Ants: Australia's tiny gardeners

Think about how you plant a tree. You take a seed, bury it underground, and keep it safe, watered, and provided with nutrients.

By carrying seeds into their nests ants are essentially planting trees!

Once inside the ant's nest, tree seeds are safe from predators and bushfires, and are kept in a moist sheltered area with lots of nutrients – the perfect place to grow!



Australia has more species of 'ant-dispersed' plants than anywhere else on the planet. Despite this, there is still so much we don't know.

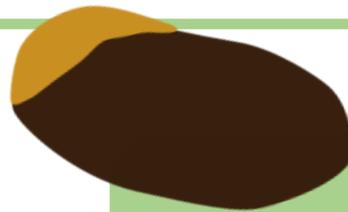
Where are ants the most effective seed dispersers? In the rainforest? In the arid zone?

How does urbanisation affect seed dispersal?

With your help we will answer all these questions and more!

Ants are some of the most important animals living beneath our feet. They carry out essential '**ecosystem services**' like bioturbation, soil aeration and pollination. This means they keep our soils healthy, and help plants reproduce. Without ants, we wouldn't be here!

One of their most important jobs in the environment is 'myrmecochory'. This is when ants pick up and carry plant seeds. By doing this they actually disperse tree seeds to new areas and help them survive.



The Seed Elaiosome

Many plant seeds have a structure called an 'elaiosome'. This light-coloured structure is good food for ants, and rewards them for picking up and carrying the seed. Ants are attracted to it because it is full of nutritious fats and amino acids.

This study is being co-ordinated by Dr James O'Hanlon from the University of New England. For more information email tinygardenersproject@gmail.com



TEACHER INSTRUCTIONS

For this experiment you will place seeds outside on the ground and see how fast ants collect them over 5 days. **It is best to conduct the experiment during the warmer months (October to March) as this is when most ants are active.** The first day will involve picking your sites and placing out your seed dishes. The seed dishes have holes in the side for ants to go in and out when collecting seeds. You will check the dishes once a day for the next four days and count how many seeds are remaining. This will tell us what seeds ants prefer and how effective they are at collecting them. How you organise tasks for this experiment amongst your group or class is up to you. Here is an overview of the entire experiment to help you plan ahead.

In your pack you should have:

- 30 seed dishes
- Sachets of 3 different types of *devitalised* seeds (A,B and C).
- Forceps
- Datasheet
- Metadata sheet
- Tiny Gardeners Worksheet (for in the classroom)



STEP 1.

- Pick **10** spots (or sites) around your garden/playground/forest patch where you can set up your seed dishes. As a rule of thumb these should be at least 5m apart and in sheltered, out-of-the-way areas that are unlikely to be disturbed throughout the experiment.
- At each site put out 3 seed dishes on the ground, e.g. at Site 1 you should place out the trays 1A, 1B and 1C. Have them separated by ~60cm. Do this for each of your ten sites.

STEP 2.

- In the tray labelled '**A**,' use your forceps to place **20 seeds** from the sachet labelled '**A**'. The seed elaiosomes often fall off the seeds, so make sure the seeds you put in the trays have their elaiosomes still attached, otherwise the ants won't be interested in them*.
- Place the plastic lids back on the dishes, and pop a small rock on top to keep them in place. This help will stop birds and small mammals from getting to your seed depots.
- Do the same for the dishes labelled **B** and **C**, with the seeds labelled **B** and **C** respectively. Repeat the above for all of your 10 sites. In total, you should have 30 dishes out across 10 different sites.

** NOTE: These seeds have been 'devitalised', which means they will never grow. This means you can conduct the experiment without worrying about introducing unwanted plants to your garden/forest.*

STEP 3.

- The next day, it's time to check your sites! Count how many seeds are remaining in each seed dish. Write this number down on your data sheet.
- Repeat this for another 3 days so you have a total of 5 days of observations. This will allow us to calculate a 'rate of removal' for each type of seed.
- It is good (but not essential) to count seeds at roughly the same time each day.

STEP 4.

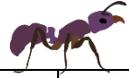
- After the final count you will have finished the experiment. Congratulations!
- Pack up your seed dishes and dispose of any uncollected seeds.
- **Please don't forget to email your scanned Data and Meta-data sheets to tinygardenersproject@gmail.com**
- If you like can post the seed dishes and forceps back to us too. These will be cleaned and reused by other groups helping us with the Tiny Gardeners Project.
- You can repeat the experiment as many times as you like. The supplied '*Tiny Gardeners Worksheet*' provides tips on how to present the experiment and discuss the data with your group.

DATA SHEET

TEAM NAME:

DATE:

LOCATION:



This is where you record all the data you collect during the experiment. Please write down how many of each seed type were remaining on each day.

		Monday	Tuesday	Wednesday	Thursday	Friday
1	A	20				
	B	20				
	C	20				
2	A	20				
	B	20				
	C	20				
3	A	20				
	B	20				
	C	20				
4	A	20				
	B	20				
	C	20				
5	A	20				
	B	20				
	C	20				
6	A	20				
	B	20				
	C	20				
7	A	20				
	B	20				
	C	20				
8	A	20				
	B	20				
	C	20				
9	A	20				
	B	20				
	C	20				
10	A	20				
	B	20				
	C	20				

META-DATA SHEET

TEAM NAME:

DATE:

LOCATION:

This is where you can tell us about where and how you conducted your experiment. This information can be very helpful in understanding what the ants are getting up to, and where!



What age range/school year is your group?

How many students/participants are in your group?

Where are you conducting your experiment?

Please give us location details as accurately as possible – GPS co-ordinates, street addresses, or references to any notable landmarks nearby are very helpful.

In what type of environment are you conducting your experiment?

For example, you may be conducting your experiment on school grounds or in an urban garden? Perhaps you are out in the bush or on farmland?

What is the vegetation like in this area?

For example, are you in a Eucalypt woodland? Rainforest? Rose garden? Spinifex grass plains?

What was the weather like during your experiment?

Did it rain during the week? What were temperatures like? Any other details?

Any other observations you made? Any other feedback?

What did you enjoy about the project? What did and didn't work for your group?

FAQ

Q. Can I plant these seeds? Will these seeds grow into trees?

A. No. These seeds have been 'devitalised'. This involves subjecting the seeds to low amounts of radiation in a procedure carried out by the Australian Nuclear Science and Technology Organisation. This stops the seeds from ever germinating, and stops us from accidentally introducing unwanted plants into the landscape.

Q. What if our seed depots get disturbed/knocked over?

A. That's OK. Having some 'missing data' is a normal part of a science experiment. Just record what data you can and make a note of what happened to the seed depots. Once a depot is disturbed, don't worry about trying to replace the seeds, you can just write 'NA' in the remaining data cells.

Q. Do we have to use forceps put seeds out? Can we just use our hands?

A. Its best to use forceps but we understand that these seeds are very small and tricky to handle, if you have to use your hands that is OK it shouldn't affect your classroom experiment.

Q. Can we run the experiment multiple times?

A. Yes of course! Feel free to photocopy the datasheets and worksheets to conduct the experiment as many times as you like. The more data you collect the more wonderful contributions you are making to the Tiny Gardeners Project! If you need more materials such as seeds or worksheets, send us and email at tinygardenersproject@gmail.com

Q. We are finished. Where can we send our datasheets and kit materials back to?

A. You can scan and email your data sheet and metadata sheet to tinygardenersproject@gmail.com. If you would like to post your materials back to be re-used by other groups please send them to:

James O'Hanlon
W77 Agricultural Education Building
University of New England
Armidale NSW 2351

If you are ever stuck or have questions, get in contact via email tinygardenersproject@gmail.com

