Home Grown

A practical guide to growing your own fresh food

City of KINGSTON

City of
KINGSTON

Front cover photo: Pomegranate

This booklet was produced by Green Gecko Publications www.greengeckopublications.com.au

Recipes by Lauren Burns, www.laurenburns.com

Design www.nainak.com.au

Photographs by Elaine Shallue, Mary Trigger, Naina Knoess, Ryan Young, Steven Pam, Tracey Martin, Gary Fox, Wildlife Friendly Netting

Green Gecko
PUBLICATIONS

Tel: 0414 641 337
Email: marytrigger444@gmail.com
ABN: 90618914198

Contents

Why grow your own produce?

Growing your own delicious fresh food is rewarding, healthy and fun!

Fig

From a simple container to extensive garden beds you can plan to grow seasonally fresh and naturally ripened food that tastes delicious and is nutritionally better for you.

Home Grown provides you with practical advice on how to grow your own produce at home, from designing and planning your garden, to planting and harvesting your own fresh fruit and vegetables. Growing your own food is a great way to get fresh air and exercise whilst providing fresh and healthy food for your family. It also helps to reduce food packaging, transportation and chemical use, and creating compost with food scraps reduces waste - which is all good for the planet!

Home Grown will also provide you with information on how to connect with other food growers in your local area.

Planning

Start small...but plan BIG!

Practical considerations

Taking the time to plan your produce garden will save you time and money. In planning your produce garden you need to consider what you have, what you would like to end up with and how you are going to get there. And remember, it doesn't all have to be done immediately, but rather according to a well thought out garden plan.

1. What exists?

Have a good look at your garden, preferably at varying times of the year. Sketch out a plan of your garden and mark in the physical elements. Where are your sunny and shady areas in summer and winter? Produce should have at least 5 hours of full sun per day. Are there any areas that get water logged? Do you have steep slopes that would need to be levelled if you put in produce beds? Is your compost bin convenient to access? Mark in any of the following: existing garden beds, clothesline, play equipment, garden shed, paths, rainwater tank, North, slopes, wet areas, taps, underground pipes, deciduous trees, sheltered areas and wind tunnels.

2. What do you want?

What do you like to eat? Do you want to supplement your family's diet? Do you just want some fresh herbs and a lemon tree? What about fruit trees? Do you have space to grow a wide range of vegetables and herbs? Do you want raised veggie beds or to combine productive plants within ornamental beds? Do you want to have chickens? How much time do you have for ongoing maintenance?

3. Do some background research

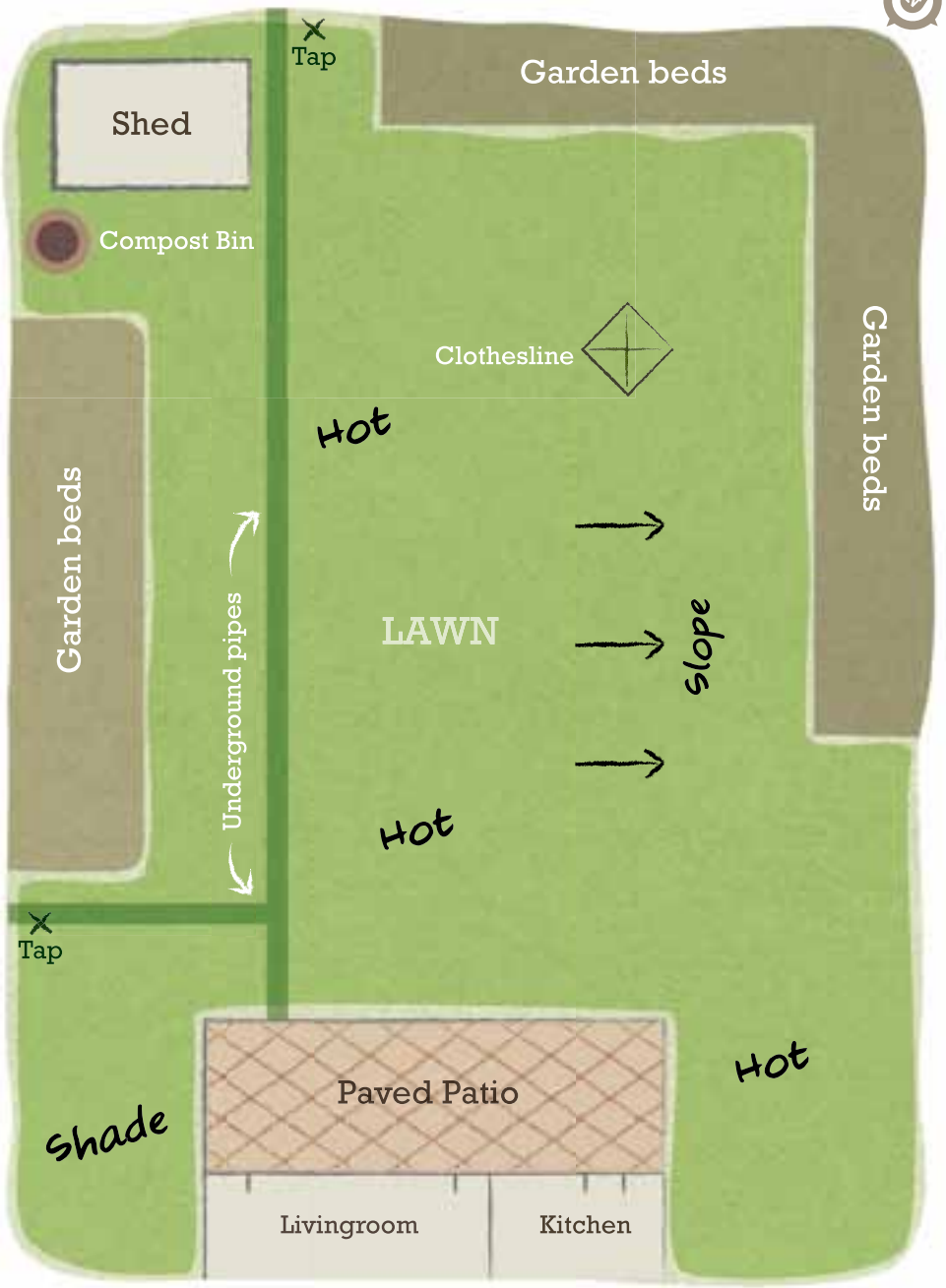
List down any major structures you want to include in your garden. Can you do it yourself, or will you need a professional builder or plumber? Make an estimate of the cost of materials for elements such as raised veggie beds, irrigation system, paving, soil and mulch, fruit trees or a rainwater tank. Do you have the time and money to do it all at once or is it better to take a staged approach?

4. Develop a plan

Once you have decided on what you want and what you can realistically achieve and afford, you can play with your garden plan exploring different options. Tracing paper overlays can work well at this stage. Decide what needs to be done first i.e. structural changes such as levelling a site for a raised bed or putting in paths. Focus on one area at a time so you are not overwhelmed.

Site analysis

Example of a typical backyard site analysis with major features draw in.



Garden plan for a food garden

Example of a garden plan to introduce a wide variety of produce and chickens to the backyard.

Installation

In general, you have three options for where you grow your produce. You can add produce to your ornamental garden beds, build a dedicated veggie bed or, grow your edibles in containers. You may decide on a combination of all three!

Container growing

Growing herbs, vegetables and dwarf fruit trees in containers is a great option for small spaces such as courtyards and balconies, and for renters. Growing edibles in containers close to the kitchen will increase the likelihood of them being used in an evening meal. You can buy glazed pots, hanging baskets, flower boxes or recycle an old bathtub! Just make sure you have drainage holes and the plant roots have ample space to spread their roots and thrive. Aim for a depth of around 30cm.

Growing produce in food cans should be avoided as they are lined with BPA (bisphenol A) which may leach into your edibles. Likewise old tyres can leach chemicals and should be avoided.

If you are using pots on a balcony, courtyard or patio it is a good idea to put them on wheels so they can be easily moved around to catch the full sun across the seasons. Potted plants dry out very quickly so add pot saucers or use self-watering pots and check regularly. Terracotta pots are quite porous and will dry out faster than glazed pots.

Use a high quality, organically certified potting mix and top up as it breaks down. Do not use garden soil in containers as it tends to break down too quickly and can drain poorly.

Add a straw-based mulch deep enough inside your container so that it will not blow away.

Avoid putting too many large pots on your balcony. Remember containers get even heavier when you water them. Balconies can also be quite exposed to high wind, potentially resulting in pots toppling over or plants dehydrating. Select plants that don't grow too tall and avoid light plastic pots.

Basil

Raised garden beds

Building up is an excellent option if you have poor quality or compacted soil, concrete, limited space, a bad back or want to create a kitchen garden feature in your garden. Raised beds can be constructed from a variety of materials including large fruit crates, straw bales, bricks, timber sleepers or galvanised iron. If you use sleepers, make sure they are CCA (Copper Chrome Arsenate) free timbers and avoid treated pine.

The height of raised beds can vary depending on what is comfortable for you. To grow large fruit trees you will need a depth of at least 100cm. If you want to grow dwarf fruit trees you will need a minimum depth of 30-50cm. Width can be an issue for accessing plants easily. If you access plants from one side aim for a width of around 50-60cm, from both sides you should be able to comfortably reach plants at a width of 1.0 -1.2m.

When your raised bed is in place, all you have to do is fill it up. You can buy some garden topsoil from your garden centre, add a layer of well-rotted animal manure or compost, top with a straw-based mulch and start planting. Or you can fill your raised bed by the no-dig method of layering materials.

The height of raised beds can vary depending on what is comfortable for you.

Raised garden bed

No-dig garden bed

A no-dig garden is filled with layers of material that break down over time to produce a nutrient-rich soil that retains water well and produces heat to accelerate plant growth. And as the name suggests, no digging required! Ideally, no-dig gardens should not be planted into immediately to give the organic matter time to break down. If you construct your no-dig bed in late summer/autumn, it will be perfect for planting in spring.

No digging required!

Once your raised bed frame is in place, fill using the following no-dig method:

1. Create a weed barrier by laying about 2cm of overlapping newspaper, unwaxed cardboard or carpet as a base. Wet down.
2. Add about 10cm of organic waste e.g. grass clippings, vegetable scraps or chopped up garden waste.
3. Cover with 10-15cm of aged animal manure or compost.
4. Add a layer of straw-based mulch to a depth of 20cm.
5. Repeat 2. to 4. if you have a high raised bed.
6. Lightly spread more animal manure to a depth of 2cm.
7. Water well.
8. Let the bed rest for a season.
9. Plant out with seedlings and mulch to a depth of 3-5cm.
10. Top up the bed with more organic matter from time to time.

Traditional veggie patch

A good size for a veggie patch is about 1.2m wide and 3m long. Mark out the bed with a string line and start digging! The soil must be dug to a depth of 30cm with all weeds removed as you go. Cover the dug over soil with about 10cm of aged animal manure and dig this in. Water well and cover with a straw-based mulch.

Pottager garden

If you incorporate your fruit trees, vegetables and herbs into your existing ornamental garden beds you are creating a pottager garden. Adding produce will create diversity, texture and colour to your beds. You will first need to incorporate a significant amount of organic matter into your soil for your nutrient-hungry produce. As indigenous plants thrive in low nutrient soil it is not advisable to add produce to native plant beds.

If you have a clay soil, sprinkle gypsum over the soil surface, as you would icing sugar on a cake, to help break up the clay. Dig over your soil to a depth of about 30cm adding 1 part compost to 3 parts soil. Plant out and mulch around your produce with a straw-based mulch. Be mindful that seasonal produce has a fast turnover that can result in disturbance to the soil around permanent plants when cultivating, so position produce carefully within your beds.

Maintenance

Good maintenance practices lead to a more productive harvest!

Soil

Produce thrives in soil that is rich in nutrients, crumbly to touch, dark in colour and water retentive. Not all soil is ideal for growing produce and so you may need to work with your soil to improve it's fertility, aeration, water holding capacity and organic content.

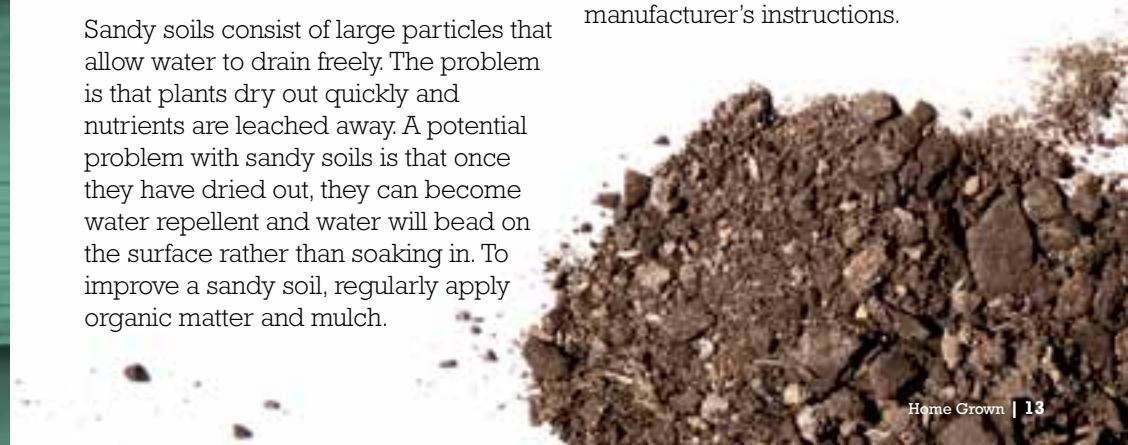
Soils are broadly classified by the size of the particles they contain as to whether they are sand, loam or clay (and variations of e.g. sandy loam). To work out your garden soil type simply take a handful of slightly moist soil and squeeze it. If it forms a smooth ball, it's a clay soil. If it does not hold form and simply falls apart, it's a sandy soil. If it roughly holds together, but falls apart readily when squeezed, it's a loam soil.

Clay soil consists of very fine particles that stick together. They tend to hold water and nutrients well. The downside of clay soils is that they can hold water a little too well, creating poor water drainage. Also, when they dry out they can become hard, making it difficult for water to penetrate. The solution is to make them more friable by adding a dusting of gypsum and organic matter such as aged animal manure and compost.

Sandy soils consist of large particles that allow water to drain freely. The problem is that plants dry out quickly and nutrients are leached away. A potential problem with sandy soils is that once they have dried out, they can become water repellent and water will bead on the surface rather than soaking in. To improve a sandy soil, regularly apply organic matter and mulch.

Loam soils fall somewhere in between sand and clay and are a mixture of fine and coarse particles. Loam soils drain well and have a good nutrient base for gardening. Add organic matter and mulch to replenish nutrients taken up by your plants.

The pH of your soil refers to the acidity or alkalinity of your soil which affects the availability of nutrients for plants. This is critical in growing healthy produce plants. You can buy pH testing kits from garden centres and routinely check your soil pH, particularly at the end of each growing season and before you plant the next crop. Ideally when growing produce, your soil should be within a pH range of 6.0 and 7.5. Altering your soil pH takes about 6 weeks. If your soil pH is too high (alkaline), it can be lowered with an application of sulphur. If it is too low, raise it with a sprinkling of dolomite or lime. Be sure to follow the manufacturer's instructions.



Kingston soils

Kingston soils provide their own challenges as they are typically sandy and dry. This makes them unattractive to the abundant micro-organisms essential for producing soil nutrients.

Improve your sandy soil by adding plenty of compost and other organic materials. This will improve your soil's moisture holding capacity, make it attractive to worms and promote better plant growth.

The benefits of sandy soils are that they are naturally free draining and warm up quickly in spring. This allows for early germination of veggie seeds such as chillies and capsicums that need long growing seasons to bear fruit.

Fertilisers

Produce requires large amounts of nutrients for optimum growth. This is particularly true for fast growing annual crops. Adding compost and aged manures to your soil will provide most of your plant's nutritional needs. Existing soil nutrients can be made more available by regulating the soil pH.

If fertilisers are necessary, feed the soil rather than the plant. This allows the plant to take up what it needs as it needs it. Before the autumn and spring growing periods begin, apply slow release pelletised fertiliser. Then during the growing period apply supplementary organic fertilisers fortnightly. Choose an organic liquid fertiliser such as worm tea, manure tea or fish emulsions. Avoid synthetic fertilisers as these often have synthetic nitrogen and the high salt content can burn young seedlings.

For information and treatment of some common plant nutrient deficiencies, refer to page 23.

Organic waste recycling systems

When organic (food and garden) waste rots in landfill anaerobically (without oxygen) gases are produced as a by-product.

Landfill gas is approximately 40% carbon dioxide, 55% methane, 5% nitrogen and other gases. Methane is a greenhouse gas that is 21 times more warming than the equivalent amount of carbon dioxide. When organic waste breaks down aerobically (with oxygen) methane gas production is minimised. If you compost your organic waste at home, rather than send it to landfill, you help reduce unwanted gases, plus your plants will love you!

Composting your food scraps, grass and garden clippings can provide your garden with an excellent source of food. Compost does not have to be dug into the soil. Unless the soil needs to be improved, the compost can be laid on top.

ADD TO YOUR COMPOST

- **Fruit and veggie scraps**
- **Coffee grounds**
- **Tea bags**
- **Herbs**
- **Leaves**
- **Egg shells –** crushed
- **Pizza containers**
- **Egg cartons**
- **Vacuum cleaner dust**
- **Onion** – outer skin
- **Finely chopped citrus peel**
- **Grass clippings**
  – thin layers 3 to 4cm
- **Chopped prunings**
- **Weeds**
  – not bulbs or seed heads
- **Shredded newspapers**

KEEP OUT OF YOUR COMPOST

- **Meat and fish scraps**
  – they can attract vermin
- **Dairy**
  – again they attract vermin
- **Office paper**
  – bleached or glossy
- **Weed seeds and bulbs**
  – you will only spread them around your garden
- **Bird, dog and cat poo**
  – can be a health risk
- **Large tree branches**
  – unless you've put them through a chipper
- **Citrus fruit**
  – too acidic in large quantities, okay in small quantities
- **Diseased plants**
  – spreads disease

Kitchen fermentation kits

A kitchen fermentation system converts kitchen scraps into a nutrient rich soil conditioner for your garden. The system is air tight and requires you to sprinkle a handful of the manufacturer's rice husk and wheat bran (infused with micro-organisms) over a layer of kitchen waste to rapidly break down food scraps. The fermented product is then dug into the soil where it continues to breakdown. The kitchen fermentation kit is ideal for those in flats or with small gardens. The kit is small enough to sit on or under a kitchen bench.

Regularly drain the juice produced using the tap at the base of the bucket. Dilute 1 teaspoon with 2-3 litres of water and apply.

Compost bins

Compost bins are a compact closed system to break down organic waste into compost. Locate bin in a position that is shaded in summer and sunny in winter. Under a deciduous tree is ideal. Place on soil so that liquid drains away and worms can enter the bin to aid composting. Fasten a piece of mesh wire under the bin to prevent rats and mice digging underneath. Add alternate layers of high nitrogen ingredients (e.g. food scraps, manure, grass clippings, soft prunings) to low nitrogen ingredients (e.g. dry leaves, straw, garden waste, shredded newspaper). Aim for layers of 1 bucket of high nitrogen followed by 3 buckets of low nitrogen. Keep moist but not too wet. Cover with a layer of hessian to retain heat and moisture. The compost should be ready in 12-16 weeks.

Compost heaps

This is an open system that requires more space and will attract vermin if kitchen scraps are added. The system needs to be a minimum of $1m^3$ in order to generate enough heat to work. Build a large heap of organic materials 1.2m high by 1.2m wide. This can be on soil or on a hard surface. Alternate your organic materials between high nitrogen (e.g. garden cuttings, lawn clippings and aged animal manures) and low nitrogen (e.g. dry leaves, straw, shredded newspaper) with each layer being 10-20cm deep. As you build, wet down each layer so that the materials are moist but not saturated. Cover your finished heap with hessian and secure. Turn your heap twice a week. The heap should generate enough heat to obtain compost in 6-8 weeks.

Worm farms

Worm farms are a great option if you have limited space and predominantly want to dispose of food scraps. You can buy worm farms that come with instructions, bedding and special composting worms. They consist of 3 containers that sit within each other and a lid. The bottom layer had a filter and tap and this is where the nutrient rich worm tea accumulates. The middle container is for collecting the worm castings, another rich fertiliser. The top layer is where the worms live. You can also build your own worm farms from polystyrene fruit boxes or an old bathtub.

Location

It is important to locate your worm farm in a place that is convenient to access and is away from direct sunlight and rain. Too hot (over 30°C) and your worms will die. Cover your worms and kitchen scraps with damp newspaper or hessian to keep them cool and moist. Too cold (less than 10°C) and wet, they will die. A layer of old carpet on top will help in winter. Adding shredded newspaper or pea straw in with foodscraps will balance out the pH and reduce small vinegar flies in the top layer or dead worms in the bottom layer.

Food

Worms love finely cut or blended fruit and vegetable scraps, tea leaves, coffee grounds, wet shredded newspaper and aged manures. Avoid citrus, onion, garlic, cheese, meat and bread. Don't overdo it, especially when you first set up your farm, and monitor it regularly. If your farm starts to smell the food is rotting rather than being eaten. If this is the case, reduce the amount of food you are adding to your worm farm.

Coarse lime can also help the pH of your worm farm and reduce the smell.

Worm Fertiliser

Worm tea is very strong and needs to be diluted 1 part tea to 10 parts water before you add to your plants.

Worm castings are less potent and can be scooped up and added directly to your soil.

Green Cone

The green cone is an in-ground digester system where your food waste breaks down and releases nutrient-rich liquid into the soil. Once the system has been set up in the ground it remains in that location, there is no need to move it. All food waste can be directly added to the green cone. It is low maintenance as the internal warmth and soil bacteria and earthworms do the job for you. Green cones should be located next to heavy feeders in a sunny position with good drainage. It is ideal if you have limited need for garden compost. It is not suitable for garden waste.

Watering

Australia is the driest inhabited continent on Earth and climate change modelling suggests lower rainfall and an increase in hot days. It is estimated that up to 35% of household water is used on the garden. Consequently, in a situation of water shortage, water restrictions are placed on our access to mains (tap) water for gardening. If we want to grow produce we need to ensure we capture and apply water efficiently and effectively.

Water harvesting

Rainwater Tanks

Collecting your own rainwater is essential if you want to maintain a produce garden throughout the year. Rainwater collected in a tank is not subject to any water restrictions in times of low rainfall. There are a wide range of rainwater tanks on the market from steel, concrete and plastic, to slimline, round and bladder tanks. It comes down to the size you need, the space available in your garden and your budget.
For information on choosing the size and type of rainwater tank visit:
www.sgaonline.org.au

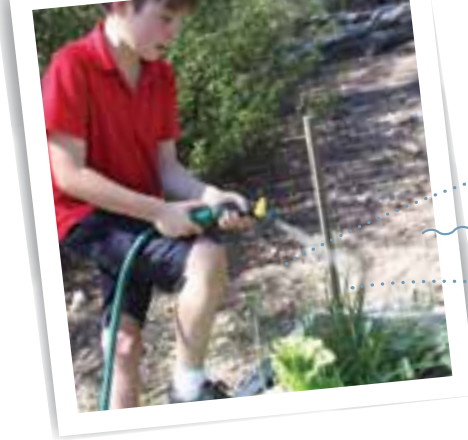
Kingston City Council encourages the installation of rainwater tanks. In most instances, a permit is not required, however it is important to be aware of regulations regarding tank siting to ensure that your tank does not interfere with the amenity of adjoining properties.

For information on rainwater tank rebates visit South East Water
www.southeastwater.com.au

Greywater

Greywater is any waste water that comes from your bathroom, laundry or kitchen. Untreated greywater can be applied to the garden under some circumstances, however it should never be applied to herbs and vegetables that are grown as food crops. Greywater can contain bacteria and other pathogens that can cause illness if consumed through eating herbs and vegetables. It can be applied sub-surface to fruit trees. Untreated greywater cannot be stored for more than 24 hours and if you are using it on fruit trees, you should use phosphorous free, low sodium detergents and flush the soil regularly with fresh water. Not a great deal of research has been done on the long term effect of untreated greywater on plants, soils and soil microbes.

For further information on greywater use in the garden visit:
www.epa.vic.gov.au and search 'greywater'.



Water to the base of the plant,

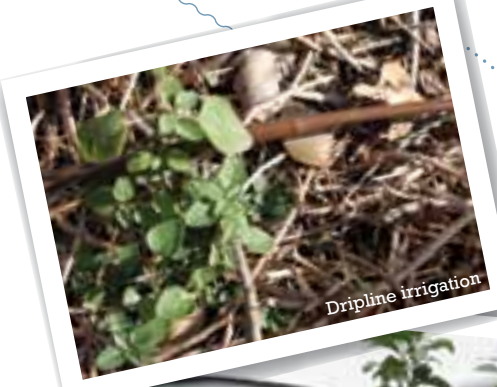
Water application

How water is delivered to your plants is very important. Use a dripline watering system which reduces wastage by ensuring that the water only goes to the base of your plants where it is needed. Check and clean your irrigation system every spring to ensure dripline holes are not blocked up with soil.

If you are using a hose, use a trigger nozzle with an adjustable spray. Do not use a concentrated spray as this will destroy the soil structure. Water to the base of the plant, not the foliage. Water in the early morning so your plants are not distressed through the heat of the day, and you will also prevent fungal diseases and moulds.

Install garden tap timers to reduce over-watering. Use a rain sensor so that watering doesn't occur automatically and ensure the system is turned off if rain is predicted. Give your plants long, deep watering and make sure they are grouped according to their water needs.

For information on current water use rules visit:
www.southeastwater.com.au



Dripline irrigation

Rainwater tank

Mulching

The major role of mulch is to protect the soil and roots of plants from the harshness of our summer sun. Mulch helps to regulate soil temperature, keeping the soil and plant roots cool in summer and warmer in winter. This allows earthworms and microorganisms to be more active. Mulching serves a number of other vital functions in our produce garden.

Mulch conserves water by reducing surface evaporation and helps water to penetrate the soil better. Mulch reduces weeds that compete with your vegetables for nutrients. As mulch breaks down it adds organic matter to the soil. This helps to improve soil structure and nutrient content.

A straw-based (pea straw, lucerne or sugarcane) mulch is best as it breaks down fairly quickly and is high in nutrients.

It's important to top up your mulch at the start of the growing seasons (autumn and spring). Don't mulch right up to the stems of your plants as it can cause fungal diseases. Leave a gap of at least 4cm around the stem. Avoid using grass clippings as a mulch as they tend to mat together preventing water and air from penetrating. Add grass clippings to your compost heap instead.

Mulching can increase the incidence of insect pests like weevils and earwigs.

How to mulch

1. Remove any weeds.
2. Make sure the soil is wet.
3. Lay your mulch to a depth of 5cm.

Commercial cloche

Frost and Sun Protection

Seedlings in particular can be badly damaged by extreme heat and overnight frosts.

If a hot day is forecast protect your produce by attaching shade cloth or even an old sheet to tomato stakes to shade them during the heat of the day. Likewise if frost is forecast, attach a cloth to stakes to protect your crop. You can also purchase 'cloches' from garden centres and hardware stores.

Garden Health

Prevention is better than the cure!

Nutrient deficiencies

Just like people, strong, healthy plants are more resilient to pests and diseases. Produce grown at home needs at least 5 hours of sunlight a day, a good supply of water, fresh air and access to nutrients to be healthy. If they are unable to access key nutrients they will be prone to attack by a range of diseases, moulds and pests.

For information on other plant nutrients and remedies visit
www.rhs.org.uk/advice/profile?PID=456

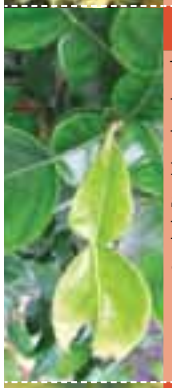
Common nutrient deficiencies

NITROGEN DEFICIENCY

Spindly plants or pale leaves early in their growing season. Nitrogen is very soluble and easily washed out of the soil in heavy rains, leaving the soil deficient. This is particularly problematic in sandy soils. Particularly affects heavy feeders.

Treatment:

- Short term, apply high nitrogen fertilisers like fish (carp) or animal manures.
- Long term, continually fertilise your soil with aged manures and compost to improve the nutrient holding capacity of your soil.

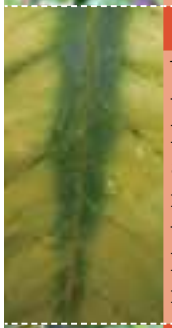


IRON DEFICIENCY

Yellowing will occur between the veins on young leaves, or the entire leaf turns yellow. Can result from waterlogged or cold soil, damaged roots, or soil pH higher than 7.0. Particularly affects citrus and blueberry.

Treatment:

- Check soil drainage around your affected plant.
- Ensure your plant is receiving at least 5 hours of sunlight a day.
- Test and adjust your soil pH (if too high, add sulphur or mulch with pine needles).
- Avoid alkaline mushroom and poultry fertilisers.

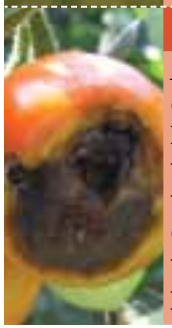


MAGNESIUM DEFICIENCY

Yellowing between leaves similar to an iron deficiency but the base of the leaf remains green, and older leaves are affected rather than young leaves. Results when the soil pH is less than 5.5. Particularly affects citrus and raspberry.

Treatment:

- Check soil drainage.
- Test and adjust your soil pH (if too low, add dolomite or lime).
- Spray Epsom Salts on the leaves.
- Add organic fertiliser in spring and autumn.



CALCIUM DEFICIENCY - BLOSSUM END ROT

A nutrient disorder due to a calcium deficiency caused by acidic soil, insufficient water in the growing season, waterlogged soil or application of high nitrogen fertilisers. Affects tomato, capsicum, zucchini, pumpkin, melon & cucumber.

Treatment:

- Test the soil pH before planting.
- Water regularly and deeply.
- Do not overwater heavy clay soils.
- Mulch with straw.
- Grow in pots if drainage is poor.

Crop rotation

When vegetables from the same plant family are planted in the same place year after year, they gradually strip the soil of the nutrients needed by that crop, and pests and diseases can build up in the soil. To understand crop rotation first we need to know the different vegetable families.

Family	Type	Nutrients
Alliaceae	Onion, garlic, shallot, chive and leek	Light Feeder
Amaranthaceae	Spinach, chard and silverbeet	Heavy Feeder
Apiaceae	Carrot, coriander, parsley, parsnip, dill and caraway	Light Feeder
Asteraceae	Lettuce and artichoke	Heavy Feeder
Brassiaceae	Asian greens, cabbage, broccoli, Brussel sprout, cauliflower, turnip, mustard and radish	Heavy Feeder
Chenopodiaceae	Beetroot	Light Feeder
Cucurbitaceae	Pumpkin, zucchini, cucumber and melon	Heavy Feeder
Fabaceae	Pea and bean (legumes)	Nitrogen Producer
Poaceae	Sweetcorn and maize	Heavy Feeder
Solanaceae	Tomato, capsicum, chilli, potato, and eggplant	Heavy Feeder

The vegetable family a plant belongs to gives us an indication of how much nutrients it needs.

Heavy feeders require a lot of nutrients, and will deplete the soil of nutrients to produce a crop.

Light feeders are mainly root vegetables that need little or no fertiliser in good garden soil.

Nitrogen producers are legumes (pea and bean) that put nitrogen back into the soil.

There are two main rules to crop rotation:

1. If you plant a crop from one family e.g. eggplant from the *Solanaceae* family, the next crop you plant in that bed should be from a different family e.g. carrot from the *Apiaceae* family, or leek from the *Alliaceae* family.

2. Plant a nitrogen producer to restore soil fertility before planting a heavy feeder. Follow with a light feeder. It is recommended that you 'rest' a bed by not growing a crop for a season, but instead focus on adding compost and aged manures to replenish the soil.

	SEASON 1	SEASON 2	SEASON 3	SEASON 4
BED1	Nitrogen Producer	Heavy Feeder	Light Feeder	Rest
BED 2	Heavy Feeder	Light Feeder	Rest	Nitrogen Producer
BED 3	Light Feeder	Rest	Nitrogen Producer	Heavy Feeder
BED 4	Rest	Nitrogen Producer	Heavy Feeder	Light Feeder

Disease and mould control

There are a multitude of microorganisms and fungi living in our produce garden. Many of them are beneficial and necessary for the health of our plants.

For example, rhizobacteria and trichoderma fungi protect plants by keeping other disease-producing bacteria and fungi under control. Problems arise when conditions in our garden change to the advantage of harmful diseases and moulds. There are some simple practices you can undertake to reduce the incidence of disease and mould in your produce garden:

- Check the health of your plants regularly.
- Practice crop rotation.
- Water plants in the morning and, if possible, via dripline irrigation.
- Buy your seeds and plants from a reputable supplier, otherwise you may inadvertently bring diseased plants into your garden.
- Space plants out to ensure good ventilation to prevent disease.
- Make sure your pruning tools are sharp to avoid tearing stems and branches. To do so leaves the plant susceptible to disease attack.
- Prune back any dead or damaged parts of your plants as soon as you notice a problem.
- Use a rag soaked with eucalyptus oil to wipe down your secateurs blades before moving on to each plant.
- If you are treating a plant for a disease e.g. peach leaf curl, make sure you collect any fallen leaves and put them in the rubbish bin. Do not compost them.
- Pick up any fallen fruit. Don't leave dropped fruit on the ground.

Ladybird eating powdery mildew

Companion planting

Including aromatic and flowering plants in your produce beds attracts beneficial insects which may actually control a plant problem naturally. For example, the Australian ladybird feeds on powdery mildew without damaging the plant. Growing mustard is believed to fumigate the soil as the plant exudes chemicals that are toxic to soil fungi. Some plants perform better (or worse) when certain plants are growing next to them. We are not always sure why, but gardeners over the years, swear by the benefit of growing certain companion plants with specific vegetables.

Home remedies

Gardeners have been experimenting with different natural remedies for countless generations. To treat powdery mildew, spray one part full cream organic milk mixed with nine parts water. For downy mildew, spray with 2 teaspoons of bicarbonate soda dissolved in 1.8 litres of water.

Organic commercial sprays

There are a number of fungicides available commercially that can be used without fear of introducing toxic chemicals into our vegetables and herbs. Examples include copper oxychloride and lime sulphur for the treatment of peach leaf curl and apple scab, and potassium bicarbonate for the treatment of powdery mildew.

A healthy biodiverse garden will have a broad mixture of different plants.

Companion Plants

BACTERIAL WILT OF TOMATOES

This bacteria rapidly kills plants in the *Solanaceae* family. Healthy plants wilt and die. If you cut the stem in half it will be brown and if placed in water will exude a milky sap. Prevention is essential. Plants affected include tomato, capsicum, chiili, potato and egglant.

Treatment:

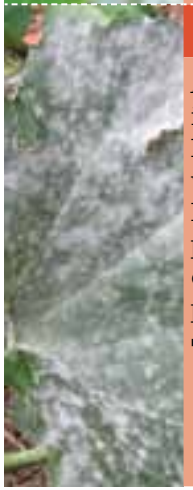
- Buy seeds and plants from a reputable outlet.
- Practice crop rotation to avoid a build up of bacteria in the soil.
- Follow a *Solanaceae* crop with a mustard crop to fumigate the soil.

APPLE SCAB (BLACK SPOT)

A fungal disease that attacks apple and pear trees, particularly with high spring rainfall. Leaves develop dark spots that become raised and corky. Fruit marked with scabs.

Treatment:

- Remove infected leaves and fruit from tree and ground.
- Spray tree at leaf burst with lime sulphur or oxychloride. Repeat at bud burst.
- Lay fresh mulch in spring and autumn to act as a barrier to fungal spores.
- Apply water via dripline irrigation.



POWDERY MILDEW

A fungal disease that occurs in shady areas during warm, humid spring and autumn weather. Powdery white bloom appears on all plant parts. Particularly affects, cucumber, zucchini and pumpkin.

Treatment:

- Avoid high nitrogen fertilisers that produce soft, sappy growth.
- Spray the infected plant with 1 part full cream organic milk to 9 parts water when mildew appears.
- Or spray the infected plant with potassium bicarbonate.
- Apply water via dripline irrigation in the early morning.
- Encourage ladybirds that love to graze on powdery mildew by planting companion plants.

Common moulds and diseases

SOOTY MOULD

Affected plants appear covered in a dark soot, particularly on the leaves and stem. The appearance of this fungus usually indicates the plant is under stress from insect attack e.g. scale and aphids. Affects a wide range of plants including citrus trees.

Treatment:

- Prevent infestations of aphids and scale.
- Hose the plant down with jets of water.
- Use a cloth to wipe the branches clean of fungus.

PEACH LEAF CURL

A fungi that affects stone fruit trees resulting in leaf thickening and young leaves turning pale.

Treatment:

- Spray the leaves in early winter at leaf fall and again in spring at bud burst with copper oxychloride or lime sulphur.
- Remove infected leaves or spray plant with potassium bicarbonate.
- Remove and bag any infected leaves or fruit.
- Apply water by dripline irrigation in the morning.
- Mulch with clean straw in autumn and spring.

DOWNY MILDEW

Angular yellow spots appear on the upper leaf surface before enlarging and becoming brown. The under surface has white cotton-like fungi. Affects a wide range of plants including fruit trees.

Treatment:

- Plant in full sun with good air circulation between plants.
- Always water to the base of the plant, not the leaves.
- Remove diseased leaves. Do not compost.
- Spray with 2 teaspoons of bicarbonate soda dissolved in 1.8 litres of water.

caterpillars and snails - chooks love them.

Ladybird eating aphids.

Use a trap to attract snails, slugs and earwigs.

Insect Pest Control

Chewing, sap-sucking and rasping pests are part and parcel of gardening. We can often tolerate a minor infestation, but need to take action if the pest is damaging our plants.

It is important to correctly identify the pest, its consequences, the severity of the problem, the possibility of natural predators keeping the pest under control, and control techniques you can put in place. You can help minimise pest problems if you:

- Check your garden regularly for signs of infestations
- Practice crop rotation
- Plant a diverse range of plants in your produce garden
- Avoid using high nitrogen fertilisers that produce soft, sappy growth that attracts pests
- Squash or remove pests with a gloved hand. e.g. caterpillars and snails - chooks love them
- Spray the pest off with a jet of water e.g. aphids
- Cut off heavily infested plant parts. Do not put into compost
- Cover crops in wildlife friendly netting (Refer pg 36).

Companion planting

A diverse garden will attract birds, bats, frogs and lizards that hunt and prey on insects. So too do ladybirds, praying mantis, lacewings, spiders, hoverflies, wasps and dragonflies. These beneficial insects are attracted to plants such as alyssum, marigolds, lemon balm, cosmos, parsley, carrot, tansy and coriander.

Plants can also be used to deter pest insects. For example, mustard grown between plantings inhibits nematodes (microscopic worms), that cause root knot. Planting white violas amongst your brassicas mimics other Cabbage White Butterflies and acts as a deterrent (as do egg shells). Planting scented herbs e.g. mint, dill, sage, near brassicas is believed to mask the scent of the brassicas making it harder for pest insects to locate them.

Home remedies

Some popular home remedies to control insect pests include the following:

To control aphids, crush a whole bulb of garlic and cover with vegetable oil. After two days, strain off the liquid, add a couple of drops of dishwashing liquid and use one millilitre of concentrate to one litre of water. Spray on pests.

Pour linseed or fish oil in a flat dish at soil level to trap earwigs.

Deter snails and slugs by ringing your plants with a circle of coffee grounds or sawdust. Pour beer into a dish at soil level to trap snails and slugs.

Trap coddling moths by half filling a jar with water and add a little sherry and some vegetable oil. Hang in your apple and pear trees.

Dab mealybugs with a cotton bud that has been dipped in methylated spirits.

APHIDS

Aphids are sap sucking insects that affect the growing tips of plants resulting in distorted leaves, flowers and fruit, and possibly yellowing and wilting. Aphids attack a wide range of plants but particularly affected are bean, cabbage, cucumber, pea, potato, pumpkin and tomato.

Treatment:

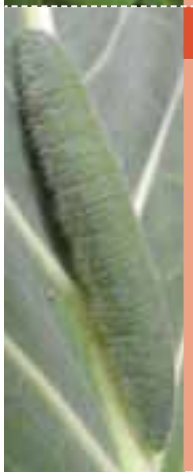
- Squash aphids by hand.
- Hose off with a water jet.
- Spray with a homemade garlic and oil spray.
- Use an insecticidal soap. Dilute in water as per manufacturer's instructions, and spray directly on aphids.
- Encourage predatory insects and birds.

CITRUS LEAF MINER

The larvae of a moth that burrows under the leaf cuticle. Usually found on citrus tree leaves, particularly in late summer and autumn.

Treatment:

- Remove infected leaves, bag them and place in rubbish bin.
- Spray leaves with a commercial botanical oil spray.
- Avoid using high nitrogen fertilisers.



CABBAGE WHITE BUTTERFLY CATERPILLAR

Caterpillars hide on leaf veins during the day and feast on seedlings by night. They affect a wide range of plants but particularly cabbage, radish, broccoli, kale, Brussel sprout, Asian Greens, celery and beetroot.

Treatment:

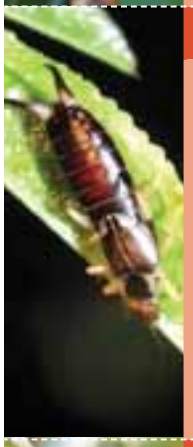
- Plant scented herbs e.g. mint .
- Plant white violas or place egg shells amongst seedlings.
- Remove by hand.
- Cover bed with wildlife friendly netting, when adult white butterflies are first noticed.

CITRUS GALL WASP

The adult female wasp emerges from the gall (calluses) in late winter and lays her eggs in the soft stem of the same tree. The larvae grow in the stems until they pupate and reinfest the tree. Plants affected include all citrus trees but particularly grapefruit and lemon.

Treatment:

- Avoid high nitrogen fertilisers in late winter and spring.
- Remove all newly formed galls before the end of winter.
- Hang yellow sticky traps on infected trees in late winter.
- Remove infected stems and burn.



EUROPEAN EARWIGS

Earwigs are active at night and hide in mulch during the day. They mainly feed on seedlings and soft berries such as strawberry.

Treatment:
Trapping earwigs is the most effective control. Try:

- Fill upturned pots with scrunched newspaper and empty each morning.
- Place covered snail traps with fish or linseed oil in garden beds.
- Put rolled up newspapers in garden beds and empty daily.

MITES

Mites are tiny spiders. Empty egg casings on the underside of leaves are easier to spot than the mites. Webbing appears on the tips of plants and silvering on the leaves. Plants affected include bean, cucumber, zucchini, pumpkin, pea, tomato and strawberry.

Treatment:

- Hose with water jet.
- Remove infected leaves and plant parts.
- Use crop rotation.
- Clean up weeds and leaf litter around the plant base.
- Spray with botanical oil or insecticidal soap.

City of
KINGSTON

Kingston City Council
PO Box 1000, Mentone,
Victoria 3194
Phone: 1300 653 356 | Fax: (03) 9581 4500
Email: info@kingston.vic.gov.au
www.kingston.vic.gov.au