The Dummies Guide to Gardening

Fun, educational activates that’ll turn you & your child into gardening and sustainability experts in 12 simple sessions

Suitable for ages 6 and up.

Feeding The Self is a registered Public Benefit Organisation (#930038248) that puts food gardens in rural and under-resourced school, and uses them as a new way to teach the curriculum. Find out more at www.feedingtheself.org
Introduction

This document is based on the Feeding the self school project, and so is ideally designed for groups of children, whether in a school, community location, or home.

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Session 0: Did you know that you can grow your own food?

Growing food is easy!

To grow your own food there are things you need:

1) A place to grow plants
2) Soil for plants to grow in
3) Seeds to plant and grow
4) Water to help your plants grow
5) Sunlight, free from the sun

Once you have prepared the garden, all you have to do is watch your plants grow.

Growing food is fun!

Did you know? All energy for life comes through plants from the sun.
Aside from producing food, the project teaches students about their relationship with the environment. It emphasises that this relationship is not passive; that they can shape their world through thought and careful action. All it takes is thinking, planning, and an experimental attitude. Instead of hurrying into gardening, we should first carefully observe, and think of what will work best in the situation; gardening is about reflection, and providing time for thought.

The garden and the school
The garden is that it is not just for growing food; it is a way of helping/encouraging learners to engage with material in the curriculum by taking an active role in the way their school looks and what it produces.

Gardening offers students a way of becoming involved with the school as an environment, allowing them to manipulate and shape that environment while remaining safe. They also learn a wide range of practical and personal skills, including observation, planning, problem solving, and responsibility. Finally, it will give them a meaningful sense of accomplishment and self-worth because at the end of the program their own gardens, both at the school and at their home, will be producing food.

The garden as a teaching/learning space:
The garden is a space that can be used creatively to introduce new ideas to the learners, and a helpful teaching resource. We will be providing materials to help with integrating the garden into English, Natural Science, LO, and Maths. It provides the perfect place for showing how different subjects relate to each other; for example, through nutrition and food security, it brings Life Orientation into the Natural Science class. The garden thus becomes a classroom as well as a resource which can be used within the classroom.

Question: What can you teach with a garden?
Answer: Natural Science, Community Awareness, Health and Personal development, the importance of looking after the environment... All it takes is imagination.

There are many possible ways to use the garden as an educational resource. A few of those possibilities will be outlined, but you can use the space in other creative ways as well. Each following item is an idea that you will be able to teach to your students in the classroom using the garden, and will be reinforced by learner activities within the garden.

On the next page you will find a list of terms. Each will have a highlighted definition in bold, look out for them.
The Environment

The environment is a place populated by people, animals and plants that surrounds, and supports all of us. But it is also a space that can be managed, influenced and shaped by our actions. In biology, environment refers to the physical, chemical and biological conditions of the region in which an organism lives.

Since human beings are also organisms, ‘the environment’ refers to all the conditions that influence human life. Physically, it is where we live, work, socialise and play. Chemically and biologically, it refers to what we eat or drink as well as what we do (i.e. how we use our bodies).

The garden is part of our environment: it affects our physical conditions, by making the school look/feel nicer. It attracts insects and butterflies, and monkeys might try to steal the food growing in it. It affects us chemically and biologically, because the learners will be out in the garden, working with their bodies, to produce food to fuel those bodies.

The garden also shows learners how to positively influence their environment; that they can shape and change the conditions where they live, work and play. All it takes is thinking, planning and action.

Your garden will become a functioning ecosystem;
A space where the students can work with their environment,
Their first laboratory and a place of experimentation

In the garden one must observe, plan, design and think – as well as plant.

Ecology and Ecosystems

We live in an environment populated with people, places, plants and animals. These people, places, plants and animals all form an ecosystem. Ecology is the study of the interrelationships between those organisms and their environments.

An ecosystem is a biological community and the physical environment associated with it. The physical environment includes the role and function of soil in the life cycle of plants, animals and a healthy environment, as well as effects of the climate and rain levels on the environment. A biological community would include the plants, animals and us, and how we all function in relationships with each other.

The garden is an ecosystem, and in studying it we can become ecologists: It can be used to teach the essential role played by plants in human life and to life in general. As a teacher, you can use the garden to talk the importance of plants from a nutritional perspective, for example how plants are our food, as well as food for other animals (like monkeys and insects). As an ecosystem the garden also supports lizards which eat the insects that eat the plants.

An understanding of ecosystems and biological communities will be applied to the learners’ garden design: plants which can support each other will be introduced, and certain insects and lizards will be encouraged, since they eat other creatures that are dangerous to our plants (i.e. we will introduce natural predators to control pests rather than using pesticides). Through the garden, the learners will build a functioning ecosystem.
Permaculture

Permaculture simply refers to the primary method of gardening that will be used in the school, and the learners. It combines two words to create sustainable environments for us to live in: Permanent + Agriculture. The idea behind permaculture is to create a system that will continuously produce food without damaging the environment or requiring damaging materials like chemical fertilizers and pesticides.

Permaculture incorporates the ideas of ecosystems and ecology. Therefore in the garden the learners will learn how to work with nature and natural systems to produce food, bringing together traditional techniques with modern science to grow their gardens.

The principal of permaculture is to work with nature; to spend time observing, thinking and planning rather than just working thoughtlessly. The learners will be looking at the plants, insects and animals within the garden as an ecosystem. Examine their relationships with each other and to the garden as a natural system, and then use these observations to improve upon the garden.

Remember: A healthy garden environment is one that includes insects, lizards, herbs, worms, vegetables and trees in harmony. Using these together within the garden will create a healthy ecosystem.

Community

A community is the environment that we inhabit. In biology, a community is a naturally occurring group of plants and animals living in a defined area (their habitat). Remember that we are a natural species, so there is the human community as well as a human habitat. Human community can be viewed from many levels: a) the people living in one locality, b) a group of people sharing common ethnic, cultural, or religious characteristics, or c) the public in general; i.e. society.

All of these levels of human community affect us in various ways, and we can influence our community positively. In the same way we shape our environment, we shape our community – it is as easy as growing food. One of the basic requirements in any community is food security, and through the permaculture garden we offer food security to people in their community.

Simply in “Feeding The Self” well the local community will be positively changed. This will also give the learner a true sense of self-worth, in that they will be able to take practical skills out into their community.

Outreach and Responsibility

The final layer of this educational system is to encourage the learner to take and implement what they have learned responsibly into the community. The learner will then become a space for change within the community. And as the Sessions of growth and gardening continue the learner will be encouraged to see it as their responsibility to take their skills (i.e. ability to produce food) out into the community.
The first things you will need to create a garden are space, plants, seeds and effort. All the elements are in place; there is plenty of space, and seeds are cheap, so all we need to make the garden happen is planning, thinking and then planting. This project will help you learn everything you need to feed yourself and your family for as long as you are willing.

For a successful garden you will need some simple tools, seeds and plants, which we will provide.

**A trowel:** A trowel is a small spade used for digging and planting seeds or plants.

**Seed trays:** A seed tray is a tray used to seed certain varieties of plants. Like children, seeds need a safe space to grow before they can be introduced into the world.

**Seedlings:** A seedling is a young plant or a plant which has recently germinated (i.e. started growing). Some seeds are best grown first in seed trays and then moved into the garden.

**Seeds:** All plants start out as seeds. Some seeds are best planted in seed trays (e.g. cabbage, eggplant, spinach and tomato). Other seeds can be planted directly into the garden (e.g. radish, beans, peas and carrots).

**Potting Soil:** Potting soil is a special mixture of soil and plant matter good for seed trays and growing pot plants in.

**Compost:** This is made from layering unused plants and vegetables with soil for a few months. It helps the plants grow faster and stronger. It is very concentrated, so remember to only use small amounts of compost. Most of what a plant needs to grow is already found in the soil.

Over the next twelve Sessions you will be creating a garden and growing food. As you read below you will find some helpful tips on how to plant and some activities you will do in the garden and in the classroom.

Did you know that all the vegetables you eat were planted and grown in gardens?
And this is something you can do for yourself.

Before you start planting:
1) Talk in your groups about what you think your garden will look like when it has grown.
2) Think about how you want the garden to look.
3) Talk about what types of food you might like to try and grow in the garden.
4) Also think about what you could do with all the food you are going to grow.
5) Remember to have fun.
Sugar (or glucose), and vitamins are formed in plants by photosynthesis (taking energy from the sun). Minerals are taken from the soil by plants and used to grow. Fibre comes from the cell walls of plants, which are formed as the plant grows.

Did you know? Photosynthesis (taking energy from the sun) in plants is the source of all the sugars; even carnivores (meat eaters) get sugars from plants by eating the herbivores.
Getting your hands dirty.

1: Check your garden

1) Find your group garden space.
2) With your hands, trowels or garden forks check the soil of your garden:
   Remove any small stones, root material, grass and/or litter you find on, or near to the soil surface.
3) Tidy up any litter around your garden.

2: Plant seedlings

You have been provided with seed trays, some of the seed trays already have seedlings.

To remove seedlings from the white seed trays:
1) Find a pencil, or old pen.
2) At the base of each tray compartment is a small round hole.
3) Push the back of pencil/pen into the hole to push the seedling out of the compartment.
4) Dig a small hole with your fingers.
5) Put the seedling into that hole.
6) Make sure that the leaves of each seedling remain above the soil surface, exposed to sunlight.
7) To help the seedlings grow, you can sprinkle a little compost around the plant. Remember that the soil has all the food the plant needs so only use a very little compost.

3: Seeds

As a group you have been given bean, pea, marigold and radish seeds to plant in the garden, around the seedlings from the seed trays.

Make the radish seeds make a pattern in your garden:
1) Discuss as a group what pattern you want to make in with your radish seeds. It could be: A square, circle, triangle or even a star... be creative.
2) Use your finger to draw the pattern in the garden soil.
3) In the pattern sow the radish seeds.
4) Cover the radish seeds with soil.
5) In a few weeks your pattern will be outlined with radishes.

Remember: Be gentle when you remove the seedlings.

Plants need sunlight to grow. They have Chlorophyll in their leaves; this allows plants to convert the sun’s energy into fuel for growing. This is called photosynthesis. This is why the leaves must be given lots of sunlight.

When you plant seeds you are sowing them.
When you sow seeds you are planting them.
4: Seed trays

Some of the seeds you have been given need to be planted in seed trays before you put them into the garden. You have been given black plastic seed trays, potting soil and seeds.

To prepare the seed tray:
1) Using your hands or trowel half full all the compartments in the tray with potting soil.
2) Place in each compartment one seed.
3) Once you have planted your seeds you can cover the seeds and full the tray with potting soil.
4) Carefully water the seeds. Be careful: You do not need a lot of water; seeds are very small so only drink a small amount of water.
5) Put the seed trays in a place that gets shade and sunlight. And do not leave the trays inside all day; remember that plants need sunlight to grow.

Remember: Record and label which seeds you plant in the seed trays. It is very important that you do this, ask your teacher for help.

5: Workbooks

Write about the garden in your workbook. Try the following... but the workbook is yours!

- What does your garden looks like?
- Draw a map of the garden beds and their shape.
- How much have your plants grown?
- What type of plants/seeds are you growing?
- Are you having fun with the garden?

Every Session record how the garden changes and grows.

If you work together it will be more fun.
Together you can do more than when you are alone.
Together things will seem easier.
Work with your group.
Work together.
The garden as an ecosystem.

We are going to re-introduce your garden to you and in doing so offer a new way of maintaining the space. One which is productive whilst relying on minimal work from you; whilst attracting life into the garden – butterflies, birds, and good creepy crawlies.

**Step 1: ‘Ecosystems’**.

Look at the support material and read the section in the facilitator introduction on the *environment* and *ecosystems*; then ask:

- When you look at nature do you see anyone maintaining it?
- Would you like a garden that maintains itself?
- What elements do you think are necessary a healthy ecosystem?

Remember the base of any ecosystem is plants: Examine the Plants as Food poster.

- Plants are not only food for us they are also food essential to life on Earth and the environment.
- Basically without plants there would be no life on Earth.
- We can use plants, in farming and gardening, to shape an ecosystem to suit our needs sustainably.

**Step 2: The garden as an ecosystem.**

Read the *Permaculture* section in the facilitator introduction of the support material:

- Why isn’t every other plant in your garden producing food?
- Vegetables and fruit plants grow easily and look as good as other plants; and they produce food.

Remember that vegetables are an essential part of a healthy diet: Examine the Plants as Food poster.

- We should plant them in our gardens to be certain we are eating fresh produce.
- We can create an ecosystem that not only maintains itself, but one that also helps maintain us.

**Step 3: Work together.**

Getting the garden going will require a little effort so work together with family or friends. If everyone chips in it will be fun and much easier. Get your hands dirty by working through the first Session’s activities.

Avoid planting one kind of plant together in a bed (we are not farming crops) so mix it up. This is called *companion planting*, certain plants groups grow well together (see companion planting lists at the back). Mix flowers, herbs, and food plants together in a garden bed.

**Step 4: Talk about what you are doing.**

Talk about what you are doing.

Work smart not hard.

Have fun.
Session 2: Digging a permaculture bed

The garden beds are home for your plants. To make this home nice and healthy for them, you must **dig down** or **build up**

**Digging down**

To dig down, you need a spade and a pick or pitchfork

1) Outline the area you are going to dig.  
2) Remove grass, roots and stones from the garden bed.  
3) Dig the bed to a depth of one spade head. (Keep the soil to the side of your bed)  
4) Now take the pitchfork or pick and loosen the underlying earth.  
5) Then return the soil you into the bed. (Your bed is now ready for planting)

If you **dig deep**, you loosen the soil underneath your garden bed. The soil will then hold water better so you can water the plants less. The roots will also grow stronger and faster because the soil is looser.

**Building up**

You need soil a spade and something to hold the soil in place (like a pot).  

1) Remove grass, roots and stones from the soil.  
2) Line the bottom of the container with dry plant matter (mulch).  
3) Full the container with the soil mix.  
4) Make sure that the soil is loose.  
5) The container is ready for planting.

Things you might use to build up with:  
1) Two or three old tires packed on top of each other.  
2) A deep old pot, wooden box or barrel with holes in the bottom.  
3) Bricks or H-blocks to outline & create a garden bed.
Plants, the soil and habitats.

The learners have now started planting in the garden and making seed trays. There is still much for them to do: build a lizard island and plant fruit trees, for example. The learners will need to see the soil and the lizard islands as habitats. Remember: Good habitats are essential to a healthy environment.

**Habitat:** A habitat is the place where plants, animals (organisms) live, and is characterized by its physical features (soil, climate, water sources, predators, etc.). In Natural Science, it is where the plant or animal grows, eats and reproduces. The plants or animals living in the habitat will do well if the habitat is healthy (i.e. having good soil, water and sunlight for plants). This changes per habitat; for example, the ideal habitat for acacia trees is very hot and dry, which would kill many of the plants in the garden.

For plants their habitat is the soil. Using their root system, plants extract all the minerals and water they need to grow from the soil. If the soil is poor then the plants will not grow well, but if the soil is good then the plants will grow well. This is also why it is better to water under, rather than on top of, the ground.

This Session the students should build a Lizard Island, a habitat which will attract lizards into the garden. This will help the garden eco-system because the lizards will eat insects which could hurt the growth of their vegetables, and also poop in the garden. In the garden you can use nature as a friend to improve the growth of vegetables.

![Certain plants (like Comfrey) will help other plants grow because they feed many of the minerals that other plants need in order to grow back into the soil.](image)

**Decomposition:** Decomposition refers to when plants or animals decay. It is the breakdown of organic matter (once living) into its elements or parts. This simply means wood, leaves, branches, and roots of a plant will break apart into smaller and smaller pieces as they are eaten by microscopic life forms, worms and insects. This continues until there is nothing left of the original plant and all its elements and compounds have returned into the soil. These elements (like: carbon, nitrogen, phosphate, calcium, etc.) are then used by the next generation of plants to grow.

Decomposition occurs naturally as leaves fall from trees and insects die, but you can help the cycle by creating mulch piles, compost heaps and worm farms. **Compost** is merely ‘soil’ rich in decomposing plant matter, the same matter used by plants to grow. If soil quality is poor then adding compost can help create a balanced habitat for plants. **Mulch** is old grass, leaves and plant matter that has been left to dry. It aerates the soil, and provides carbon for small animals and worms (life) to eat. The top 10 cm of soil is rich in microbial life, which you can see from how dark the soil is (the darker the better). If you do not have compost then adding dark coloured topsoil (top 10 cm) or mulch to the garden will also help.

![In biology many worms are called detrivores (detri = decaying + vore = eats) and are therefore decomposers. A detrivore eats decaying and dead plant matter which helps in decomposition. This is why earthworms are important to the soil, as they help breakdown plant matter into the elements (minerals and nutrients) used by plants for growth.](image)
How to start your garden

Soil is the most important element to growing a healthy garden.

One: Check your garden

1a) Make sure your garden is growing well.
1b) Clean up any litter from your garden and the area surrounding the gardens.
1c) In the workbooks write what your garden looks like.
1d) Measure how tall three different types of plant are, keep the results in your workbook.
1e) Have fun!

Answer the following questions:
What would make the garden look nicer or healthier?
Do you see any insects in the garden?
How much have the plants grown since you planted them?
Have the seeds you have planted started to grow yet?

Two: The soil.

2a) Examine the soil around the garden bed: run your hands through the soil and crush the soil between your fingers (Remember not to stand on the garden bed!).
2b) What does the soil looks like? What colour is it? How does it feel? Ask your teacher about why. For example, if the soil is dark, it is full of life; if it is lumpy and heavy, it has a lot of clay in it; if it’s pale or sandy it will need compost or topsoil to bring life back to it.
2c) Find and examine soil away from the garden: run your hands through the compost, crush it between your fingers.
2d) What does the soil looks like? What colour is it? How does it feel?
2e) Write down what the soil was like (Remember dark, loose soil is the best for growing!). Later, you can compare how well plants grow in different soils at the school and at home.

When plants die they return all their health and goodness to the soil. They do this by decomposition. Decomposition refers to when a plant (the stem, leaves, roots and branches) break up and return minerals to the soil. Try to find dry grass/plant matter (organic material) and spread it around your plants; this is called mulch and will help the plants grow by stopping the soil from drying out.

Three: The Lizard Island

3a) Search the school grounds for either stones or logs to build the Island with.
3b) Chose a quiet location within the garden to build the Lizard Island.
3c) Build the lizards a little Island out of the logs and stones to live in. Arrange the stones and wood carefully to give the lizards space to live in. The lizards will eat the insects in the garden.

You want lizards in the garden! They eat the insects that eat your vegetables. To get lizards build them a habitat.
The soil and the environment

The base of any ecosystem is plant life, and plants grow in soil. If we ‘fix’ the soil properly then most of the hard work for ensuring healthy growth is done. After all up to half of a plant is under the soil.

**Step 1:** What to do with your soil.

Try activity two on the second worksheet and get your hands dirty:
- Is the soil sandy, dry and grey? (This tells us the nutrient level of the soil is low)
  - Add dark brown or red soil, otherwise adding compost to the mix can help.
- Is the soil heavy and forms large difficult to break up clumps? (This tells us there is too much clay present)
  - Add sandier soil to the mix.
- Is the soil a dark reddish brown and breaks into small clods easily? (This is excellent news!)
  - The soil is ready for planting.

Soil colour tells us about the nutrient and mineral content; which plants use to grow:
  - Pale soil is poor (little grows in beach sand).
  - Dark reddish brown soil is excellent.

How hard or compacted the soil is tells us how much clay is present:
  - Clay is bad because it makes the soil hard and heavy to work with.
  - It binds the soil and restricts root growth, but clay also improves water retention.
  - Sandy soil is lacks support and has poor water retention.
  - Good soil crumbles into small beads of dirt.

**Step 2:** Life is good...

Plants draw minerals, nutrients, and water from soil using roots.
We want to see worms, lizards, little plants, and bugs in and on the soil – to tell us the ecosystem is healthy.

If the soil mix is good and the right plants are planted then the garden will attract life to it.

**Step 3:** Build a place for lizards.

More life is good, but not all insects are helpful, some eat our plants.
But the ecosystem provides a solution: lizards, birds, and more eat those pests.
Attract lizards into the garden their needs are simple.

Do activity three of worksheet two:
  - Pile stones and logs to create gaps and make prime real estate for lizards to hide and live in.
  - Predators are part of any functioning eco-system.

**Step 4:** Attract the right kind of life...

Remember when it comes to flowers and other non-producing plants: **Indigenous is better!**
These plants have always grown in this region and so are biologically suited to the local environment.
Also indigenous plants are best for attracting useful local wildlife (lizards, birds, butterflies, and more).
Session 3: Photosynthesis & plant health

From the sun: Comes sunlight, which is energy.

The sunlight is caught by chlorophyll inside plant cells; this chlorophyll then turns sunlight into vitamins and sugars.

Chlorophyll is why leaves are green.

When chlorophyll makes energy from the sun (light) into energy for plants and all life (sugar) it is called photosynthesis.

Sunlight does one more thing: It helps plants pull water and nutrients out of the soil and up through roots using evaporation.

Did you know? Even humans need sunlight to grow and live properly; our bodies need sunlight to produce Vitamin D, which is important to virtually everything in the body.
The soil, sun and rain

The garden has experienced the positive and negative effects of rain and sunshine. These positives and negatives make good teaching material.

**The sun and seedlings in the seed trays:** When making seed trays it is important that they get enough sunlight, but not too much. A lack of sunlight will cause the seedlings to die, just as too much sunlight can. Too little sunlight will cause the seedlings to grow tall too quickly as they look for the sun, making them very weak; too much sun will dry the seedlings out too quickly, and they will not germinate properly. Just as human cells burn fats and sugars for energy, so do plants; however, they get their sugar from photosynthesis (photo light + synthesis (making a new thing)). All plants need sunlight to photosynthesize, and they need to photosynthesize to grow. Photosynthesis converts the energy of the sun (light) into energy for their growth (glucose). But seedlings are young and sensitive, so the sun can also hurt them.

*Something to think about:* A duty with the seedlings is to make sure the seedlings get enough sunlight, but no too much. This means during longer breaks someone responsible should watch the seedlings.

**Glucose:** Is a sugar, like fructose and sucrose, and the main source of energy in all living things, both plants and animals. Without sugars nothing would have the energy to live and grow. Without photosynthesis there would be no glucose, and so without photosynthesis there would be no energy for life.

**Did you know?** Even carnivores get their sugar/energy from plants photosynthesising. They get their glucose from the fat of the animals they eat, because bodies store sugars (energy) in fat cells. So there really could be no life on earth without photosynthesis; it was simply photosynthesis that happened in plants many millions of years ago (for example, during the time of the dinosaurs).

**Leaching and the rain:** Leaching in science means to remove the soluble components of a solid mixture by percolating (i.e. running) something through it. So if you run water (a liquid) through soil (a solid mixture) the water will pick up minerals, nutrients and other bits from inside the soil. Think about when you run water through soil – the clear water becomes brown and dirty (try this as an experiment). This is because the water leaches out soluble material from the soil which turns the water brown. Too much rain can be bad because it can leach from the soil minerals and nutrients plants need to remain healthy, but this can be fixed. Leaching may even change the colour of the soil and make it paler.

This is why there is a layer of mulch at the bottom of each bed we have dug, since this gives the bed a space for leached materials and water to be retained. Adding dry plant matter (mulch: leaves, grass, bark and small twigs) to the soil’s surface as well as layer underneath the bed will stop leaching and slowly replace any lost nutrients. But plants also need water to grow, especially if it is hot (i.e. like in Durban’s summer).

**Compost, mulch and nutrients:** On forest floors and in other plant-rich areas there is a layer of detritus (organic material derived from dead and decomposing plants) called humus which gives soil its rich dark-colour and is the organic component of soil which is formed by decomposition. Compost is artificial humus and is the result of encouraging the activities of detrivores (like worms, bacteria, etc.) that help decomposition by eating decaying plant matter. In a compost pile we are create the conditions of decomposition which break down organic matter into minerals and nutrients that plants use for growth.

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**Remember:** It is okay to get things wrong, as long as you move forward and learn from it. Some things in the garden will not work. That is okay; use it as a learning opportunity.
Composting and mulching are decomposing plant matter that return minerals and nutrients to the soil. For compost a mix of 50% greens (for nitrogen) and 50% browns (for carbon) is best.

One: Maintaining soil quality
An easy way of maintaining soil quality is to create a compost pit.

1a) Select some ground that gets both sunlight and partial shade during the day. Mark a square on the ground that is 1 meter by 1 meter; near the garden.
b) Dig out the marked area to a depth of 30 cm; or more simply start your pile on a flat surface.

- A compost pile/pit needs heat to help the decomposition of the plant material.
c) Deposit vegetable scraps, garden clippings and other fresh organic material (no animal/human waste) into the centre of the compost pit/pile. Also add in dried leaves, chopped twigs and brown organic material.
   - If the pile starts to smell then you have too much nitrogen in the mix; to fix this add dried crushed 'brown' leaves/grass or generally mulch and soil into the compost and turn it.
d) Turn the compost with a pitchfork every two weeks. Heap the material to the centre of each time, and add a shovel full of soil each time you turn it. Poke holes in the stack providing places for air to reach the inner layers.
e) Maintain dampness by adding a little water to the pit if it becomes too dry.
f) Use the compost when it is thoroughly decomposed and crumbly. Mix into soil for nutrient rich organic gardening or place around established plants.

Two: Planting flowers and seeding the seed trays
You have been provided with potting soil and flower seeds.

2a) Mix the potting soil with some normal soil. Make sure the mix is loose (i.e. easy to run your fingers through).
b) Fill the seed trays with the potting soil mix.
c) With the food seeds add one seed to each compartment in the seed tray.
   Pack the seeds firmly into the mix then sprinkle a little water.
d) Take the flower seeds you have been given; add some to your gardens and put the rest around the school.
e) Discuss with your teacher and class when you the flowers will grow.
   Check the seed packet, it has helpful information.
f) Record in your work book when the flowers you planted will bloom.

Three: Preparing material to take home
You are going to be given seeds to take home and plant so:

3a) Think about and in your groups discuss what you have learnt about growing plants.
b) With your group start writing material, like the digging poster, you can take home for your gardens.
c) Maybe you can use some of the records in your workbook to help create gardening material? For example, you can redraw pictures from your workbooks on posters for your parents.
Helping the soil

The soil is so important that it is worth mentioning again! The soil contains the nutrients and minerals that plants convert into growth. These nutrients can be replaced and/or added, if necessary.

**Step 1:** What plants need.

Plants need: 1) sunlight, 2) water, and 3) nutrients.

- Plants draw their nutrients and water from the soil, with roots.
- Plants convert sunlight into energy in a process called **photosynthesis**.
- Energy from photosynthesis allows plants to convert minerals, nutrients and water into sugar.
- This sugar is used by the plant, and all other life to grow. (See 4: Energy from plants)

Sunlight is not a problem as it comes from the sun... for free. So we can go back to the soil.

**Step 2:** Compost and Mulch.

Read about decomposition in 2: plants, the soil and habitats:

- Compost/ mulch is good for the garden ecosystem, it replaces lost minerals and nutrients.
- You can make your own compost easily and cheaply.

It is easy to make compost; follow activity one in the 3: It’s all about the soil worksheet.

- Use a bin or dug out pit, add decomposing plant, and vegetable matter, but avoid animal products.
- Thick fruit peels (lemon, orange, banana, etc.) do not work well.
- Mix together brown (soil, twigs, drying, leaves, and bark) and green (kitchen greens, grass) equally.
- Every two weeks turn/stir the (de)composting material.

Mulch is a covering layer of decomposing plant matter (mowed grass works best), or cardboard.

- Cover any garden bed with the mulch leaving an uncovered area immediately around seeds.
- The mulch will stop sunlight reaching the seeds of plants you do not want, slowing their growth.
- Mulch reduces the negative effects of too much rain, too much sun, or too much cold.
- Always mulch!

**Step 3:** Water and the soil.

Read the section ‘leeching and the rain’ in 3: The soil, sun and rain.

Plants draw water from the soil and good soil preparation can manage the amount of water the garden needs.

In sandy soil water runs away (leeches) too quickly, and in the course of a day go from wet to dry.

- Soil with high clay content retains too much water, and when it is hot the water/soil mix bakes hard.
- The soil that crumbles into small beads is best because water is retained, but it is still soft for root growth.

- Mulching and adding compost will improve soil quality, and mulching slows water loss through evaporation.

The best time to water a garden is in the morning or evening, but never at midday.
Session 4: Grow your own food at home

A garden improves the environment in lots of ways!

1) It makes a home more personal; more ‘your’ home.
2) With flowers and indigenous plants, a garden improves the health of any local environment; with the right plants, it will also attract birds and butterflies.
3) The garden is relaxing and is a family/community activity.
4) It provides an additional source of food.

Gardening is fun and easy!

For a successful garden you need

1) **Space** to dig a garden bed, or a container to plant in.
2) **Some tools**: A spade or shovel, and a hoe, pick or pitchfork.
3) **Some seeds** or seedlings to plant.
4) **Free time** to spend in the garden.

All around you!

1) **Space**: Look around you; talk to your neighbours, find old pots or tyres.
2) **Tools**: Ask if you can borrow tools, but look after them!
3) **Seeds**: You can get seeds from the fruit and vegetable you like to eat! Also, maybe gogo has some spare seeds?
4) **Time**: With the help of friends or family there is lots of time.

Where can I find all these things?
Energy from Plants

What comes to earth from the sun?
Energy (heat and light) comes to earth from the sun

How does that energy get to earth?
Energy comes to earth as sunlight, and is blocked by clouds and the atmosphere.

Where do plants get energy from?
Sunlight gives plants energy

How do plants turn sunlight into energy they can use?
Photosynthesis changes energy from sunlight into energy for plant development.

Inside plant cells chlorophyll changes energy from sunlight into sugar.

Where do we get energy from?
Everything needs energy to fuel growth, development, activity and healing.
Humans (us) and all the animals get their energy from sugars.
Humans and all the animals get sugar from plants.
Plants make sugar using sunlight.
Sunlight is energy from the sun.
So our energy (sugar) comes from eating plants!
One: Expanding the garden at school

1a) Go over the poster on how to prepare a permaculture bed.
b) Decide if you should build up or dig down to expand the garden space (why not try both in different beds?).
c) Find and mark out the space for the expansion. Use sticks, rocks, string, or anything you can to outline the bed.
d) Collect the things you will need; ask for help from your teachers and neighbours.
e) With the help of your class and group, expand the garden.

Remember: with more people helping digging will be easier and faster. But also more fun!

Two: Translate the dig poster for your community

2a) Look at the “how to prepare a permaculture bed” poster carefully:
   What is important on the poster?
   How would you make the poster look?

b) Discuss what the words on the poster could mean with your class/group.
   Do you know any Zulu words for them?

c) In your groups design a poster that will be in Zulu:
   Discuss what you want the poster to tell people.

d) Be creative!

Do not only translate the words on the poster! Make the poster your own; use your own words, and find/draw your own pictures. The most important thing is the information not the words!

Three: Try growing a garden at home

Have you thought of growing food at home, or with a friend near where you live? You can do this in almost any space; a tyre, or an ice cream tub for seedlings, for example.

1a) Look at the activities, and information, you have been given; could you do this at home?
b) Go over your garden guides; could you do this at home or with a friend?
c) Talk to your parents/ neighbours about growing a garden, and give them the poster.
d) Mark out where you want to put your garden.
e) Start the garden: all it takes is a little work, time and effort.

Remember what you learn at school you can take home!
Improving our environment

The words ‘environment’ and ‘ecosystem’ do not just apply to animals or nature. We live in the environment, and we can shape, improve and maintain it at home, or anywhere you might wish to. Use what you know about soil, plants and planting to improve your environment – grow food, or just flowers.

Step 1: If it can be in one place then it can be done elsewhere.

To grow all plants need are soil (nutrients, minerals, and water) and sunlight. In Durban these commodities are easy to find... and so all the garden really needs is creativity, seeds and work.

What value would you place on the environment working for you?

Step 2: Maintaining the garden.

With mulch and properly dug beds you should only need to water once or, maybe, twice a week; and that is if it has not been raining. Also if you are layering mulch onto the garden then some potential future problems are being taken care of:

Plants convert nutrients and minerals into growth; this means they need to be replaced to sustain growth rates. Mulch returns lost nutrients because the decomposing material seeps back into the soil.

Also with companion planting the community of plants will help each other as certain plants will generate the organic material (compounds) used by others. Also the flowers will distract pests and attract predatory insects that eat pests. This reduces the need for fertilizer and/or pesticide.

Step 3: Seedlings

Grow your own seedlings. You can use old plastic containers (punch a hole in the bottom to allow for drainage), or reuse old seed trays. Use soil dark soil or potting soil. When placing the seeds leave space between each to give them room to grow.

Seeds are small, but if you place too many seeds next to each other when they all start growing their roots will entangle, this will restrict growth and make replanting difficult.
Indigenous: An indigenous plant is any plant that is naturally occurring to the local environment. This means that it grows all by itself; humans did not bring it into the environment, and it does not need special conditions to grow in.

Many plants, especially most food plants like mealie, cucumber, tomato, and potato, are not indigenous, and were mostly brought to South Africa from Europe and the Middle East.

Indigenous plants improve the local environment by attracting more butterflies, insects and local wildlife than other plants, because local life is built to recognise them. This is good for the health of the environment, and reduces pests.

1) Indigenous plants grow well locally without the help of humans.
2) An indigenous plant fits into the environment; so you do not need to change the soil, water the plant, add compost or anything else (although all of these will help the plant grow better).
3) All you have to do is prepare the soil properly, plant the tree or flower, and watch it grow.

Did you know? The reason we don’t use indigenous plants for food crops is that they haven’t been selected/bred for long enough (only a few hundred years). Most of the food plants we eat have been carefully bred for maximum growth and tastiness over thousands of years.
Insects in the garden
This Session we will be learning about insects in the garden. To do this you will be outside catching them.

One: A display house for insects

Before you go outside and hunt for insects you need some containers that can be used as a house for the insects.

Things to think about when selecting the container (house):
- You want to be able to see the insects.
- You need to make air holes in the container (all life, including plants and insects, breathes).
- The container needs to hold the insect, and soil and plant matter for the insect in live/eat.

Try and find two or three containers you could use to make your insect house.

Did you know? Some animals live by only eating insects. These animals are called insectivores; any animal that only eats insects is an insectivore. The Aardvark (a relative of the hyena) is an insectivore.

Two: Hunting for insects

Insects are small, delicate and very good at hiding so you must look carefully.

In your groups go outside and look for insects.

2a) Look on plants, under stones and in the soil (everywhere) for insects and other forms of life.
b) Remember where the insect you find lives, you need to make its house look like that.
c) Do you think your insect eats plants or other insects?
d) Think about which insects you want to catch and catch them.
e) Write in your workbooks where the insect lives and what you think it eats.
f) Watch the insect in the house:
   i) Is it eating the food you have given it? (Try different food types)
   ii) Is it growing? Does it hide, or stay in the open?

Did you know? If you added up the weight of all the insects in the world, they would weigh more than if you added up the weight of all the people in the world.

Three: Build a house (habitat) for the insects

In the containers you brought to school build a house (habitat) for the insects:

3a) Add thin layer soil, old twigs, leaves and grass for the insect to live on.
b) The habitat inside the house must be the same as the habitat you found the insect living

c) Put the insect into its house.
d) See if you can find out the name of your insect.

Remember

[Diagram of an insect with labels: Antenna, Head, Thorax, Abdomen, Wings, Antenna, Head, Thorax, Abdomen, 6 legs, G mercury, Mouthparts]
Making an insect zoo

Fun you can have with children: Going outside to hunt for insects and other life.
To do this you will need containers (e.g. old coke bottles, ice cream containers, jam jars, an unused fish tank, etc.) to keep the insects in.

**Step 1:** Building a habitat for insects.

Before you build the insect house look and see what the insect lives in and might eat.

When looking for insects:
1) Look on plants, in dead plant matter, in the soil and on the ground.
2) Pay attention to where the insect lives.
3) Decide if the insect eats plants or other insects.
4) For each insect they choose to keep they must build a habitat for that insect to live in.

The insect habitat will need to have a section you can see through (otherwise what is the point), holes to allow air in and out, and a reproduction in miniature of the environment the insect was found in.

**Step 2:** Catching the insect.

*Remember* build the habitat before you catch the insect! You do not want the bug and nowhere to put it.

Go back to the places you found the insects in and catch them.
Insects can be creepy but they cannot hurt you. In Durban and South Africa it is important to know a little about them because they are everywhere and many can be quite bad for the garden, whilst others are beneficial.

Even though insects are very small, if you added up the weight of all the insects in the world (their total **biomass**) they would weigh more than all the humans, reptiles, and mammals, in the world. Insects are important for the ecosystem; i.e. bees not only make honey but they pollinate flowers when they collect the nectar they use to make honey.

**Step 3:** Flowers versus Insects.

In companion planting flowers are an important defence against insects.
- Insects find food with a sense of smell and sight.
- Flowers have a strong scent which confuses insects’ sense of smell.
- Flowers are brightly coloured which confuses the insects’ sense of sight.
- Flowers attract predatory insects (i.e. the praying mantis) that eat pests.
**Session 6: The life cycle**

Germination is when the ‘baby’ plant cracks through the seed casing and sends down a root (to find water) and sends up a shoot (looking for sunlight).

Once the seed **germinates** the plant will then continue to grow. This growth will continue until the plant blooms (i.e. its flowers and vegetables grow).

The flower attracts insects to **pollinate** the flower. Once **pollination** has happened the flower will ‘die’ and the seeds (or fruit) will grow where the flower was. And then the cycle begins again!

**Did you know?** All plants move, and will try to turn and face the sun as quickly as they can. Flowers will also sometimes open and close during the day to prevent moisture loss (especially on cactuses).
**Did you know?** Chlorophyll is not only responsible for photosynthesis, but it is also the reason why most plants are green.

**Did you know?** It is a good idea to put worms into compost heaps. They will help the plant matter decompose… i.e. Worms turn plant matter into compost.

**Glossary**

This is a helpful list of terms/words that will be found in the teacher, student and planting support material. The reference list is arranged alphabetically and each word/term has a definition and explanation. Feel free to add to the list, but share the definitions with everyone in the classroom.

**Allium**

Any liliaceous plant of the genus Allium, such as the onion, garlic, shallot, leek, and chive.

**Biology**

The study of living organisms: This includes their structure (from the body to the cells), functioning, origin and evolution, classification and interrelationships, and distribution.

**Brassica**

Any cruciferous plant of the genus Brassica, native to the Mediterranean region and is grown widely as vegetables. The genus includes plants such as cabbage, rape, swede, turnip and mustard.

**Carnivore**

Animals that get the majority of the glucose and other nutrients they need by the eating of meat. Examples: Lion, Leopard, Hyena, Eagle, Shark, etc.

**Chlorophyll**

Any one of a class of pigments (colours) found in all living organisms that photosynthesize; found in the leaves of all land plants.

**Community**

A community is a naturally occurring assemblage of plant and animal species living within a defined area of habitat.

**Compost**

Made from layering unused plants and vegetables with soil for a few months. It is used to help the plants grow faster and stronger. Remember: Only use small amounts of compost because what a plant needs to grow is already found in the soil.

**Cucurbits**

Any creeping, flowering plant of the mainly tropical and subtropical family Cucurbitaceae, which includes the pumpkin, cucumbers, squashes, and gourds.

**Decomposition**

The breakdown of organic matter into its parts. This happens after death when plants or animals decay. This means that the wood, leaves, branches and roots of a plant will break apart into smaller and smaller pieces. This continues until there is nothing left of the original plant and all its elements and compounds have returned into the soil.

Decomposition occurs when as leaves fall from trees and insects die, but one can help the cycle by creating mulch piles, compost heaps and worm farms. Compost is ‘soil’ which is rich in decomposing plant matter, the same matter which is used by plants to grow. If soil quality is poor then adding compost can help create a balanced habitat for plants.

**Detritus**

Particles of organic material derived from dead and decomposing plants. It is the result of the activities of detrivores (like worms), who help decomposition by eating the decaying plant matter.

**Detrivore(s)**

Animals that eat decaying and dead plant matter which helps in decomposition. Many worms are actually detrivores and help with the decomposition of plant matter. This is why earthworms are important to the soil, they breakdown plant matter into its elements which are used by other plants for growth.

**Ecology**

The study of the interrelationships between those organisms and their environments.
**Ecosystem**
A biological community and the physical environment associated with it.

**Environment**
We live in the environment, it surrounds us. In biology the term environment refers to the physical, chemical and biological conditions of the region in which an organism lives.

**Genus**
A category (type/variety) used in the classification of organisms (species), consisting of similar or closely related species. Brassica, Alliums, Legumes, Nightshades each are a genus of plants.

**Germination**
The initial stages of growth from seed to form a seedling. The emerging ('baby') stem/shoot and root grow upwards and downwards respectively.

**Glucose**
A sugar and it is a source of energy for all living things, both plants and animals. Without sugar nothing would have the energy needed to live and grow. Glucose occurs widely in nature, and is found in many plants, fruit, honey and the starch of potato. It is very important for our bodies functioning healthily.

**Habitat**
is the place in which an organism lives, which is characterized by its physical features. It is where a human, animal or plant lives, grows up, eats and reproduces. If the habitat (place of residence) for the plant, insect or animal is healthy then the plants or animals living in the habitat will do well.

**Herbivore** is any animal (insect to mammal) that eats only plants.

**Humus** gives soil its rich dark-colour and constitutes the organic component of soil and is formed by the decomposition of plant matter. It improves soil quality making it more fertile and workability.

**Legumes** are any table vegetable of the superfamily Leguminose, includes Beans and Peas.

**Manure** is a mixture of compost rich in animal waste which is used to fertilise the soil.

**Microbe**
A living organism (plant or animal) that can only be seen with the aid of a microscope. In other words microbes are so small we cannot see them with our eyes.

**Nightshades**
A variety of plants including Tomatoes, potatoes and Egg Plant/Brinjal.

**Omnivore**
Any animal that eats both plants and meat. Biology classifies humans as being omnivore because we eat plants and meat.

**Permaculture**
A way of gardening that combines two words to create a sustainable environment for us to live in: Permanent + Agriculture. The idea behind permaculture is to grow a garden that will continuously produce food. It makes use of the study ecosystems and ecology in the garden so is easy to maintain and productive all year round. The permaculture garden works with nature and natural systems, bringing together traditional techniques with modern science to grow food.

**Photosynthesis**
Plants need sunlight to grow. They have Chlorophyll in their leaves; this allows plants to convert the suns energy into fuel for growing. This is called photosynthesis, and why leaves must be given lots of sunlight.

**Potting soil** is a mixture of soil, compost and plant matter designed (i.e. made) to be good for plants planted in seed trays or pots.

**Predator**
Is an animal that hunts and eats other animals, such as a lion or hyena, is a predator.

**Seedling**
Is a young plant or a plant which has recently germinated (i.e. started growing). Some seeds are best grown in seed trays and then moved into the garden.

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**Did you know?**
In Durban you do not need to use manure to fertilise the soil as there is already enough in the soil to help plants grow healthily.
Knowing all the right words

One: Glossary and workbooks (knowledge exchange).
In groups, go over discuss and exchange (tell the group about) your dictionary terms:
1a) Compare the terms in the glossary with the dictionary in your workbook.
   - Are the definitions in your work books the same as in the glossary?
   - Are these differences important or not?
   - What Zulu words did you find for the English ones?

b) Share your definitions with other members from your group.
   - Explain what you think each term means.
   - Listen to what the others in the group think the terms mean.

c) Create a list of the top five words every gardener should know; then share and compare the lists with the other groups in the class.

Two: getting the garden set up for going away
You and the entire school are going away on holiday!

You have been given sunflower seeds:
2a) Plant the sunflower seeds around the edge of the garden beds.

b) Pick up all the litter in and around the garden, and check on your plants.
c) Check that each bed has been mulched properly.

d) When in the garden, with your teacher and class ask:
   - Who lives close to the school?
   - What are you doing during the holiday?
   - Can you check on the school garden once a Session?
   - If you can back and the plants had died then how would you feel?

e) How will you make sure your garden is okay during the holidays?

f) Who can and will take responsibility for the garden?

When outside in the garden ask the following questions:
Does the garden/soil look better after rain?
What does the soil look like after lots of hot sun?
When are the plants brown and grey?
When are the plants green and growing?

Maintaining the garden
In Durban the garden doesn’t go on holiday. With the sub-tropical climate plants can grow year round because you never get ground frost. Plants grow fastest and best over the summer, but will keep growing year round if you add some water.

**Step 1: The climate it matters.**

In the natural world, there are many cycles and stages in the environment. Consider the rainfall over a year:
- When does it rain more, during summer or winter?
- Does this happen every year?
- When are the plants most green, before or after the rain?

Green as on plants indicates fresh growth, during spring and early summer the greens are vibrant. During winter when there is less rainfall the tone of the green changes as the plants and trees grow less. To be effective gardeners recognise the natural cycles and prepare for them. Also, plants are green after rainfall because the seasonal rainfall triggers new growth in most plants. If watered effectively a garden will remain green and growing year round.

**Step 2: Maintaining is easy**

Responsibility for the sustainability and success of the garden is ours, and if the garden is looked after it will be productive year round. This is very easy plants grow naturally but keep an eye on things. Here is a check list of helpful questions:

- What colour is the soil? (Pale, grey is bad)
- Is there life in the garden (worms, lizards, insects, birds)? (More life is good)
- Are you noticing plants being eaten? (Attract predators and hide food plants by growing flowers)
- Are the plants dropping, bleaching, and looking unhappy? (Add water, try shading the plants)

Be patient with the garden, it takes a little time and work but the rewards are lasting.

**Step 3: Plant something interesting...**

In the garden, try planting sunflower seeds – it grows big and fast.

No really it grows very fast.

Take some bets with the family:
- When will the seed to germinate?
- When will the sunflower reach a meter in height?
- When will the sunflower bloom?
Session 7: Harvesting Seeds

As the garden is expanded, and harvested you will need more seeds. The seeds allow harvested plants to be replaced and a garden to be grown easily and cheaply.

Where can I find these seeds?
Are they expensive?

Seeds can often be taken from the fruit and vegetables you eat. All you need to do is the following easy steps:

1) Carefully cut open any fruit or veg.
   Check: Does the fruit/veg have any seeds?
   What do the seeds look like?
   Are the seeds wet or dry?

2) Separate the seeds from the fruit/veg.
   Place the seeds on a flat surface, cover them with newspaper and leave them to dry.

3) The seeds are ready for planting when:
   They are hard and dry.

It is that easy to get seeds!
Ask your neighbours if they can start collecting seeds as well.
By working together there will be enough seeds to start many gardens.

Did you know?
Most seeds need to be at about 12% humidity (internal moisture) to germinate, and when food rots the gas it releases it prepares seeds for planting - this is why things grow easily in compost piles, and why you should plant food that is going off.

The Changing Garden
One: How much has the garden changed?

Take your workbook out into the garden. Write down how much the garden has changed over the holiday and answer the following questions:

1) How much have the plants grown?
   1.1) Did any plants get eaten by insects/goats?
   1.2) Did any plants die and why did they die?

2) Have any other plants (weeds) grown around the vegetables/flowers?
   2.1) Do the vegetables/flowers look like they were hurt by any of the weeds?
   2.2) What are weeds?

3) How does the compost/mulch look?
   3.1) Has the plant/vegetable matter decomposed into soil?

4) How would the garden be different if you had worked on it during the holiday?
   4.1) Would goats/insects still have eat some of the plants?
   4.2) How many weeds would have grown?
   4.3) Would the compost/mulch still have decomposed?

Two: Maintaining the garden.

Look at nature and remember that different plants grow together.

a) Weeds can be useful so check before pulling them out:
   1) Are there lots of plants surrounding your vegetables?
   2) Are those plants hurting your vegetables?
   3) How much work does the garden really need after the holiday?

b) Clear space around the vegetables and flowers.
   1) Use the weeds you cut down as mulch, by laying them around the plants you want to keep. This will help the soil.
   2) Do not cut down all the plants growing round your vegetables, some of them are helpful.

c) Remember if everyone works together it will be fun and fast.

Who’s eating my veggies?

The garden changes because of the effects of rain, sunshine, and animals (goats, insects, worms, etc.). Too little sunshine and too much water are bad for seedlings in the seed trays. Too much rain/sunshine can be bad for the vegetables growing. Also insects can eat the plants. But we can learn from all of these, even if some of the plants did not survive, you can just replant.

Step 1: Check the garden
Observing the garden is the best way to learn about it.
Answer the following questions:
1) How much have the plants grown?
   1.1) Did any plants get eaten?
   1.2) Did any plants die, and why did they die?
2) Have any other plants (weeds) grown around the vegetables/flowers?
   2.1) Do the vegetables/flowers look like they were hurt by any of the weeds?
3) How does the compost/mulch look?
   3.1) Has the plant/vegetable matter decomposed into the soil?
   3.2) Remember to stir the compost heap every two Sessions!

Work together, it is more fun.

Step 2: More about companion planting

Look around:
1) Do lots of different types of plants grow together or just one?
2) When you see only one type of plant growing is it natural or because of people?

Weeds are not bad for the garden. You only need to pull out weeds when they are hurting the growth of the vegetables/flowers, otherwise they too can often help growth. To mulch, for example, you can just cut the top of the weeds off and drop them around the garden bed – and if the weed dies it does not matter, because its roots will help the soil underneath.

Remember, it is always better and easier to work with nature than fight against it... so not all weeds are bad, and if something dies it is all part of the cycle of life so you can just plant something new there.

Step 3: Seeds are everywhere!

You do not always need to buy seeds. The seeds of your favourite fruit and vegetables often can be found inside the fruit and vegetables. Planting potatoes means you will get a potato plant and more potatoes.

To harvest the seeds:
1) Carefully cut open the fruit or veg.
   - Does it have any seeds?
   - Is the seed wet or dry?
2) Separate the seeds, place them on a flat surface, cover them with newspaper, and let them dry.
3) When the seeds are dry and hard they are ready for planting.

Session 8: Chop and Drop

What is Mulch?

Mulching is a natural feature of forests and areas of high density plant growth. The forest floor is covered by leaves, branches, and decaying plant matter called Humus.

Mulch is a layer decomposing plant matter covering the ground around garden plants, just like Humus.
So why add Mulch?

Decomposing humus naturally returns minerals back into the soil and encourages microbes to grow that help plant growth. Mulch is us using a natural process to help plant growth.

So with mulch we need less fertiliser, less compost, and less work to build a healthy food garden.

How do you mulch?

Mulching is easy!
Mulch is decomposing plant matter.
All you need is:

Leaves, grass, broken of twigs, torn plain cardboard, or other plant matter
You can even chop up plants/weeds growing around the garden to use as mulch.
Take the chopped plant matter and drop it to grow around the garden.
Make sure the mulch does not cover the growing seeds, seedlings, or plants.

Did you know: Mulch and low lying weeds help by protecting the soil from the sun (meaning that the soil stays moist) and from heavy rainfall (which can drown seedlings).

Reaching out into the community

This Session you will be helping your students become more sustainable, do things for themselves and help the community. The learner can easily make an impact in their environment by handing out extra seeds and seedlings, as well as talk about growing food and teaching what they have learned.

Sustainability: Everything that we have been doing in the garden thus far has been to give the students a practical way of becoming more sustainable in their lives. Being sustainable is about using the local environment to meet the needs of communities. Here the local solution to the problem of getting enough food is to having members of the community (learners, parents and you) growing food for themselves.

Teach: Point out that in growing food at school they are becoming more sustainable, the student is living a sustainable lifestyle, and it does not take that much work because all plants need to grow is sun, soil and water. Plants are doing a lot of the work for them.

Things to think about: What is the biggest problem that most of the children face? Remember: A basic need for all people is food security; simply that they have regular access to two/three meals a day.
Food Security/Poverty: Did you know a common use of the word poverty refers to when a group or individual is simply without enough food to eat? A person is considered to be living in poverty when they have no food security, so a simple and sustainable way of reducing poverty and improve food security is to have people growing the food they eat. And growing food means that a person is being more productive.

Teach: If the student is growing food at home as well as at school, then they are helping reduce the level of poverty in their environment. If the student then helps their neighbour buy giving them seeds or seedlings, and showing them how to harvest seeds from food then they are improving the food security of others within their community. Food is something everyone needs, it is our fuel, helping us grow, and work as productive members of a community.

Things student can do to make a difference:

1) Distributing extra seeds and seedlings to the community.
2) Show people that they can feed themselves by growing food.
3) Help a neighbour, or someone in the community, plant a food garden.
4) Tell people about growing food.
5) Encourage people to own the environment they live in.

Change starts at home.
Change starts with you.
The best day for change is always today.

To Help: Share and encourage.
Who do you know?

One: Community Outreach

Remember you are part of the community; the community is your social environment. So whatever you do to improve your community is as good for everyone else as it is for you.

With your group answer the following questions:

1.1) Is there any unused space that can be used for growing food or flowers?
1.2) How could you encourage people start harvesting seeds to use to grow food?
1.3) Do you have a garden they can show to their neighbours?
1.4) Is anyone already growing food in the community, maybe you can help them?
1.5) What skills and knowledge to people need to growing food?

When you have answered the questions:

Design and develop a poster or pamphlet, with information, that will encourage people to start growing food at home.

Share your group poster and ideas with the rest of the class.

Do not stop with the poster. Ask your teacher, friends, and class to help you start a community garden. With friends this will be fun!

Two: Expanding the garden – at home, in the school, and in the community.

Remember: Everything you do in the school can be done at home or in the community. All you need is space, time and help. Together it is easy!

With you group ask the following:

What do you need to grow plants and food?
Is what you need available?
Is there any space you can use at school to grow more plants?

Ask your teacher if you can prepare the space for growing food and encourage other classes to help.

Remember to maintain the gardens!

Sustainable living

What is sustainable living?
To simplest way be sustainable is to use, and re-use, resources from the local (i.e. your) environment rather than import materials from faraway places. Harvesting seeds would be an example. Two old tyres stacked up can make a good pot – there are many ways to re-use old things. All it takes is creativity, time, and work. Growing your own food is a great way of being more sustainable, what could be more local than your own garden!

**Step 1: Get the neighbourhood involved**

A community garden is a great way of make life and the neighbourhood better. All you need is: 1) Space to plant and grow gardens, 2) The support of the community, 3) Seeds for planting, 4) Knowledge and skills.

- Is there unused space?
- Invite the neighbours around and show them your garden?
- Is anyone else growing food in the community, maybe they can help?
- What people need for growing food?

Recycling and sustainable living start at home, but the next stage is to invite the community, neighbours, and friends. Remember do not preach, but when you have friends round feed them with food grown from the garden – it will give them the idea.

**Step 2: There is more you can do at home?**

Look for areas and ways to expand your garden. Remember you can build up a garden bed using containers, pots, or tyres instead of digging a new one. As always working together is better and more space means more garden and potentially more food.

- What do plants need to grow? (Space, soil, sunlight, and water)
- Is what they need available?
- If so why don’t you growing more food?

More food grown means less food bought… all you need is time and work.

**Step 3: Spend some time in the garden.**

Spend time in the garden, look at what you created and enjoy it.
Very simple: When a person has food security they have food to eat for breakfast, lunch, and supper every day. Without food security a person will not have three meals a day, or worse, not know when they will eat next. When a person loses food security it is a sign they might be living in poverty.

Growing food at home will improve food security for me and the community.

Remember:

Money is a way of getting things, not a real thing.  
You cannot eat money.  
You cannot live underneath money.  
You cannot be friends with money.  
If you have food, a home, and friends then you have everything you need to be happy.

Work in the garden with your friends  
Help your friends with their garden  
Get your friends to help you with yours.  
Eat well together.

What is needed for our life?  
Food! It is our fuel and without it we will stop working.

Did you know? South Africa is a net importer of food (that is, it buys more food than it sells internationally).

What are resources?
One: Poverty

Poverty is not about money. You cannot eat, live underneath, or be friends with money. To live well you need food, a home, and friends (a community) - more than money. People are in poverty if they are struggling to get enough food to eat.

With your group of answer the following questions:
1) What is the biggest worry (concern) in your community? Is it money, security, or food?
2) What does it mean to be living in poverty? Is food security or money more important, why?
3) What resources are lacking within the community? Is it money, food, space, shelter, or skilled people?
4) What does the community need most? How can you help?

Two: How do seeds move?

Did you know? Using animals, birds, and the wind to carry them the seeds of plants can walk and fly great distances from their parent plants.

When it is windy: Outside, hold a towel, or shirt, at four corners against the wind. Answer: What shape catches the wind best? How big would the sail have to be to move a person or a boat? What shape is a sail and why is it that shape? How big is a boat's sail?

Draw the sail of a boat being blown by the wind.

Three: Indigenous plants

An indigenous plant is a plant that has always grown in South Africa (or its local environment). The marula fruit tree is indigenous to South Africa, as is the Protea of the Western Cape. A plant which was brought into the country by people (like mealie, apples or oranges) is not an indigenous plant. A person carried the plant from another part of the world to South Africa; mealies for example come from the Middle East and North Africa.

Ask Gogo (or another elder):
1) Can they name two indigenous plants (plants they remember always being there)?
2) Can they name two plants which have arrived in Durban during their lifetime?
3) Are any of the new plants bad for the local plants?

Try asking your classmates, friends and family (Gogo might know) about indigenous plants.

Remember: Ask Gogo, she has lived for a long time and knows a lot of things. What did the environment look like when she was young?
Knowing what you’ve got

The problem of poverty can be reduced by helping people become more sustainable. Poverty refers to the amount of food security a person has, not that they have no money. A family is living in poverty when they do not have enough food to meet their nutritional needs – i.e. they have no food security. By growing food a person gains more food security improves because they can eat food grown in the garden.

**Step 1: It is not just about money**

Wealth is about more than money it is about the resources you have access to; be they land, skills, food or people. If an person has land, friends, and food then even if they do not have money they may be wealthy.

When thinking about the needs of a community ask:

1) What is the biggest worry (concern) for a community, or under-resourced community?
   - Is it money, security, or food?

2) What does it mean to be living in poverty?
   - Does having no money mean you are living in poverty?
   - Does not having food, housing, a community, or free time mean you are living in poverty?
   - Can you eat money?

3) What resources are lacking within under-resourced communities?
   - Is it money, food, space, shelter, or skilled people?

One reason for the loss of skills in communities is they rely on external support more than on their own effort. One way to be sustainable is to solve problems yourself, rather than wait for another to fix them. Growing food is a skill and resource. Growing food is easy and if more did it then less would go hungry.

**Step 2: Remarkable seeds**

There are many ways in which seeds propagate - move. Plants move by walking, swimming, and even flying.

How do plants walk, swim, or fly with roots stuck in the soil?

The seeds carried from place to place. They walk by being carried by animals. Swim by floating in water. Fly using birds, or by being carried on the wind. Plants grow tasty fruit/nuts which animals and birds eat and will carry around. Some seeds are so small and light that they can be carried by the wind. Other seeds are shaped like a sail. Some seeds are like thorns the stick into skin, hair, clothes and fur and get carried like that.

**Step 3: Plant local trees**

An **indigenous** plant is one that has always grown in South Africa (or its local environment). The Marula fruit tree is indigenous to South Africa, as the Protea is to the Western Cape. An **alien** plant is one that was brought to the country by people from another part of the world. Some alien plants were brought here on purpose, like many of the food plants we eat. But some alien plants are invaders and can kill the local plants.

Can you...

- Find the name of two indigenous plants, and what they look like.
- Find the name of two alien plants and what they look like.
- Find the name of an alien plant that is dangerous.

Remember, planting indigenous plants will be best for any garden ecosystem because they are adapted to the local climate and wildlife.
Session 10: Companion Planting

Did you know? When only one type of plant (i.e. sugar cane) grows over a large area it is often because humans work to keep other plants from growing.

When you are outside look at the plants growing!

- In the garden is only one plant grow?
- Are plants growing next to each other?
- Are those plants growing well together?

In a sugar cane field how much work does it take to keep to keep other plants from growing?

Plants grow in Communities!
In communities the different plants help each other.

If you plant colorful flowers with your food plants, they will attract birds and insects that eat the pests that eat your food. Also they hide the food from pests!

Planting varieties of plants together is called: Companion Planting.
Companion planting reduces the need for pesticides, compost, and fertilizers.
Companion planting improves the quality of the soil.
Companion planting works with nature and eco-systems to improve the quality of the food grown.

Did you know? An eco-system is balanced and maintains itself. So the closer your garden is to being a natural eco-system the less work you need to do to make it productive.

Reaching out to others
One: What and how to plant.
With your group design a poster telling younger children how to plant and grow food. To do this first answer these questions:

1) In their gardens does only one plant grow?
   1.1) Where only one plant grows is it natural or a result of human work?
   1.2) Did they grow well?

2) What plants are growing next to each other?
   2.1) Are those plants growing well together?

3) Is it natural for plants to grow together?
When working on the poster tell the children what you liked about the garden!

Two: Maintaining the Garden.
With your group design a poster that tells younger children how to maintain the garden. First answer the following questions:

1) What is mulch, and what do you do with it?
2) What do plants need to grow?
3) How much water does the garden need?
4) Can too much sun be a problem?
5) Is it more fun to work in the garden with friends?

What would you tell someone is the most important thing to do when maintaining the garden?

When working on the posters, talk about the different things you would do with the food you grow in the school garden and at home.
A new perspective on your world

How would you introduce the idea of food gardening, or gardening to others; especially to those who would be truly benefitted by the practice? There are two ways of helping: 1) you can give a man a fish, or 2) you can teach him to fish.

**Step 1:** Spreading the idea through children.

Children are a great way of spreading an idea. They are often willing to try new things and have the energy to keep going – all it takes is positive encouragement.

1) What would make gardening fun?
2) How would you design a poster that is fun for young children?
3) What did you learn about growing food?
4) Could you show anyone how to grow food/garden?

**Step 2:** Companion planting revisited.

In the natural world do you find one type of plant growing next to each other?

In the natural world do you see lots of different plants growing next to each other?

Where do you find only one type of plant growing next to each other?

How did only one type of plant end up growing in some areas?

On Sugar cane farms over large areas only sugar cane grows. This is not natural, lots of work is needed to make only sugar cane grows. An easier way of planting the land is to plant a variety of crop plants and followers next to each other. This is companion planting, and uses the fact that certain plants grow well together - and form a community. The community is an ecosystem wherein the plants help each other grow.

In the garden does only one plant grow?

Where only one plant grows is it natural or a result of human work?

Did they grow well?

What plants are growing next to each other?

Are those plants growing well together?

To grow one type of plant together is to do lots of work, but if you use companion plants they help each other grow and you need to do less. Let nature do the work for you.

**Step 3:** What you can get from the garden?

What they would like to do with the food they grow in the school garden.

1) How much food could you get from the garden?
2) What could you do with the food in the kitchen?
3) How much food would you need to grow to have a day where you sell the food you grow?

The amount of food taken from the garden is the yield.
The plants are the base of the triangle and use photosynthesis to make nutrients (food). There are many more plants than herbivores & predators.

The herbivores eat plants to get nutrients (food) so they can live a healthy life. There are more herbivores than predators, but if there were no predators then the number of herbivores would continue to grow and grow and eat all the plants.

The predators eat herbivores to get nutrients (food) so they can live a healthy life. There are less predators than herbivores, but they are necessary to the ecosystem because they maintain balance by keeping the number of insects and animals that eat plants low. So plants can continue to grow and photosynthesise creating nutrients to feed the entire ecosystem.

**Did you know?** The reason why people have to use pesticides is because they have broken the balance of the ecosystem, so there are too many plant-eating insects. Attracting predatory insects (using flowers) and lizards (building lizard islands) keeps the system in balance.
**What is an ecosystem?**

**One: Improving the local environment poster.**
With your group make a poster for young children telling them about the environment and how they can improve it. Before making the poster answer the following questions:

1) What lives in your environment?
   1.1) What plants and animals do you see growing?
   1.2) Does everything look healthy in the environment?
2) Who lives in your environment?
   2.1) If all your neighbours and community were happy and healthy how would you feel?
3) What can you do to help improve life in your environment?

Remember the environment is not something far away, it is where you live!

Design the poster!

**Two: Eco-systems and sustainability.**
With your group make a poster for young children telling them about eco-systems. Before you do make the poster answer the following questions:

1) Do wild animals and plants need to be looked after, or can they live by themselves?
2) What would happen if all the people left the city?
   2.1) How long would it take for plants to overgrow everything?
   2.2) How long would it take for animals to move back in?
3) What do Lions and other predators do in an eco-system?

An eco-system is in balance. The plants are eaten by the herbivores. If there were too many herbivores then all the plants would be eaten. But there are predators (like lions) which eat the herbivores so all the plants are not eaten!

Design the poster!

**Three: How the food from the garden tastes.**
Think about what to do with the food, do you cook it or eat it raw? In the garden and taste some of the plants, but only SMALL bits. What did it taste like?

In your groups talk about these questions:
1) At home do you cook? What food can you eat raw (uncooked)?
2) Will you have to cook all the vegetables from the garden?
3) How do you know if you must cook something or eat it raw?
4) Who can you ask to find out?

Ask Gogo what plants you can eat and how to cook them!

Why not, bring your parents to school. You can show them the garden growing and all the posters you are making. They will really enjoy it.

Discovering the garden with others

Introducing children to the garden is a good way to encourage learning about science and nature. Remember what you have observed about eco-systems from the garden and make it fun for young children.

Step 1: What can you answer?

Try to answer the following:
1) What is an environment?
   What is our (human) environment?
2) What is an eco-system?
3) How can we improve our environment?
4) What would you teach anyone about eco-systems?

Remember the environment isn’t just where animals live, we live in the environment as well. Our (human) environment is where we live. It is our home and community, including all the people around us: friends, family, neighbours, and the animals (pets) and plants that surround us.

An eco-system is a part of the world that is balanced and requires little or no work from us. For example, companion planting builds a community of plants which then help each other by returning nutrients to the soil, and flowers attract predatory insects, lizards, and birds which eat the pests that would eat the garden.

Step 2: Observing the natural world

Life as a term is full, which means it includes everything, plants, animals, and people. For our life to be healthy we must be surrounded by healthy life. Think about wild animals and plants and answer the following:
1) Who looks after wild animals and plants?
2) What would happen if all the people left the city?
   2.1) How long would it take for plants to overgrow everything?
   2.2) How long would it take for animals to move back in?
3) What do Lions and other predators do in an eco-system?

Eco-systems move towards balance and this makes them sustainable. Lions for example will keep the population of herbivores down - otherwise they would eat all the plants. If your gardens are balanced then they will grow without lots of work – if your garden attracts predators to eat the pests then you do not have to keep chasing them away.

Step 3: Food from the garden

Taste the food from the garden:
1) What food do you cook and what food can you eat raw (uncooked)?
2) Will you have to cook the vegetables from the garden?
3) How do you know if you must cook something or eat it raw?

Taste spinach, cabbage, and other foods from the garden:
1) What did it taste like?
2) Would it taste better cooked?

Spinach tastes best if it is blanched. Boil water, when boiling (bubbling) put the spinach into the water. Leave the spinach in the water for around ten seconds then remove and let it cool.
**Session 12: Replanting**

What can I do after harvesting?

- Prepare your garden bed for planting
- Mulch: add dead, dry plant matter to the soil
- Mix fresh compost into the soil with a pitchfork
- Dig and loosen the soil
- Plant seeds or seedlings
- Water & watch everything grow again

Remember the soil.

Your food is growing in the soil!

- Healthy soil = healthy food
- Mulch adds support to the soil
- Compost returns lost nutrients to the soil
- Loosening the soil makes for easier plant growth

Fix the soil: It matters

Doing this will keep your garden healthy and help you grow lots of food!

Plant growth is fuelled by good soil, sunlight and water.
Healthy food helps you lead a successful life.

Did you know? If you add up the weight of all the insects in the world, they will weigh more than all the people in the world.
Planning a garden party

You are going to throw a parent day. So you must design invitations, tidy up the garden, school and classroom, and make decorations for the classroom.

One: Invitations
Design an invitation for the parent and community day. This invitation is not just for your family it is for all the people in your community. The best invitation will be chosen to be sent to all the parents.

Your invitation must:
1) Tell everyone what they will see in the garden and at school.
2) Tell everyone why they should come and see the garden.
3) Tell people what they could learn by coming.
4) But most of all, tell everyone to come.

Remember to make people come be bright, fun and bold

Two: Preparations
Having a day at school for all the parents means getting everything ready. So you need to tidy up the school, garden and classroom...

Think about
What you would like to show to your parents.
What you want everything to look like.
What you want the classroom to look like.
What you want the garden to look like.

Now go and get everything ready!

Three: Decorations
With your group pick one of the ideas you have learnt from the garden project (i.e. photosynthesis, food security, or the environment) and design a poster for the classroom wall.

Before designing your poster ask the following:
1) What would they like their parents to know?
2) What is the concept they have chosen?
3) How would they tell someone else about the concept?
4) What is the number one, most important thing about the concept?

Remember
This poster will be on the wall for all the parents to see and be on the wall to help next year’s students to learn about growing food and the environment.
Designing posters

Why not set up an open or community day. Invite parents, grandparents, or important members in the community to the day and show them what you can do with a garden.

**Step 1: Generate interest.**

Work with others to make this fun day happen:

- Who would you invite?
- What venue could you use?
- What needs to be done in the garden to prepare?
- What would you tell people about the garden?
- What could people learn from gardening, growing food?
- When would the event be held?

**Step 2: Design invitations/posters**

With your groups design an invitation for the event. Also this invitation is to an event so there needs to be information on it:

- What will there be at the event?
- Why is it important to come to the event?
- What could people find out whilst at the event?

This invitation needs to target all of the community!

An invitation needs to encourage attendance: People are busy so they need a reason to give up their time.

**Step 3: Design adverts/posters**

As with the invitation adverts need to be informative and encourage people to attend. Think of the following, working in a group will improve output:

- What would they like people to know?
- What idea should be pushed?
- How would they tell someone else about the idea?
- What is the number one, most important thing about the idea?

Remember these posters will be displayed around the neighbourhood and community for all to see.

**Step 4: Getting ready.**

Having an event for the community requires work, and need to be done.

A good team and clear goals is all you need to make it happen. Also if you make it happen then you will have achieved something special.
Appendix 1: Companion planting

Each plant creates a microclimate where it grows, making the conditions better for other similar plants (but too little variety leads to monoculture, with many associated problems). Plants will grow well within their own type, or with companion types, as long as you don't have competition for the same space at the same time (i.e. radishes & parsnips).

<table>
<thead>
<tr>
<th>Plant type</th>
<th>Examples/ type</th>
<th>Companion</th>
<th>antagonists</th>
<th>Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cucurbits</td>
<td>squash, gourds,</td>
<td>Fences</td>
<td>Field planting</td>
<td></td>
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<tr>
<td></td>
<td>cucumber, melons</td>
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<tr>
<td>Alliums</td>
<td>garlic, onion,</td>
<td>nightshades</td>
<td>legumes</td>
<td>Deter rabbits</td>
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<td></td>
<td>chives, leek,</td>
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<td></td>
<td>shallots</td>
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<tr>
<td>Brassica</td>
<td>Virtually any</td>
<td>legumes or</td>
<td>nightshades</td>
<td>Also called Cruciferae from the shape of their</td>
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<td></td>
<td>leafy or headed</td>
<td>alliums</td>
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<td>flowers, whose four petals resemble a cross.</td>
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<td>green: cabbage,</td>
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<td>Widely considered to be healthy foods, they are high</td>
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<td></td>
<td>spinach,</td>
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<td>in vitamin C and soluble fibre and contain multiple</td>
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<td></td>
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<td>properties. Many sharp-tasting substances in these</td>
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<td></td>
<td>broccoli</td>
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<td>vegetables are produced from substances called</td>
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<td>Legumes</td>
<td>Beans, peas,</td>
<td>brassicas,</td>
<td>alliums</td>
<td>Legume plants fix atmospheric nitrogen</td>
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<td></td>
<td>lentils, lupins,</td>
<td>nightshades</td>
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<td>with bacteria found in root nodules. The nitrogen</td>
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<td></td>
<td>and peanuts</td>
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<td>fixation ability of legumes is enhanced by the</td>
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<td>availability of calcium in the soil and reduced by the</td>
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<td>presence of ample nitrogen. Grain legumes are</td>
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<td>cultivated for their seeds, and are also called pulses.</td>
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<td>The seeds are used for human and animal</td>
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<td>consumption or for the production of oils for</td>
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<td>Nightshades</td>
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<td>examples of such combinations are dal with rice by</td>
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<td></td>
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<td>Indians, and beans with corn tortillas, tofu with rice,</td>
</tr>
<tr>
<td></td>
<td>tobacco</td>
<td></td>
<td></td>
<td>and peanut butter with wheat bread.</td>
</tr>
</tbody>
</table>
**Helper plants (natural pesticides, soil improvement, etc.)**

NB Aromatic plants include most kitchen herbs, such as thyme, rosemary, taragon, and dill. Each has particular effects, detailed in the master table; this is a digest for quick reference.

<table>
<thead>
<tr>
<th>Plant type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aromatic</td>
</tr>
<tr>
<td>Flower</td>
</tr>
<tr>
<td>Indigenous</td>
</tr>
<tr>
<td>Carrot</td>
</tr>
<tr>
<td>Mint</td>
</tr>
<tr>
<td>strawberries</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confuse pest insects and many other crop predators and pests</td>
</tr>
<tr>
<td>Any brightly coloured plant will attract insects like butterflies and bees</td>
</tr>
<tr>
<td>Attract significantly more local wildlife, since the ecosystem is designed for those plants.</td>
</tr>
<tr>
<td>Work with everything</td>
</tr>
<tr>
<td>Works with cabbage very well</td>
</tr>
<tr>
<td>Works well with brassica</td>
</tr>
</tbody>
</table>

### Helpful weeds

<table>
<thead>
<tr>
<th>Plant</th>
<th>Type</th>
<th>Companion Plants</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nasturtium</td>
<td>Helper food</td>
<td>Everything</td>
<td>Considered one of the “magic bullet” companion plants, benefiting almost any crops around it in some way, and not known to hurt any</td>
</tr>
<tr>
<td>Clover</td>
<td>Helper weed</td>
<td>Brassica, corn, cucurbits</td>
<td>Provides a humid microclimate that benefits many plants by stabilizing their moisture. High-protein source of food, but generally only eaten in survival situations.</td>
</tr>
<tr>
<td>Cocklebur</td>
<td>Helper weed</td>
<td>Grasses and grains</td>
<td>Also used for yellow dye</td>
</tr>
<tr>
<td>Dandelion</td>
<td>Helper weed</td>
<td>Various grains, tomato plants</td>
<td>Tap root breaks up hardened soil and brings up nutrients from deep down, benefiting plants with weaker or shallower roots without competing with them. Leaves/ flowers edible.</td>
</tr>
<tr>
<td>Milkweed</td>
<td>Helper weed</td>
<td>Corn, basil, potatoes</td>
<td>More effective insulator than goose down, breaks up hard soil, allowing nearby plants to develop healthier root systems. Attracts predator insects.</td>
</tr>
<tr>
<td>Nettle</td>
<td>Helper weed</td>
<td>Broccoli, tomato, valerian, mint, fennel</td>
<td>Young plant parts are edible, as is much of the plant when blanched or otherwise prepared. Attracts bees.</td>
</tr>
<tr>
<td>Purslane</td>
<td>Helper weed</td>
<td>Corn, solanums like tomatoes and peppers</td>
<td>Breaks up hard soil and hardpan, brings nutrients and water up from deeper than crops can reach, provides healthy ground cover, stabilizing soil moisture, contains more Omega-3 fatty acids than any other leafy vegetable plant</td>
</tr>
<tr>
<td>Queen Anne's Lace</td>
<td>Helper weed</td>
<td>everything</td>
<td>Dill, parsnip, radish</td>
</tr>
<tr>
<td>Wild Rose</td>
<td>Helper weed</td>
<td>Strawberries, grapes, roses</td>
<td>Deters rabbits, rose hips can be used in herb tea</td>
</tr>
</tbody>
</table>
Companion planting examples: seed kits

These are examples of plants that will work well together. To check details, please see the following plant guide.

Seed groups to help your other plants

1. Baby Spinach (Dash), Sweet Rocket, Rue, Lemon Basil, Sorrel, Oreganum, Dill, Chives, Chamomile, Anise, Pennyroyal. This kit can be grown intensely in a small space and provides tasty herbs and spices. Because it is aromatic, if planted in your garden it will deter pests and attract predatory insects.
2: Inedible help: Use flowers, such as Lobelia, African Daisy, Gazania, Alyssum, Marigold, & Tansy. Aside from beautifying your space, it will attract a variety of butterflies, birds and insects. Brighter colours attract more birds and wildlife, and indigenous plants attract significantly more wildlife of all kinds
4. Helper: a group that improves soil & vegetable quality, deters pests, and attracts predatory insects. Plants to help your other plants, that you can eat; Garlic Chives, Nasturtium, Borage, Lovage. Flowers, to deal with ants, and attract predatory insects: Pennyroyal, Anchusa, Lobelia, Chervil, Marigolds.

Food sets

1. Allium & Brassica: (Allium): Onion (Texas Grando) (Brassica): Spinach (Fordhook Giant), Radish (Champion), Cabbage (Copenhagen Market). (Helper plants): Marigold, Nasturtium, Borage
2. Nightshades & Legumes: A cook’s food kit; all the things you need to bring out the tastiness of your food. Covers 5m\(^2\). Legumes: Peas (green feast), Beans (star 2001) Nightshades: Eggplant, Tomatoes Helper seeds: Carrots, Borage
## Appendix 2: Master Plant guide

The following guide is a list of common edible and helpful plants that the average gardener may come into contact with. This guide includes planting, germination and harvest times, in addition to the respective plants companions and antagonists. It is correct as far as our research has taken us (since much of the information is from packets and the like, large sections are incomplete, particularly germination times).

<table>
<thead>
<tr>
<th>Plant</th>
<th>Type Description</th>
<th>Germination</th>
<th>Harvest</th>
<th>Companions</th>
<th>Antagonists</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>African Daisy</strong></td>
<td>High Noon medium height, flowery</td>
<td>7 – 14</td>
<td>35 – 120</td>
<td>Nightshades, brassica, carrots, sage, rosemary</td>
<td>Is said to make tomatoes taste better, deters various insects. Attracts butterflies.</td>
</tr>
<tr>
<td><strong>African Daisy</strong></td>
<td>Silverhill White medium height, flowery</td>
<td>4 – 6</td>
<td>45 – 45</td>
<td>Nightshades</td>
<td>Indigenous, Attracts bees, butterflies, etc.</td>
</tr>
<tr>
<td><strong>Alfalfa</strong></td>
<td></td>
<td>4 – 6</td>
<td>45 – 45</td>
<td>夜光拟蝴蝶</td>
<td>Feeds nitrogen, improves soil, breaks up tough soil, and attracts predatory insects.</td>
</tr>
<tr>
<td><strong>Alyssum</strong></td>
<td>Carpet of Snow</td>
<td>7 – 14</td>
<td>35 – 45</td>
<td>Nightshades</td>
<td>Attracts pollinators.</td>
</tr>
<tr>
<td><strong>Asparagus</strong></td>
<td></td>
<td>– –</td>
<td>– –</td>
<td>Nightshades</td>
<td>Everything except...</td>
</tr>
<tr>
<td><strong>Aubergine</strong></td>
<td></td>
<td>– –</td>
<td>– –</td>
<td>Nightshades</td>
<td>Alliums</td>
</tr>
<tr>
<td><strong>Aztec Herb</strong></td>
<td>Creeper</td>
<td>7 – 14</td>
<td>35 – 45</td>
<td>Nightshades</td>
<td>Everything except...</td>
</tr>
<tr>
<td><strong>Baby Spinach</strong></td>
<td>Dash</td>
<td>7 – 14</td>
<td>35 – 45</td>
<td>Nightshades</td>
<td>Annual, shiny leaves, very aromatic</td>
</tr>
<tr>
<td><strong>Banana Tree</strong></td>
<td></td>
<td>7 – 14</td>
<td>35 – 50</td>
<td>Nightshades</td>
<td>Common rue, brassica, carrots, sage, rosemary</td>
</tr>
<tr>
<td><strong>Basil</strong></td>
<td>Ocimumbasilicum chamomile, anise</td>
<td>7 – 14</td>
<td>35 – 90</td>
<td>Nightshades, oregano, petunias, brassica, carrots, corn</td>
<td>Is said to make tomatoes taste better, deters various insects. Attracts butterflies.</td>
</tr>
<tr>
<td><strong>Beans</strong></td>
<td>Star 2052 Sticks</td>
<td>7 – 10</td>
<td>80 – 100</td>
<td>Nightshades</td>
<td>Everything except...</td>
</tr>
<tr>
<td><strong>Bear’s Lime</strong></td>
<td>Star 1105 large tree</td>
<td>7 – 10</td>
<td>80 – 100</td>
<td>Nightshades</td>
<td>Alliums</td>
</tr>
<tr>
<td><strong>Beetroot</strong></td>
<td>Star 1105 large tree</td>
<td>7 – 10</td>
<td>80 – 100</td>
<td>Nightshades</td>
<td>Buildings</td>
</tr>
<tr>
<td><strong>Beets</strong></td>
<td>Star 1105 large tree</td>
<td>7 – 10</td>
<td>80 – 100</td>
<td>Nightshades</td>
<td>Alliums, brassica, beans</td>
</tr>
<tr>
<td><strong>Borage</strong></td>
<td>Borageo officinalis big, flat leaves</td>
<td>7 – 14</td>
<td>35 – 120</td>
<td>夜光拟蝴蝶</td>
<td>Almost everything</td>
</tr>
<tr>
<td><strong>Broccoli</strong></td>
<td>Kale</td>
<td>7 – 10</td>
<td>65 – 70</td>
<td>Nightshades</td>
<td>Everything except...</td>
</tr>
<tr>
<td><strong>Bush Beans</strong></td>
<td>Tall, thin</td>
<td>7 – 14</td>
<td>50 – 60</td>
<td>Nightshades</td>
<td>Everything except...</td>
</tr>
<tr>
<td><strong>Bushine</strong></td>
<td>Aloe-type</td>
<td>7 – 14</td>
<td>110 – 110</td>
<td>Nightshades</td>
<td>Everything except...</td>
</tr>
<tr>
<td><strong>Butternut</strong></td>
<td>Sunset</td>
<td>7 – 14</td>
<td>110 – 110</td>
<td>Nightshades</td>
<td>Everything except...</td>
</tr>
<tr>
<td><strong>Cabbage</strong></td>
<td>Star 3317 low kale</td>
<td>7 – 10</td>
<td>75 – 85</td>
<td>Nightshades</td>
<td>Carrots, strawberries, mint</td>
</tr>
<tr>
<td><strong>Cabbage</strong></td>
<td>Cape spitz low kale</td>
<td>7 – 10</td>
<td>90 – 110</td>
<td>Nightshades</td>
<td>Carrots, strawberries, mint</td>
</tr>
<tr>
<td><strong>Cabbage</strong></td>
<td>Glory of enkhuisen low kale</td>
<td>7 – 10</td>
<td>90 – 95</td>
<td>Nightshades</td>
<td>Carrots, strawberries, mint</td>
</tr>
<tr>
<td><strong>Cabbage</strong></td>
<td>Copenhagen market low kale</td>
<td>6 – 10</td>
<td>100 – 130</td>
<td>Nightshades</td>
<td>Carrots, strawberries, mint</td>
</tr>
<tr>
<td><strong>Cabbage</strong></td>
<td>Drumhead low kale</td>
<td>7 – 10</td>
<td>110 – 140</td>
<td>Nightshades</td>
<td>Carrots, strawberries, mint</td>
</tr>
<tr>
<td><strong>Carrot</strong></td>
<td>Ideal red root</td>
<td>10 – 14</td>
<td>90 – 100</td>
<td>Nightshades, Alliums, brassica, dillum, parsnip, radish</td>
<td>夜光拟蝴蝶</td>
</tr>
<tr>
<td><strong>Catnip</strong></td>
<td></td>
<td>– –</td>
<td>– –</td>
<td>Nightshades</td>
<td>Deters flea beetle.</td>
</tr>
<tr>
<td><strong>Cauliflower</strong></td>
<td>Wallaby</td>
<td>7 – 10</td>
<td>80 – 85</td>
<td>Nightshades</td>
<td>Nightshades</td>
</tr>
<tr>
<td><strong>Celery</strong></td>
<td>tall</td>
<td>7 – 10</td>
<td>80 – 85</td>
<td>Nightshades</td>
<td>brassica</td>
</tr>
<tr>
<td>Plant</td>
<td>Genus</td>
<td>Characteristics</td>
<td>Interactions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------------</td>
<td>------------------------</td>
<td>-----------------------------------------------------</td>
<td>------------------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chervil</td>
<td>Anthriscus cerefolium</td>
<td>Parsley-like</td>
<td>Works well with other culinary herbs. Deters aphids.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chilli</td>
<td>Allium schoenoprasum</td>
<td>80-80-90</td>
<td>Provides ground cover and deters rabbits, aphids, ants.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chives</td>
<td>Allium schoenoprasum</td>
<td>7-14-90-120</td>
<td>Sunflowers, legumes, cucurbits, tomato, celery.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coriander/Dhania/Cilantro</td>
<td>Coriandrum sativum</td>
<td>beans, peas</td>
<td>Spices, carrots, tomatoes, brussica. Deters aphids.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corn</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cucumber</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cumin</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dill</td>
<td>Anethum graveolens</td>
<td>fennelike leaves</td>
<td>Deters aphids, mites, and potato beetle. Retains soil moisture.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drumstick</td>
<td>Moringa oleifera</td>
<td>small tree</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Garlic</td>
<td>Allium sativum</td>
<td>Bulb</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gazania</td>
<td>Orange</td>
<td>7-14-100-120</td>
<td>Indigenous. Attracts bees, butterflies, etc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ground Ivy</td>
<td>Glechoma hederacea</td>
<td>Creeper</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hemp</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jalepeno Pepper</td>
<td>Capsicum frutescens</td>
<td>16-18-75-80</td>
<td>Tomatoes, geraniums, petunias, beans, brassica.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leek</td>
<td>Melissa officinalis</td>
<td>12-70-270</td>
<td>Celerly, carrots. Legumes. Deters aphids, ants.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lemon Basil</td>
<td>Ocimum basilicum var</td>
<td>small leafy</td>
<td>Mint. Can be used as sedative tea for headaches &amp; tension.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lemon Tree</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lettuce</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mustard</td>
<td>Brassica nigra</td>
<td>short, yellow flowers</td>
<td>Deters aphids, spider fly, fox, ants.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nasturtium Gem</td>
<td>Tropaeolum majus</td>
<td>bushy, broad flat leaves</td>
<td>Both work as trap crops for aphids, are among the best at attracting predators. Entirely edible.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nasturtium Gem</td>
<td>Tropaeolum majus</td>
<td>bushy, broad flat leaves</td>
<td>Both work as trap crops for aphids, are among the best at attracting predators. Entirely edible.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nasturtium Gem</td>
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<td>bushy, broad flat leaves</td>
<td>Both work as trap crops for aphids, are among the best at attracting predators. Entirely edible.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Onion</td>
<td>Star S522</td>
<td>bulb</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Onion</td>
<td>Brown</td>
<td>bulb</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oregon (O/U)</td>
<td>Origanum vulgare</td>
<td>small, dense leaves</td>
<td>Provides ground cover and much-needed humidity for pepper plants if allowed to spread among them</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plant Name</td>
<td>Common Name</td>
<td>Description</td>
<td>Flower Season</td>
<td>Pest Control</td>
<td>Companion Plants</td>
</tr>
<tr>
<td>-----------</td>
<td>-------------</td>
<td>-------------</td>
<td>--------------</td>
<td>-------------</td>
<td>------------------</td>
</tr>
<tr>
<td>Turnip</td>
<td>Early purpletop</td>
<td>14 7 50 50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parsnip</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peas</td>
<td>Green feast</td>
<td>medium, broad top, 7 10 120 120</td>
<td>Everything, except cucumbers, tomatoes, strawberries, beans, carrots</td>
<td>Alliums</td>
<td>Feeds nitrogen, creates shade, grows readily</td>
</tr>
<tr>
<td>Pennycress</td>
<td>Methapulegium</td>
<td>ground cover, 7 14 90 120</td>
<td>Everything, except cucumbers, tomatoes, strawberries, beans, carrots</td>
<td>Roses</td>
<td>Makes good tea. Repels aphids. Don't use if pregnant.</td>
</tr>
<tr>
<td>Pepper (Green)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peppers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Petunia</td>
<td>Petunia x hybrida</td>
<td>-- -- -- --</td>
<td></td>
<td>Cucurbits</td>
<td>It is a trap crop almost identical to geraniums in function</td>
</tr>
<tr>
<td>Potato</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pumpkin</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Queen Anne's Lace</td>
<td>Dauicarota (Wild Carrots)</td>
<td>-- -- -- --</td>
<td></td>
<td>Young roots are edible</td>
<td>Some recent scientific support for its historic use as a culinary herb.</td>
</tr>
<tr>
<td>Radish</td>
<td>Champion</td>
<td>6 7 21 28</td>
<td>Brassica and Nightshades</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radish Sparkler</td>
<td>Small round fruit, 5 7 21 28</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rocket</td>
<td>Sweet</td>
<td>small, leafy, 10 14 30 50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rosemary</td>
<td>Rosmarinus officinalis</td>
<td>-- -- 80 90</td>
<td>Sage, cabbage, beans, carrots</td>
<td>Basil</td>
<td>Deters cabbage flies, repels many bean parasites</td>
</tr>
<tr>
<td>Rosemary Half blue</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rue</td>
<td></td>
<td>7 14 90 120</td>
<td>Peach trees, tomatoes, strawberries</td>
<td>Basil</td>
<td>Deters mant insects</td>
</tr>
<tr>
<td>Sage</td>
<td>Salvia officinalis</td>
<td>-- -- -- --</td>
<td>Rosemary, cabbage, beans, carrots</td>
<td></td>
<td>Deters cabbage flies, repels many bean parasites</td>
</tr>
<tr>
<td>Sorrel</td>
<td>Rumex acetosa</td>
<td>small leafy, 7 14 60 70</td>
<td>Oregano</td>
<td></td>
<td>Eat raw like spinach, or in soups, salads, and as a condiment.</td>
</tr>
<tr>
<td>Spinach</td>
<td>Fordhook giant</td>
<td>large, bushy leavey, 10 14 40 60</td>
<td>Legumes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spinach Star 1801</td>
<td>short, bushy leavey, 10 14 40 60</td>
<td></td>
<td>Legumes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spinach Greenwave</td>
<td>short, bushy leavey, 10 14 40 60</td>
<td></td>
<td>Legumes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Squash</td>
<td>Cucurbita</td>
<td>small, 7 0 28</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Star Jasmin</td>
<td>Trachelospermum</td>
<td>creeper, -- -- -- --</td>
<td>White scented flowers from spring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sunflower</td>
<td>Helianthus annuus</td>
<td>-- -- -- --</td>
<td>Corn</td>
<td></td>
<td>Ants herd aphids onto sunflowers, keeping them off neighbouring plants.</td>
</tr>
<tr>
<td>Sweet Pepper</td>
<td>California wonder</td>
<td>pepper (bell), 14 18 75 80</td>
<td>Tomatoes, geraniums, petunias</td>
<td>Beans, brassica</td>
<td></td>
</tr>
<tr>
<td>Tansy</td>
<td>Tanacetum vulgare</td>
<td>small yellow flower, 7 14 20 20</td>
<td>Beans, cucumbers (cucumbers, squash, etc), corn, roses</td>
<td></td>
<td>Deters flying insects, Japanese beetles, striped cucumber beetles, squash bugs and ants. DO NOT EAT!</td>
</tr>
<tr>
<td>Tarragon</td>
<td>Artemisia dracunculus</td>
<td></td>
<td>Everything, but especially eggplant</td>
<td></td>
<td>Annual. Distilled by most pests, enhances growth and flavour of crops grown with it. Harvest after flowers appear &amp; before leaves turn yellow.</td>
</tr>
<tr>
<td>Thyme</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tiny Tomatoes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tomato</td>
<td>Rodde</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tomatoes Floradade</td>
<td></td>
<td>10 10 -- 110</td>
<td>Carrots, alliums, celery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tomatoes Oxheart (large, heart shaped)</td>
<td>7 14 --</td>
<td></td>
<td>Carrots, alliums, celery</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Got a community organisation?
Want a no-hassle web presence?

Thirteen13.org.za is a new site for small organisations in Grahamstown, to give them a platform for communications and networking. It allows members to easily update their web presence from their phones, so they can focus on the work and be sure they can still post photos, videos and blogs without hassle.

Contact us through the www.thirteen13.org.za site or through the Feeding The Self contact details.

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Give us a call or email, and...
✓ Get in touch with interesting and interested people
✓ Get you a web page that you can easily update
✓ Find a strong network and resource archive
✓ Find ways to improve your work
✓ Get help setting up your NGO
✓ Learn new ways to reach out