I Get Around

Summary
Students examine seeds and perform tests to see how weed seeds disperse.

Learning Objectives
Students will be able to:
- Explain how some weeds arrived in New Zealand.
- Describe three ways weeds spread to new areas
- Explain two ways to prevent weeds from spreading.

Suggested prior lessons
What is a weed?
Cultivating weeds

Curriculum Connections
Science Levels 3-7

Vocabulary/concepts
weed, introduced, dispersal, seed, vegetative reproduction, rhizome, runner

Time
1 ½ - 2 hours over several weeks

Materials
"• old socks (1 per student)
- collection of seeds (for "Blowin' in the wind")
- copies of "Blowin' in the wind" calculation sheet
- potting mix, trays or pots
- paper towels
- large plastic zipper bags
- plant rhizomes (e.g.: twitch or yarrow)

Background information

Most New Zealand weeds are plants that were introduced by people. Some weeds were introduced on purpose, but many arrived accidentally. They may have arrived as seeds in soil with a potted plant, in the mud on a traveller's boots, in packing material, or stuck to the fur of an animal. Once these weeds arrived, their seeds allowed them to spread rapidly. A common characteristic of weed seeds is an ability to travel long distances. They may do this by blowing in the wind, sticking to the fur of animals, or passing through the digestive tract of a bird.

Activity

Please note that this lesson is best done during the late summer months, when weeds are in seed.

How do weeds spread?

Using "think, pair, share", ask students to consider how weeds spread. The plants are rooted in the ground; they can't get up and walk to a new place, so how do they spread from place to place?

Some of the many ways weeds spread include:
- seeds blow in the wind
- seeds stick to animal fur or people's clothing and move with the animal
- seeds are eaten by birds, and pooed out in another location
- seeds are washed away by water
- bits of plants drop off trailers on their way to the greenwaste facility
- weeds send out rhizomes or runners
- seeds are carried in mud on people's shoes

- aquatic weeds can be carried stuck to boats

Explain to the students that you are going to test some of the ways weeds move around.

Hitchikers
Take students to a weedy field. Have students put a sock over one of their shoes and walk around in the field. Weed seeds will stick to the sock. Before you leave the field, have students remove the sock, turning it inside out to capture the seeds. Back at school, students can pick the seeds out of their socks. If you have time, plant the seeds in potting mix and see what sprouts. Alternately, sort the seeds by their look, and ask students to count how many different weed seeds they picked up. Discuss with the students how this strategy works by asking them to imagine they've gone tramping and picked up some seeds in their socks. The seeds work their way into the sock and start scratching them after a while, so they stop to pick the irritating seeds out. They drop the seeds beside the track, where they germinate.

Blowin' in the wind
Collect a variety of different wind-dispersed seeds (e.g. dandelion, swan plant, maple, ake ake, birch), and some non wind-dispersed seeds (e.g.: acorns, corn, beans). On a windy day, take students outdoors to test how far each type of seed can blow. This activity is easiest if you can have the seeds blow across a netball court or playing field. Have one student release some seeds from shoulder height. Other students should follow the seeds as they travel, and stand where the seeds come to rest. Measure the longest flight of each seed type. Which seed travels the farthest? What features help the seed fly far? Back in the classroom, you can use these figures, along with some information about the plant's life cycle to work out how far each plant might spread in 10 years. For example, say a swan plant seed travels 10 metres in your wind experiment. The swan plant in an annual—that is it can grow and produce seed in one year. It has a generation time of one year. So we can calculate its spread in 10 years with the following formula:

Distance blown	**X**	**# generations in 10 years**	**=**	**Distance travelled in 10 years**
10 m	X	10 generations	=	100 m

An acorn, on the other hand, might only blow 1 metre from it's parent tree, and take 10 years to reach maturity and produce seeds of its own. So the calculation for oaks (assuming they only dispersed by wind) would be:

1 m	X	1 generation	=	1 m

Just passing through
Some seeds germinate best after passing through the digestive system of an animal. Kereru and other native fruit-eating birds are important dispersal agents for some of our native plants. Some weed seeds can also be transported in the digestive system of birds. Plants that disperse through being eaten often have a sweet fruit to attract animals.

Collect poo from fruit-eating birds (you will be able to see the seeds in the poo, and the poo may be pink or purple—look near fruiting plants like raspberries or grapes). Spread the poo in a pot filled with potting mix and water. Keep the soil moist and warm, and see what germinates.

Runners and rhizomes
Some plants don't need seeds to spread. Instead, they spread *vegetatively*. There are many ways to do this, but one of the most common is through underground stems called rhizomes or their aboveground counterparts called runners. Strawberries are an example of a plant that reproduces through runners. And anyone who has ever weeded twitch out of their garden will be familiar with how quickly plants can spread with rhizomes. Runners and rhizomes make it difficult to eradicate weeds, because even small bits of plant left behind can take root and grow.

For this activity, collect a quantity of twitch or yarrow rhizomes. Explain to the students how some weeds can spread without seeds. Divide the class into pairs and give each pair a couple of long rhizomes, a plastic zipper bag, and a paper towel. Have students cut up the rhizomes into small pieces and spread the pieces over half the paper towel. Fold the other half over the rhizomes, and moisten the towel. Slip the towel into the plastic bag, and place it in a warm place. After a week or two, have students check on their rhizomes. Have any of the pieces started to grow? Where is the growth coming from? Students should be able to see that growth starts from the nodes along the rhizomes—pieces without a node should not sprout. How big a piece of the plant is needed to create a whole new plant? Would it be easy to get rid of this plant if you pulled it out of the ground?

Extension/discussion:

1. Have students research common local weeds and find out how they spread. Can weeds spread in more than one way? Discuss how we might reduce the spread of weeds (by cutting them down before they produce seeds, or by drying out rhizomes to kill them before putting them on the compost pile or taking them to the greenwaste facility). Weedbusters has excellent information on preventing weed spread.

2. Look at weed seeds under the microscope. Can you see features that help them disperse? Design a seed that disperses by wind or by sticking to bird feathers. Draw your imaginary seed and label it to show how the features help it disperse.

Curriculum Connections

Science—Living world
Levels 3 & 4:
Life processes
- Recognise that there are life processes common to all living things and that these occur in different ways.

Level 5:
Life processes
- Identify the key structural features and functions involved in the life processes of plants and animals.

Level 6:
Life processes
- Relate key structural features and functions to the life processes of plants, animals, and microorganisms and investigate environmental factors that affect these processes.

Ecology
- Investigate the impact of natural events and human actions on a New Zealand ecosystem.

Level 7
Ecology
- Explore ecological distribution patterns and explain possible causes for these patterns.

Vocabulary/concepts

Dispersal – the spreading out of a plant's offspring from the parent plant, usually through seeds.

Introduced – Not found naturally in New Zealand. Introduced accidentally or deliberately from elsewhere by people. Also called introduced or alien.

Rhizome – An underground stem. Roots and shoots sprout from nodes on the stem, creating new plants.

Runner – A stem running along the soil surface. Roots and shoots sprout from nodes on the stem, creating new plants.

Seed – The reproductive part of a plant. Seeds result from sexual reproduction—when pollen from one flower fertilises the ova in another flower.

Vegetative reproduction – Asexual reproduction – or reproducing without seeds. Vegetative reproduction takes place when part of a plant grows into an entirely new plant, capable of living on its own.

Weed – A plant growing where it is not wanted.

Blowin' in the wind

Some seeds are great fliers. Record how far each seed travels, then calculate how far the plant could spread in 10 years.

Plant	Distance blown	X	# generations in 10 years	=	Distance travelled in 10 years
		X		=	
		X		=	
		X		=	
		X		=	
		X		=	
		X		=	