Growing Veggies From Seed

…and protecting them from the sun

By Nev Sweeney

TABLE OF CONTENTS

1.0 Why Grow Veggies from Seed?

Next to being able to save seed from your own veggies, I think the ability to grow your veggies from seed is one of the most valuable skills to have. It is easy to learn, needs a minimum of kit and does not require a huge amount of time, money or effort, but why should we bother?

I'm glad you asked!

Reasons to grow from seed –

1. Save Money – A cheap punnet of 8 to 10 veggie seedlings can cost around $4.00 (AUD, 2023) and some can even run as high as $8.50, whereas a packet of 750 lettuce seeds can be had for as little as $2.00.
2. Variety – As far as commercially available seedlings go, you would be lucky to find 3 or 4 varieties of, say, tomatoes available at the hardware or nursery, whereas there are over 200 varieties of tomatoes that can be grown from seed. There may be a variety out there ideally suited to the environment you are growing in, and if you grow from seed you can try out as many as you want! Also, if you want to try growing an unusual vegetable, it may not even be available as a seedling and growing from seed may be your only option.
3. Grow from your own – As I mentioned above, being able to save your own seed is a valuable skill to have, but to be able to capitalise on that of course, you also must be able to grow vegetables from your saved seed.
4. You can grow root crops – Root crops need to be direct sown where they are to grow and do not do well if raised in a punnet then transplanted. I know that it is possible to buy carrot seedlings in punnets, but they will not do well and are a waste of money. The seeds need to be sown directly, and a knowledge of growing from seed will assist!
5. Resilience – You can store seed, home grown preferably, but commercially available as well. This will increase your options should there be personal issues like unemployment, or if there were to be something more widespread, like another pandemic. In the middle of the Covid pandemic, when there was a renewed interest in home growing, seedlings and then seed became difficult to get. If you are used to growing your own veggies from seed, you won't be reliant on others for seedlings and so more resilient in your food growing.
6. Spread the Harvest, reduce waste – One of the things with buying, say, a punnet of 8 to 10 lettuce seedlings, is that they all go in the ground at the same time and mature at the same time. So, unless you have a big family it is highly likely that you will harvest two or three of your lettuces before the rest start to bolt to seed and become bitter. Sowing your own means you can grow as many as you want, when you want, reducing the amount of your crop that doesn't get eaten.
7. Control – You will know what has been applied to the seedlings, and what has not. There is no way of knowing if commercial seedlings have been treated with chemicals of some type. Note - If you want to grow organically and are growing from commercial seed, check the packet to ensure that the seeds have not been coated with a fungicide prior to being packaged. It should make note on the packet that the seeds are not suitable 'for food, feed or oil'.
8. Satisfaction – it is remarkably satisfying to be able to harvest and eat a vegetable which you have nurtured throughout its entire life journey, from germination to maturity.

Whether you are direct sowing your seeds, or sowing into punnets to grow your seedlings, it is worthwhile from so many angles. It is a simple skill worth acquiring, why don't you give it a go today?

2.0 Sowing, Potting on and Planting Out

2.1 Sowing seed into punnets

Planting seedlings rather than seeds means you can get a jump on the weather by raising the seedlings under plastic early in the season and then planting out when the weather is warmer. Planting well grown seedlings also gives them a jump on pests set to devour frail little plants, and when you plant a seedling you don't waste time and garden space waiting on seeds that are not going to germinate.

The following method also allows you to hold seedlings for a while if you get inclement weather, don't have the beds prepared or life happens and you are short on time. It also minimises transplanting shock on the seedlings too.

Generally speaking, the seeds of root crops like carrots, parsnips and beetroot etc, need to be sown directly into the soil where they are to be grown. If they are started in punnets and transplanted they will not grow well. Large seeds like those of peas, beans, corn etc can also be direct sown but will also work if the following process is used. All other vegetable crops will thrive using the process of sowing into punnets, potting on into newspaper pots and then planting out.

These are some punnets in my collection

I have a world class collection of plastic punnets! They are all left over from when I used to buy seedlings from the nursery and before I realised how easy they are to grow yourself. I use the punnets with eight divisions or cells in them although for larger seeds like pumpkin I can still use the older style with no divisions.

If you are re-using your seedling punnets you should wash them in disinfectant and dry them off before you use them. This is to prevent a build-up of diseases like damping off, I usually use Dettol® or one of the "el cheapo" quaternary ammonium disinfectants

available from the supermarket. Another way is to wash them with soap and water, then put them out in the sun to be dried and disinfected by the sun's rays.

This is the style of punnet I use mostly today

To fill the punnets I make a seed raising mixture that it composed of -.

- 1 Part by volume coarse sand (not brickies sand or the sand that goes in a child's sand pit, that is too fine)
- 2 Parts by volume of sieved (and preferably home produced) compost or worm castings*
- 3 Parts by volume of cocopeat or horticultural coir

Sieved compost (L) and Raw compost (R)

*When I started out, I was using compost exclusively, and while being stored in the greenhouse it got a bit of heat treatment which may have killed off any pathogens, I make a cool compost. I started to get problems with the seedlings keeling over from damping off and changed over to the worm castings. That was over 15 years ago and the damping off has not returned so you may take what you will from that.

This is what the mix looks like

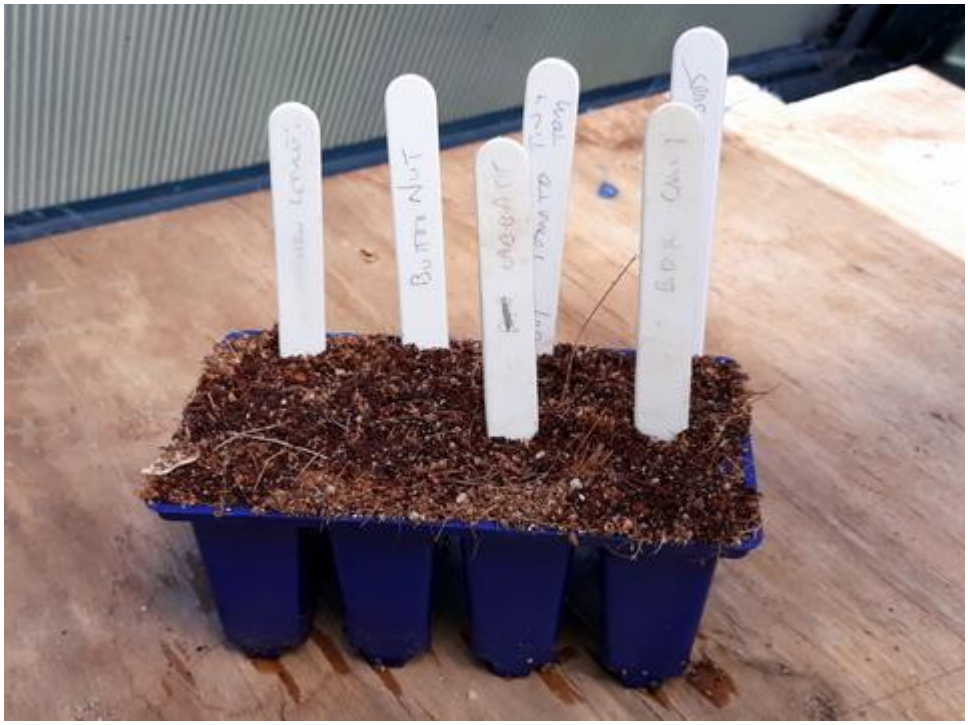
The compost/worm castings give some nutrition and body to the mix, the cocopeat ensures water retention and the sand ensures drainage. I was adding one part of perlite to the mix and also tried vermiculite, but both were expensive so I left them out and it did not seem to make any difference. I use a 500ml plastic Chinese food container as a measure. All of this is placed that wonderful product, the cat litter tray – cheap, available and mind bogglingly useful, more on them later. Mix by hand and voila! Homemade seed raising mixture.

Vermiculite (L) and Perlite (R)

A Quiet Warning

I don't know the technicalities, but some people have gotten sick with Legionella infections after working with commercial potting mixes, when they inhaled the dust. If you keep all your raw materials moist that should keep the dust down and mixing outdoors where there is plenty of ventilation will also reduce the risk. If you are still concerned, purchase an Australian Standards approved dust mask to wear while doing this work.

One of the things about buying commercial seedlings in punnets is that you get a load of the same veggie seedling at one time, meaning that they will all get planted out together and then be ready to harvest together. This means that some will bolt to seed or become over ripe before you can consume them. To avoid this eventuality, I use eight cell punnets and then sow a few seeds of each type or variety of veg in each cell. This is the way our system is designed to work by providing a continuous small harvest which is consumed quickly rather than a large harvest at once which then needs to be preserved. There are some exceptions to this such as corn and onions but this is the system we have been running successfully for over fifteen years.



A punnet sown and labelled

To sow your seeds in these punnets, place your homemade seed raising mix in the punnet and firm it down with a finger, leaving a small depression in the centre of each cell. Place a few seeds into the depression and add a light cover of potting mix over the top and press down gently to give good seed raising mix to seed contact. As a rule of thumb, seeds should be sown a maximum of two to three times their diameter deep into the soil or seed raising mix. Some seeds, such as lettuce, will germinate better if they have access to light and so should be sown more shallowly.

The veggies have sprouted!

The surface of the seed raising mix should be flush with the surface of the punnet so that there is good air drainage, otherwise still, moist air can favour damping off, a fungus which causes the new seedling to look pinched where they emerge from the soil, killing them. Label the division with a tag (These can be cut from an ice cream carton with scissors) showing the vegetable type and variety, plus sowing date if required. Follow this process for the rest of the punnet divisions.

Once the punnet is full it needs to be kept warm and moist until the seeds germinate, but watering from the top can wash the seeds out of the seed raising mix so they need to be watered from underneath. The easiest way to do this is to make a capillary bed by getting one of the aforementioned cat litter trays and half filling it with coarse sand (fine sand will crust over) I use the same sand I add to the seed raising mix. Add a couple of bottles as water reservoirs and you are good to go!

Capillary bed in action

Place the punnet(s) on the sand and then water the sand until there is just a little free water over the top of the sand. The seed raising mixture in the punnet will absorb the water through the bottom by capillary action eliminating the need to water the punnets directly. Also, the sand will form a reservoir of water reducing the amount of the attention needed by the seedlings. In hot weather place the capillary set up under some shade cloth and in cold weather make a small plastic house, green house or cold frame to keep the seedlings warm. More detail on making a capillary bed is available in Section 3.0 of this eBook.

To ensure a continuing harvest of veggies, I sow a mix of veggies into punnets twice a month. They are then potted on into newspaper pots somewhere between two and four weeks after sowing (depending on time of year) and then planted out two to four weeks after that (depending on time of year). The seeds will take longer to germinate and are slower to grow after potting on in the colder parts of the year.

2.2 Potting On

Once the seedling has grown to the four leaf stage, it can be potted on into a larger single container to grow further until you are ready to plant it out into the veggie bed. Originally, I used to do this by making up a potting mix that is a bit richer than the seed raising mix –

1 part by volume of coarse sand
2 parts by volume cocopeat
3 parts by volume sieved compost
But I found the original seed raising mix worked just as well so I now use that mix alone for both operations.

I used to pot the seedlings on into 100mm lengths of cardboard tube that I was getting from where I was working at the time (They are the spool around which paper for the plotter is wound) which were thrown out. To start off with I coated them in wax and the used a wooden slug to push the seedling out so that the tubes were re-useable, but I found that the transplanting shock for the seedling was considerable and after 2 or 3 uses the tubes carried all sorts of bugs that caused damping off etc. so I gave up on that idea and used them uncoated as a single use only, allowing them to rot down and allow the roots out into the soil over time.

The old system

However, I left that place of employment and after 12 months my stock of tubes had depleted, so I moved over to making newspaper pots to do the same job. The seedlings did much better in the newspaper pots and the newspaper pots rot down much more quickly than the cardboard tubes did anyway!

To pot the seedlings on I fill a newspaper pot with seed raising mix then push a hole down the centre of the mix in the pot with my finger. I then dig the seedling(s) out of the punnet with my space age technical potting on tool (a paddle pop stick). I push the stick down into a cell of the punnet and then push it back while lifting, levering the seedlings, their root mass and the seed raising mix out of the punnet. This minimises damage to the seedlings.

My potting on tool!

I tease the mass of roots and seed raising mix apart and choose the largest and most well grown seedling(s) to pot on, keeping as much of the seed raising mixture around the roots as possible. I place the seedling gently into the newspaper pot, then top the newspaper pot up to level with the edge and place it in a plastic flat (designed for holding punnets) which holds 20 newspaper pots. I carry the freshly filled newspaper pots out to the greenhouse then place them directly onto a capillary bed to keep moist until they are ready for planting out.

2.3 Direct Sowing

As mentioned previously, the seeds of root crops need to be sowed directly where they are going to grow if they are to thrive, and large seeds can be direct sown into veggie beds rather than raised as seedlings first. This requires no specialised equipment or training (although a trowel can help to loosen any compacted soil) just some appropriate seeds and a place to grow them. However, each veggie has their own requirements in terms or sun, water, nutrients, soil pH, planting time and so on, so before sowing it is worth doing a bit of research to make sure that will do OK where you are intending to sow them.

Loosening up the seed bed

When it is time to direct sow, check the soil to make sure it is level, moist and has a fine tilth, especially when sowing small seeds like carrot, and that there are no sticks or rocks to inhibit the seedling's growth. This is also a great time to check for and remove any weeds growing in the area.

Seed bed ready to go

Sowing depth is two to three times the seed diameter. For larger seeds you can dig a furrow at the correct depth, sow the seeds the correct distance apart and then cover them over with the surrounding soil, or push them into the damp soil with your finger as I do with our peas and bean seeds. Smaller seed like carrot needs a bit more care and can be sown onto the surface of the bed and then covered with a light dusting of soil, sand or cocopeat.

Pushing in the bean seeds

Once sown, larger seeds can be given a light layer of mulch (1 -2 cm) to maintain soil moisture, but smaller seeds may find it difficult to make their way through a mulch so the soil should be left bare until the seeds have sprouted. In any case, it is important to ensure that the soil stays moist until the veggies are poking their heads through the soil, as this will also prevent a crust forming on the soil that inhibits sprouting.

2.4 Planting out

When the seedlings have grown enough, this is usually 4 to 6 weeks from sowing, they can be transplanted directly into the bed newspaper pot and all, the pot rots away and allowing the seedling roots to push through into the soil. Generally, seedlings should be transplanted in the late afternoon or early morning to minimise transplanting shock due to drying out of the seedling by the sun, but when using the newspaper pot method this can be less of a problem. More on this later.

The chook tractor doing its job

The bed that the seedlings in newspaper pots are to be planted out into will have had the chook tractor on it for a period of two weeks, during which time they will have dug it over, removed any weeds or leftover crops and thoroughly manured it. Once the chook tractor moves on, the patch will be mulched with 4cm to 6cm of straw mulch which has been dug over and thoroughly gone through and any remaining wheat seeds eaten by the chooks in the retirement village. During this process they will have broken the straw stalks down and added their quota of high nitrogen manure to the straw.

A mulched bed

Only once these processes are completed is the bed ready to receive the veggie seedlings and depending on the time of year, the time between the chook tractor moving on and the seedlings being planted may be a week or two or up to a month.

The usual process of potting on is simple enough, a narrow trowel is used to move the mulch aside and dig down into the soil until a hole in the soil is produced a bit larger than the newspaper pot. The newspaper pot is lowered down into the hole and the surrounding soil scraped in to ensure the seedling is stable and well covered with soil. For plants that send out adventitious roots like tomatoes, the hole will be a bit deeper and the soil heaped up around the seedling to provide extra room for the roots.

Mulched bed, planted out

Each of the seedlings will be planted into a pattern, starting with four seedlings across the width of the bed, followed by three in the next line, then four, then three and so on until the bed is filled. The resulting pattern allows the veggies to be roughly 30cm away from their nearest neighbour, maximising space while allowing room for the veggies to spread out as they grow. As well as planting out the seedlings using this pattern, the seedlings are interplanted, that is to say (as much as possible) the seedlings of the same vegetable family are not planted next to each other. This can reduce issues due to pests, diseases and can increase yields by allowing closer plantings.

Corn grown in a block

There are some exceptions to these planting rules, such as corn, which needs to be grown in a block to ensure cobs are wind fertilised and onions which we grow, harvest and process as a single crop.

Sun Protection

Originally I found, that while the late afternoon planting works in spring and autumn, planting seedlings in the full heat of a western Sydney summer causes a certain mortality rate anyway, so I developed a movable shade cloth frame. I used it when planting out during the hottest times of the year. Since I operate with standard size beds, I had two half size and two full size covers and they did the trick. By the time the next bed needed it, the original seedlings were strong enough to take the full sun.

Seedling sun shade

Unfortunately, with the effect of climate change, the western Sydney summers are getting hotter and it seems as if the sun is getting more intense, so about ten years ago I came up with the idea of installing semi-permanent veggie bed covers. The framework stays in position all year, but sometime around mid-spring, 50% shade cloth covers get installed and stay in place usually until sometime around mid-autumn at which point they are removed and placed in the shed. More details on the veggie patch covers can be found in Section 8of this eBook.

Semi-permanent cover for three veggie beds

3.0 Making a capillary bed and Newspaper Pots

3.1 Making a capillary bed

The amount of water held by punnets in which seedlings are grown is fairly small, and there is nothing quite so demoralising as coming home after a weekend away or a particularly hot day to find all of your seedlings have dried out and are now fried. Fortunately there is a piece of kit which you can throw together quickly, most likely from stuff you already have hanging around, which can prevent fried seedlings from ever happening again. Enter the capillary bed!

Another advantage of using a capillary bed is that it allows you to keep your punnets moist without having to water them from above and possibly washing some of the seeds out. This can be a real problem, particularly with the smaller seeds.

A capillary bed in use

In basic terms a capillary bed is a container of coarse sand which acts as a store of water. Seedling punnets or other plant pots are sat on the sand and water passes up into them and keeps them moist by, you guessed it, capillary action. The better ones have a method of keeping the water topped up too.

To start making your capillary bed get hold of a cat litter tray, they are available from the el cheapo shops for a few dollars and are mind bogglingly handy for plant propagation and other grow-it-yourself tasks. They are great for mixing seed raising/potting mix, carrying stuff like punnets or pots around and they can be used when sorting seeds from trash. Let's face it, if all else fails you could use it for your cat!

To fill the cat litter tray, you need coarse river sand. Course sand is best because it doesn't crust over and river sand has no salt issues attached as beach sand may. Fill your cat litter tray almost to the top with the coarse sand and then water with a watering can until the sand is saturated. It is then just a case of resting your seedling punnets, newspaper pots etc on the moist sand.

Judging the water level using a pot

I have operated these for years and they work very well, and no fried seedlings!
With a little bit of effort you can extend the period between waterings even more. Get hold of a small pot, the one I use is 70mm long by 50mm in diameter at the top, and sink it into the sand as far as it will go. Then get hold of a small empty bottle where if you insert the neck into the small pot it comes about half way down.

The pot I used

Fill the bottle of water (I use a 600mm soft drink bottle) and insert it neck down into the pot. As the water level drops below the level of the bottle neck due to evaporation and usage by the seedlings, more water till flow out of the bottle to maintain the level. This will happen until the bottle is empty and requires refilling.

Sand and pot in place

It is a simple thing to make, but it makes growing your own from seed much easier and more secure.

3.2 Making Newspaper Pots

For years the process that I followed to produce my veggie seedlings was to put the seeds into punnets, then once they were at the four leaf stage I would fill cardboard tubes with the same homemade mix we used to state the seedlings off and then pot on the seedlings into the tubes. I got the tubes from work, they were 800mm long and 60mm wide so I used my band saw to cut them into 100mm long planting tubes. Unfortunately, about 12 months ago, I was retrenched from that particular job so the supply dried up. It took me the 12 months to burn through the tubes I had in storage but all of a sudden i had to come up with something new.

I have been aware of the old newspaper pot trick for years and never had to use it, but with my tubes all gone, the newspaper pot seemed like the answer to a maiden's prayer, or at least mine anyway. I was concerned that they would not stand up to the task of being moist and full of growing medium for weeks at a time, but they have surprised me! Another surprise has been that the seedlings actually seem to hold better for longer and are happier in the newspaper pots rather than the old tube style, so if you want to follow my ideas give it a go.

Plunger and base - pot maker and they work well

There are apparatuses that you can buy to help you make the pots that consist of a plunger and a base (OK so it is a hopeless description.....just look at the photo!) but you can achieve the same thing with a straight sided drinking glass or jar. For the purposed of making the pots to take out seedlings to grow them on before planting out, a base size of 60mm to 80mm would be best.

1. Get hold of some newspaper and cut it into strips 10 to 12 cm wide by about 60cm long (ie the length of an open newspaper page). If the glass you are using is bigger than the recommended 6 to 8cm the strips will need to be proportionally larger.

2. Wind the strip around the open end of the glass with about half the diameter of the glass or a bit more overhanging the edge.

3. Fold the free edge over into the open end of the glass so that it is lying along the inside surface of the glass. Then slide the paper off the open end of the glass.

4. Place the bottom end of the pot on a flat surface and fold down the inner flap of paper to form the base of the pot then reverse the glass and push it into the pot bottom first so you can push down and flatten out the bottom of the pot. This is easier to do if you are working on a firm, flat surface like a table.

5. Job done!
The pot can now be filled with the seedling raising/potting mix and a seedling. Making the pots is easy; you can make a stack while sitting in front of the TV at night and then plant them out as needed.

4.0 Germinating Seeds with a heat pad

Over the years I have liked to be able to get some warm weather seedlings such as tomatoes (particularly), cucumber, zucchini, capsicum and on the odd occasion chillies, up and going early. We have a greenhouse, which makes things easier, but we still get to zero Celsius or a bit below and there is no artificial heating in the greenhouse.

Considering these factors, even though I like to sow them early, they rarely come up. While I was aware of heating pads to assist such endeavours, my original thoughts were that I would have to provide 240v power to the greenhouse to operate said heating pad. This, of course, was incorrect. The use of the heating pad is purely for the purposes of getting seeds to germinate, and the veggies I wished to germinate do not need light. Once they are germinated the seeds can be relocated to said greenhouse, and they will thrive.

So I decided that I needed to get myself a heating pad!

I think that it is worth noting that if you germinate your seeds inside your house, they do not require a lot of extra heat, (tomatoes need to be somewhere between 20^{o}C to 30^{o}C depending on who you read). We don't heat the house overnight and it can get chilly here, down to 15C or less inside.

There are various levels of complexity, some with variable thermostats, some without, and of varying sizes and shapes. It also appears better to use a heating pad that is

designed for use with seedlings rather than for other purposes such as keeping pet reptiles warm or brewing beer in colder areas.

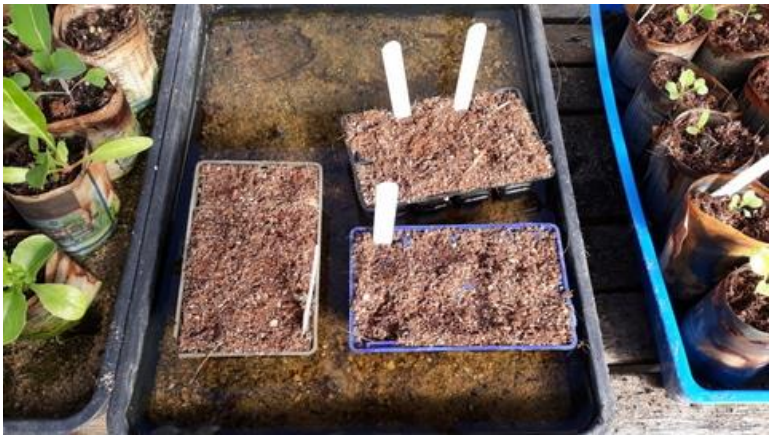
The one I got was a 'plug in and run' with no controls or lights of any description, but it was available immediately from the hardware store and seems to do the job. It also uses a ridiculously small amount of energy at 10 watts so that even if you are totally off grid it would not be an unacceptable overnight power drain.

The instructions stated that it heated the seedlings up to 10^{o}C above ambient temperature. If you were doing this outside in winter (at least around here) that would not be enough, but inside it worked fine. The instructions also make the point that the heat pad should not be located near a heat source such as an appliance or in full sun because this may cause overheating of the seeds. Also, getting it wet should be avoided because it is electrical equipment.

How I set it up and results

Obviously it needs a source of 240vAC electricity to run it, so I set mine up on our dining room table next to our table top oven. Yup! I did make sure it was few centimetres away and on the rare occasion the oven was in use it did not add anything to the temperature of the seedlings. In this position it was also near a western window where the punnets got some indirect light, but were protected from direct sunlight by an awning. This meant it was also in an area where I could keep an eye on the whole set up.

Once set up and running I put together some 8 celled punnets with tomato, cucumber, zucchini and capsicum. I did some monitoring of the temperature and, for example, with an ambient air temperature inside the house of 18^{o}C the mat temperature was 28^{o}C and this translated to a temperature at the top of the punnet of 22^{o}C. Over a couple of days the punnets dried out somewhat so I placed them in a tray of warm water in the greenhouse for 20 minutes during the day to rehydrate. I then gently shook out any excess water and placed them back on the heating pad once they were rehydrated.



The result was that after 4 to 5 days the cucumbers started to come up, followed by the zucchini a couple of days later, with the tomatoes coming a few days after that. The capsicums never did eventuate but I think that that was due to the seed being a bit old rather than a problem with the system.

I am very happy with the way things worked out and am a little chagrined that I did not apply this approach sooner. However, I am now tooled up with an understanding of the process and will be starting my spring crops earlier than I can with just the greenhouse.

Growing well!

5.0 Troubleshooting Your Seedlings

What happens when your seedlings don't come up? Or they come up then keel over? If you are having problems turning your seeds into seedlings, here are some problems you may be having without knowing it, and how to deal with them.

5.1 Seed Germination problems

Too wet or too dry? – Some seeds can be finicky about the amount of water they need and when you have seeds in a punnet keeping them damp but not flooded, and not letting them dry out too much can take some effort, especially if life gets busy. Fortunately the solution to this one is simple, make yourself a capillary bed from a cat litter tray, some coarse sand, a small pot and a bottle. The capillary bed is a container of coarse sand that is kept moist by an upturned bottle of water, allowing the water to move up into the seed punnets by capillary action. This keeps the seed raising mix damp but not sodden. Another benefit is that you don't need to water your punnets from the top, taking a chance that small seeds can be washed out during the process and possibly contribute to damping off (see below). How you can make your own capillary beds is covered previously in Section 3.

Capillary bed in use

Too cold or too hot? – Like moisture, seeds can be touchy about temperature too. Most veg will be OK to germinate between 25°C and 30°C although seed germinating conditions can vary outside this range, generally to the warmer side, a little research at the start can prevent frustration later! A greenhouse (even a small one) in a sunny spot will help keep temperatures up, but if that is not an option or you are starting crops indoors early in the season to get a jump on your growing, a heating pad can be worth investing in. There is more detail on using a heating mat **is** covered previously in Section 4 of this eBook

Too Deep – sowing your seeds too deeply, particularly for the smaller seeds like celery or carrot, can mean that the energy within the seed will expend itself before it can break through all that overhead cover. Fortunately there is a fairly simple equation to help you sow each seed at the correct depth – seeds should be sown two to three times their diameter deep into the seed raising mix or soil. Thus if your celery seed has a diameter of 1mm, it should be sown 2mm – 3mm deep. Simples!

Out of Date or Dud Seed – Seed has a definite shelf life, some like parsnip will only last a year, while cucumber seed may last ten years. So it is worthwhile when you are saving your own seed to write down when the seed was harvested for future reference. If you are buying your seed commercially, take a note of the 'sow by' date and use them up beforehand to prevent waste. Unfortunately, you can get a dud batch of seed from a commercial supplier, or maybe your seed has not been stored well and it is no longer viable. To eliminate this as a possibility for seedling no-show, you can do a germination test. This means wrapping the seed up in a moist, warm atmosphere and then seeing

how many germinate. More detail on conducting a germination test is available in Appendix 1 of this eBook.

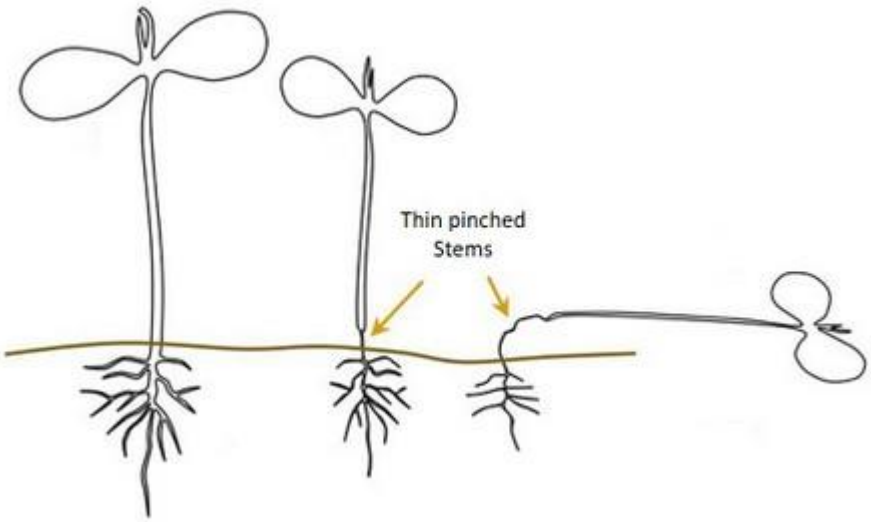
5.2 Seedling problems

Once your seeds are up and going you are almost there. Almost! There are a couple of things that can still derail your plans pretty effectively.

Leggy seedlings – This is the term used for seedlings that have grown long and spindly and is usually due to a lack of light where the seedlings are growing. This could happen if the seedlings were being germinating on a heat pad inside the house, but once they germinated they were not directly transferred to a sunny area, if they were germinated in a dark area or if they were sown so densely they shade each other. So, to avoid leggy seedlings ensure they have access to plenty of light. But, if you already have some seedlings that have gone leggy, you still have some options. If the problem is that the seedlings are too close together, break them up and transplant them further apart. Leggy seedlings can also be transplanted deeper into the seed raising/potting mix although this will work better with some seedlings than others. It will work well with tomatoes, capsicum, cucumber and squash, but not so well with leaf crops or root crops. In the end you can just plant them out when they hit the stage of having three to four true leaves and see how they go.

Leggy seedlings!

Damping off – So, your seedlings are of and growing well…….then all of a sudden, they fall over and DIE…….. Welcome to damping off! Damping off is caused by a fungus (usually Pythium species and Rhizoctonia solani but there may be others) that attacks the seedlings at or below the soil surface, resulting in the newly emerged seedlings collapsing. Damping off can become a problem where there is still, moist air that encourages fungal growth, also contributing can be old seeds being planted into cool, damp soil. To prevent damping off the following actions can be taken –



Drawing by Kevin Mechelmans

- Soak all seedling punnets, pots and trays in 10% bleach solution for 20 minutes between uses. Exposing them to direct sunlight will also help. This prevents a build-up of fungal disease on your germination equipment.
- When sowing seeds into the punnets, the surface of the seed raising mix should be level with the edge of the punnet to ensure good air drainage.
- If damping off is a real problem, seed raising mix can be sterilised by microwaving at full power for 90 seconds per kilo of seed raising mix.
- Sow seeds thinly to prevent overcrowding, improving ventilation and reducing damp conditions.
- Watering from below rather than above (see 'too wet, too dry' above) using a capillary bed will prevent water getting on the seedlings.
- Don't let your cat use your seed raising mix as a toilet (don't ask!)

Damping off

Direct Sowing – Some seeds (large seeds, root crops) can do better if sown directly into the soil where they are to be grown. When this is the case it is best to research what the optimum soil temperature for the seed to be sown is and then confirm the soil has reached that temperature with a soil thermometer. Also, the use of a soil moisture meter to ensure the soil is not waterlogged prior to sowing the seed. These actions together will go a long way to preventing damping off in direct sown seed.

5.3 Conclusions

From my experience, growing your own plants from seed will be successful 95% of the time and problems are rare, but if you do have issues with failures to grow your own seedlings, it can be intensely frustrating. It is therefore handy to use the above process to work through what the problem is and how to fix it.

6.0 The Greenhouse

6.1 Making a Low Cost Mini-Greenhouse

It can be very handy to have a place to raise seedlings or to coddle a frost tender plant through the colder parts of the year, and I'm sure everyone would love a 3 metre by 2 metre commercially made, glass clad greenhouse but what do you do if you don't have the room or the money or both? The answer of course is in the title of this article; you go out and make yourself a mini greenhouse.

A selection of the Raw Material

The greenhouse requires very few tools to make, is made almost entirely of recycled materials and costs next to nothing and while this sounds too good to be true, I assure you that it is genuine. Our choice of material of construction is the waxed veggie carton and it is a good one for a number of reasons –

- It is strong - the waxed veggie carton being stronger than the sum of the strengths of the paper and the wax.
- It is water resistant – the wax coating the cardboard not only increases its strength but also prevents water to getting to the cardboard and turning it to mush.
- It's Free – The cartons are generally single use and then they are discarded by the fruit and veggies shops so if you approach them for a couple they will be very pleased to offload them to you.
- It's recycled – or is the new buzz word "repurposed"? Our recycling technology cannot cope with waxed cartons so they are generally sent to land fill so you will be keeping a useful material out of the ground.

The Two I Picked

To make the greenhouse you will need a couple of waxed veggie cartons, preferably one bigger than the other, a recycled clear plastic bag (mine was packaging on a folder that I bought but any decent sized clear plastic bag will do), a Stanley knife or equivalent, some aluminium foil, some duct tape and some double sided tape. A pair of scissors to cut the tape instead of the knife, while not being critical, is a safer option and a rule or tape measure rounds out the equipment needed.

Simple tools for a fun job

To make your own mini greenhouse the steps are as follows –

1. Grab the smaller of the two boxed and using the Stanley knife cut the front and side flaps from the top of the box.
2. To make maximum use of the sun you need to make the top into a sloping surface. There may be ventilation holes and/or hand holes in the side of the box so you may have to vary your angle to miss them. The angle I had to use meant that the front of the box was about 19cm lower than the back. The angle isn't hugely important so long as it is the same on both sides.

Sides cut and holes filled with tape

3. It is also unlikely that you will remove all the holes when you put in the front cut out to make the angle, so any remaining holes should be covered by putting duct tape over

them both inside and outside the box. Ventilation is good but the whole idea is to keep the inside of the box warm and air leaks through hand holes etc will work against that.
4. If you want to increase the amount of light rattling around inside box you should line it with aluminium foil, secured by double sided tape, and this then completes the bottom.
5. To make the top, cut out one large side of the other box, along with its flap and place it on a flat surface, using the Stanley knife cut out a hole in the centre a couple of centimetres smaller all round than the clear plastic bag so the overlap can be used to secure the bag to the top.

Measuring the top

6. To fit the top to the main box part of the mini-greenhouse place the flap that you left on the top on the flap that you left on the rear of the bottom and then run tape around them both so that they form a hinge.

Plastic bag secured with tape to the inside of the top

Once the top and bottom are joined via the hinge the mini greenhouse is complete and you can set it up in the sun with some seedling flats inside full of seeds ready to sprout. If the weather gets a bit warm and you are concerned for seedlings or other plants inside you can fit a couple of clothes pegs on the front of the box under the lid so that the lid is elevated, providing some ventilation.

The completed Mini Greenhouse Including Aluminium Foil Lining

6.2 Our Greenhouse Journey

When I started out producing my own seedlings I worked out pretty quickly that it would be much easier if I had a greenhouse of some description. This was in the days before I discovered how to make the low cost mini greenhouse described above. As well as providing a dedicated area to keep the seedlings and going some way towards providing a warm environment, the greenhouse would keep out pests like the cabbage white butterfly which could lay waste to a brassica crop before it started. So began my journey.

The small one

We started out with a small steel tube and plastic fitting one with a clear plastic cover that zipped up in the front, the original one we bought had three shelves, which for the work I was doing at the time was plenty. It had a small footprint of roughly 50cm x 70cm and was probably about a metre high so it could fit in almost anywhere.

You need to visit your greenhouse regularly to water it and check on your seedlings so while I would like to have put it on the back deck next to the back door for easy access, that side of the house faces west, not north. To get the best out of the winter sunshine it needs to go against a north wall, but to keep it easy to get to I put it more out in the open.....bad idea! The first time we got more than light winds it blew over; wasting all of the work I had done to get the seedlings that far. Needless to say I made space for it against our north wall, which is protected from the prevailing southerly wind. The lesson to be learned if you are using one of those small greenhouses, is tie it down unless it is in an area well protected from wind.

These small greenhouses are very handy because they are small, easily relocatable and best of all cheap! Although they do have some disadvantages like the wind problem above, their small size means they gain and lose temperature quickly and if you are planning to use one to grow your winter supply of tomatoes, forget it! They are a great way to start out though and for places like units or flats may be your only option. After a while what it did was to convince me to get a bigger one.

The Small One

A Bigger One

I was still not flush with cash, but I saw a larger greenhouse in one of those "order this and we'll love you forever" catalogues that turn up in the mail regularly, at least around here they do. It was 2 metres by 3 metres and high enough for me to walk in comfortably; it had green translucent plastic cover with a zippered entry door in one end and a zippered roll up window in the other. The skin fitted over a steel tube and plastic connection inner framework. All up it cost $130 which I considered to be a bargain!

I bought one and put it up in the north western corner of the yard. This cut down some of the light and heat that the greenhouse got since it was against the northern and western fences but it still got enough sun overall and most of the morning sun. It really kept quite warm in winter. I put in three black barrels full of water to act as thermal mass, some concrete pavers down the centre and a steel framed potting bench with a mesh top I had welded up which gave me a surface to work on. The other side from the bench had a table which held the seedlings and I used some of the space there to grow tomatoes quite successfully.

In the end the black water-filled barrels didn't seem to make much difference to the overnight temperature and since the inside of the greenhouse did not freeze I wound up taking them out to give me more room. I did leave one barrel in which had a tap in the bottom which performed the dual function of retaining some thermal mass and holding liquid manure. I got hold of some horse, cow and chook manure, shoved it all into a woven chook feed bag and then suspended it in the drum three quarters full of water, instant liquid manure!

By and large I was really happy with my el cheapo greenhouse and while it was big enough and warm enough to do the job it still had one teensy problem. After not quite 12 months, the outer skin covering fell to pieces. It only just made it through one Aussie summer and that was it. The steel tube frame was still in good condition and it seemed such as waste to throw it all out and start from scratch! What to do?

The Next Step

It's funny how things work out, I used to drive past this place on the way to see my father that handled commercial greenhouse supplies, so I stopped in to see them and for a very reasonable fee (around $80 I think) I was able to get an offcut from the end of one of their greenhouse plastic rolls. The offcut was large enough to cover the entire top and sides of the greenhouse with plenty left over to go around each end. The next challenge was to work out how to wrap it around each end and close it off to keep the heat in, but still allow me access into the greenhouse.

From the front

The way I worked out was to make a doorframe out of scrap timber, about 1.9 to 2.0 metres high and about a metre in width for each end so that it sat in the middle of each end. I secured the doorframe to the steel tube above it with a piece of sheet metal strap which was screwed to one side of the frame, then run up and over the tube, down over the other side and screwed into the other side of the door frame.

What that enabled me to do was, after I had pulled the plastic taut over the top of the frame I pulled the plastic around the back and then folded it around the rear doorway and, using a staple gun (and looooots of staples!) I fixed it to the inside of the door frame, all the way around. This secured the plastic nicely so that I was able to pull the plastic taut around the front doorframe and do the same thing. I then made up two light doors by making up a frame of scrap timber the same dimensions as the inside of the door frames and covered them in the greenhouse plastic by cutting it to size then stretching over the frame and tacking in place with the staples.

From the Side

Since the back “door” was going to be against the fence anyway I just screwed it into place through both the door and door frame with long screws. The front one I hung using a couple of old hinges that I had floating around. I also put on a bolt to keep the door closed when I needed to. There was no ventilation beside the front door but the greenhouse proved satisfactory for raising seedlings for probably 7 or 8 months of the year. During summer it just got too hot, so I installed a shade cupboard (well, it was far too small to be called a shade “house”). Although a couple of years back we got a really wet summer and the shade cupboard worked too well and I was getting leggy seedlings due to lack of light. There was just not enough light getting through so I had to transfer the set up back to the main greenhouse.

The Shade ‘Cupboard’

This set up worked well for another 3 or 4 years when due to all that time in the Aussies sun, the plastic connectors themselves started to break down resulting in a very sad and wilty looking greenhouse. Again it was time for a change!

The current situation

I started checking up and it seemed that at that time a proper glass and aluminium glass house was about $5000, which was somewhat more than I could spring for so I kept looking. We were driving past a place that sold sheds and they had a wonderful little greenhouse that was made from polycarbonate corflute type material and plastic glazing bars. It was a RION brand from Israel and the bloke was getting a new shipment in a couple of months, so we paid a deposit and waited.

When it finally arrived I pulled the old one down, cleared the area and put a brick surround in, then put square concrete pavers down each side of the site and crushed terra cotta tiles in the centre to walk on, then I could put the new one up! At 2.4metres

by 2 metres it was a bit shorter than the original one and it took about three days by myself to put the thing up, but it was a joy to behold! Due to its shorter length I had to carry out some radical surgery on my steel work bench to make it fit but my trusty angle grinder made short work of it!

Brand new and just set up

Since 2013, it has performed wonderfully and allowed me to produce countless seedlings as well as a bit of out-of-season stuff too. It has proved to be a wonderful place to work on a sunny winter's day or even just a place to sit and relax in the warm. To make it easier to check when I got home from work on a long winter's night, I installed a 12 volt caravan fluorescent light and wired it back to the 12 volt system in the garage. It gives me plenty of light to do what I need to do.

This summer we have added a new wrinkle. Some friends wise in the ways of growing came over to have a look at what we were doing and asked when I put shade cloth on the greenhouse. I replied as I wrote earlier that we move to the shade cupboard for summer growing but his question sparked some thought. This year I have placed some black shade cloth over the top and rear of the greenhouse to try and cut the summer sun down a bit. It is still in the early stages of summer yet, but the difference can easily be felt and I am sure that it will prove to be a great modification.

As it is today, complete with shade cloth

Your own greenhouse is not a necessity, unless you are growing lots of stuff all year ‘round, but it makes the job easier and gives you a nice place to retreat to when the weather is cold and windy.

7.0 Growing from Seed – Special Cases

7.1 Carrots

We like carrots and probably have them with our main meal of the day four to five times a week, so we go through quite a few. For the last six or seven years we have been growing over 90% of the carrots we consume, it varies a bit from year to year and some years it has been 100%. The process we use is quite simple and easy to replicate, depending on your climate. The guts of the process came from Peter Bennett's book "Organic Gardening" and I have continued to refine to it meet our particular situation over the years.

Happily Growing Carrots!

Preparing the Seed Bed

As part of our rotation, I make sure the bed I intend to use has not grown any carrots for several years at least. The soil should be friable and reasonably fine grained to provide a good seed bed. After the chook tractor has been moved off I give the soil a week or two to settle down, watering at this stage can help. I then level the soil out with the back of a steel rake and give it a hoe to break down any lumps, then a final levelling with the back of the rake. I then tamp the soil down with the flat face of the hoe to make sure it provides a good solid seed bed.

While a high nitrogen fertiliser (like chook poo) can result in more top than carrot, we find this process works for us.

Sowing

Our carrot beds are mostly 2 metres by 1.2 metres so to get sufficient carrots for two people for a year means they are sown pretty thickly. I just do that by hand, I don't bother to mix the seed with sand to help even things out as has been suggested by others I just sow it thickly and leave it at that. Once the seed has been sown I cover it with some cocopeat, usually only three to five millimetres thick, and then go over the whole surface of the bed again, tamping it down with the flat face of the hoe to ensure good soil/seed contact.

Covering the Bed

With the seed sown I give the bed a good watering from a trigger nozzle set on 'shower' or a watering can, gentle watering means not dislodging any of the seed. The trick to good germination is keeping the seed moist for the entire time, so I cover the seed bed with hessian bags but you could use underfelt or other porous fabric which allows you to water through it.

Germination

In the colder time of the year like early spring it can take up to three weeks for the seed to germinate but germination in early summer may only take a week or two. Check every couple of days to make sure the seed is still moist and that germination hasn't started. Once germination has started, remove the fabric and allow the seedlings access to light.

Protecting the Seedlings

If you are germinating during the hotter part of the year you may consider making a portable sun shade (as described in Section 8 of this eBook) but even if you are starting your carrots off in the cooler times your bed may still need protection, perhaps from birds, but around here from cats. The carrot seedlings are very small and all of the freshly dug uncovered soil screams "toilet!!!" to the local cat population. Nothing is quite so infuriating as going down to inspect your newly sprouted carrot seedlings and finding a mound of freshly dug earth in the middle of the patch with a cat turd ensconced in its centre.

Anyway, to get around this I have some 100mm x 100mm square wire mesh which I place in a semicircle over the top of the bed, and then I cover it with white bird mesh which effectively excludes the cats and birds. It also allows me to water straight through it while the seedlings are still small. I leave it on until the carrot tops get big enough so that the bare soil is no longer visible, say 50 – 100mm high.

Harvesting

With the seedlings well up it is just a case of letting nature take its course and the carrots continue to grow. Keep an eye on the width of the part of the carrot root above ground, wider root generally means bigger carrot. You can start harvesting as soon as the carrots get big enough to be worthwhile. You can harvest a few small carrots from the most thickly sown areas for each person and use them as baby carrots, this will allow the remaining carrots to continue to grow and expand.

The carrots will continue to grow through the summer, autumn and winter enabling you to harvest and use them as you need, eliminating any requirement to preserve them. As the year moves on into spring, some will send up a seed head because carrots are biennial and this will be their second year of growth. It is for this reason that I like to plant my carrots towards the end of winter, so that I spread the harvest over as wide a timeframe as possible. You won't want to save seed from the first ones that bolt, save the seed from the ones which hold in the ground the longest and bolt latest in the season. And then it all starts again!

7.2 Onions

For the past 10 years or so we have been growing a percentage of our own onions, the percentage being dependant on how well we have done that year, but usually upwards of 6 months' worth. This is the process we use –

Sowing

In April each year we get hold of onion seed, usually white onions and the variety we like is Gladalan white although we have played with creamgold (a long storing variety) and also a red onion as well. We sow the onions into a couple of polystyrene foam veggie boxes, the ones with the drainage holes in the bottom not broccoli boxes.

This is the type we use

To prepare the boxes for sowing I fill them up with plant materials such as pulled weeds, grass clippings etc. then add a 50cm layer of seed raising mix on top. The layer of seed raising mix compresses the vegetable matter, down so that the whole lot fits into the box. The idea of the vegetable matter is that because the seedling onions will be sitting in the box for months, the breakdown of the vegetable matter will provide nutrients over time for the seedlings (called sets) to grow.

Vegetable matter in

I sow the seed fairly closely together and as evenly as I can by hand (that is to say, not very evenly at all!) over the surface of the seed raising mix. I then cover the seed with a thin layer of cocopeat, again by hand so that hopefully it will be uneven in the same concentration as the onion seed. I then tamp the surface down with a board to ensure good seed/soil contact. I then finish off by giving the whole thing a drenching with the watering can. The box will then sit in the greenhouse for the winter.

Topped up with seed raising mix

Planting Out

The seeds will germinate and continue to grow in the polystyrene veggie boxes until early to mid-September, by which point they will be roughly 200mm tall. I remove the sets from the box by hand and shake off any adhering soil and vegetable matter. I then cut the tops down to about 150mm long, to reduce the amount of transpiration while the roots get a hold in the new soil. I transplant them in rows about 75 – 100mm apart with about 25mm – 30mm between each plant within the rows. They get a good water and then I water them regularly and weed between the plants as required to keep the competition's heads down! Due to the amount of onions we plant, I don't do any interplanting in that bed, it is onions only.

Well grown onion sets

I usually plant them into a standard veggie bed and we have gotten some good results over the years, but last year I planted into one of the beds under the 50% shade cloth cover. It may have been a coincidence but all of the onions were very small that year. So this year I went back to a veggie bed without a cover. Also this year, for the first time, then bed I planted into was provided with ollas (unglazed terracotta pots buried and kept full of water for irrigation) and the result was the biggest load of onions we have ever had, over 15 kg worth!

Large, well grown onions!

Harvest

The onions are harvested after the green leaves have fallen over and the onions have dried out a bit. This is usually late November to early December, depending on the year. I pull them up and leave them in the open for a few days for the skins to dry out, then put them away somewhere dry and cool. With the large number of onions we got this year that looks like being in the garage somewhere. We just continue to eat the onions as required and they usually last us well into winter. We'll have to see how it goes this year.

The Harvest!

8.0 Seedling Sun Protection

8.1 Making a Seedling Sun Shade

Years ago I used to do most of my planting (seeds and seedlings) in the early spring, somewhere around the first week or two in September, but once I decided that I needed to produce food all year around that meant I had to plant all year around. Early on in this process I found that the Australian summer sun could cause a seedling to wither and die within a matter of hours so I needed to put a barrier between the seedlings and the sun for a while, just to give the seedling a chance. Thus I developed the sun shade idea.

How I made the Originals

I used 42mm x 19mm DAR pine, because it is easily available, light and cheap, I buy 2 metre lengths, cut one in half and make a frame 2metres by 1 metre, using lap joints and a bolt at each corner. I then put in two crosspieces 650mm or so in from each end so that the frame looks a bit like a ladder also about 250mm in from the end on the face of the frame I put in a hinge and a 300mm length of timber so that the frame now has 4 legs. To make it collapsible for easy storage I screw on a folding strut (like the type you see on card tables to keep the legs steady) from the frame to each leg. Attach 50% shade cloth over the top face of the frame using the shade cloth attachment tacks and the shade cover is completed.

Deconstructing the Old Ones

An old one - looking a bit sad

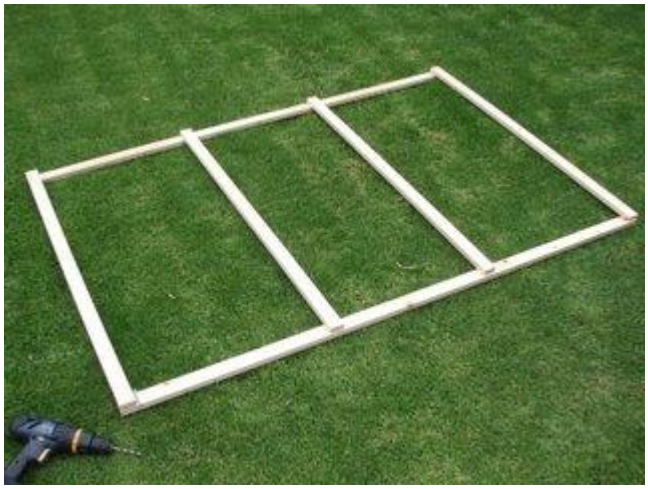
The sun shades have been working faithfully for me for over 5 years not but the two that I have are starting to look a little sad and I need another one anyway. So I decided to recycle the ones I had and extract all useable materials from them and get in enough new timber to make two and a half new ones. They cover the same area as one of my standard garden beds – about 1.2 metres by 1.8 metres, so a half size one covers 1.2 metres by 0.9 metres. I do have 3 extra-long beds near the centre of the yard but by combining as standard shade with the short one I can cover the whole of it if I need to.

Detail showing the lap joint previously used

To deconstruct the old ones I pulled out all the bolts and screws holding it together and then removed the gang nails holding the shade cloth onto the frame. The shade cloth looked pretty much brand new even after 5 or so summers exposed to the sun so I folded it for use later. The legs holding the frame off the ground were also in good condition and the hinges that attached them to the frame were a bit rusty and bent in places but after a bit of panel beating they were ok to reuse. The timbers in the frame were mostly split, especially where I had made the lap joint in the corners, while I had done this to improve the look of the frame all I had done was to make it more complicated and detailed to produce while actually reducing the strength of the frame.

Building the New Ones

The timber that I used to build the new ones was 20mm x 40mm DAR pine because it is light, cheap and available. Sometimes you can do a good deal on pre-cut lengths if they are on “special”; I bought some 1.2 metre and 0.9 metre lengths at quite a good per metre rate, but paid normal price for the 1.8 metre lengths that I bought. Another plus was that because I was able to buy the exact lengths I needed waste was reduced and I did not need to spend time measuring and cutting (or screwing up the lengths and having to re-cut, for that matter).



Laying out the frame

To start I laid out the 1.8 metre side rails and then placed two 1.2 metre lengths at the end and two more at 60 centimetre intervals to act as braces, drilled 6mm holes through both members and bolted them together using 50mm x 6mm bolts with a washer each side. I could not use the original bolts because they were only 30mm long due to my using lap joints previously so I had to buy new ones.

Frame bolted together and shade cloth attached

Once the frame was securely bolted I attached the original shade cloth onto the top of the frame using the original gang nails. Then I turned it over to attach the recycled legs, screwing them onto the frame with Philips head screws so I could use my battery drill, much quicker and easier than a screwdriver. I butted the back of the legs up to the end piece of the frame so that it would act as a brace and provide a bit of strength to stop the legs bending back the wrong way.

Detail showing gang nails used to attach shade cloth

To keep the legs from collapsing I needed to fit a card table stay on each leg, this allowed the legs to be folded back for storage but provided bracing when the legs were open in use. These were in place on the originals but were in such poor condition that they were unable to be recycled. I also used the Phillips head screws to attach the stays to the frame and the leg rather than the chatty little screws provided as they tend to rust and can pull out although to be fair they are probably designed for lighter duty than I needed.

Leg and leg stay now in place

With the stays fitted, the legs can be folded under the sun shade for easy storage, always at a premium at our place, or folded out for use. So I folded the legs down and carried the sun shield over to the veggie bed planted out yesterday and put it in place. It fit well and should do an excellent job.

Completed sun shade in place and working!

8.2 Making Veggie Patch Sun Covers

Finished Product

The summers here in western Sydney seem to be getting hotter, and the numbers (number of hot days, length of hot spells, highest temperatures) definitely back that impression up. It can be hard to keep the garden going, let alone producing, in the hot dry conditions we have experienced lately. The ollas have helped to keep the water were it needs to be, in the beds that have them but the long, strong afternoon sun takes a heavy toll on the plants. Seeing as it was a bad year this year (2014) and all the gurus say that global warming will only make things worse I decided to do something about it.

I obviously needed to put some protection between the fierce afternoon sun and the veggies, but the question was… how? It took some time to get the design right, because my original design followed the one my father put in place many years ago. He used to grow orchids and had built a huge shade house that took up half of our fairly generous back yard. He built most of the structure out of 25mm (or 1" as it would have been then) galvanised water pipe. It was strong and durable and comparatively cheap and easy to build. Perfect!

We it was perfect until I tried to get hold of some 25mm water pipe! If I wanted it in one metre lengths I could walk right into Bunnings and get as much as I wanted, but I wanted four to six metre lengths, plus fittings. To get hold of that stuff was almost impossible second hand (there was some 50mm stuff available but very heavy and very pricey) and the stuff was expensive with a capital "E"! So after some months of trying to work out a design I decided it didn't need it to survive a nuclear blast and I would have to use something lighter (and cheaper!).

The new design was based around poly pipe, star posts and some timber.

Components

When we had a dog, and before the chook tractor, I used lots of star posts to make fences around the veggie patches and the chook area to separate the livestock from the crops. When the fences came down I kept the star posts in the shed, some were 1350mm and others were 1800mm so at least I didn't need to buy any. In any case they are easily available and sometimes you can pick them up second hand.

To make the overhead bows that would support the shade cloth I am using 50mm (nominal) green stripe polypipe. To work out how much I needed, I measured the distance I needed to cover (in this case almost 4 metres) which gave me the diameter of a theoretical circle. By multiplying the diameter by π and then halving it I could calculate an arc that would do the trick, it came out to roughly 6 metres, so that is what I went with.

The roll of polypipe

Unfortunately many suppliers want you to buy a whole 100m roll and are unwilling to cut lengths off for you, particularly hardware and produce merchants in my experience. I wanted 6 x 6 metre lengths to make 6 bows but I was eventually able to buy a cut 36 metre length from a rural irrigation supplier. This stuff is big and I had to hire a ute to bring it home in but that worked out much cheaper than home delivery and there was NO WAY is would have fitted into my little Suzuki Alto!

The battens to hold the hoops together and support the shade cloth and allow it to be attached to the structure are 20mm x 42mm treated pine. For the back veggie patch I needed timber about 4.5 metres long to go the distance in one go and the stuff came in

4.8 metre lengths which worked out pretty well. Transport was a bit problematic so I used the same ute which we hired to pick up the poly pipe.

Shade cloth effectiveness is measure by how much light the shade cloth blocks out, hence 90% shade cloth only lets through 10% of the light. While I wanted to break the strong sunlight down a bit I didn't want to block out the light almost completely and get leggy plants that were not productive. To that end I got hold of a roll of 50% shade cloth and it seems to work pretty well, allowing the plants to keep growing in the hot weather without stopping them from developing normally.

Putting it all together

Measuring the polypipe out is a bit of fun, the stuff can be fairly stiff so a warm sunny day helps to soften the plastic. It is also handy to have another person to stretch out the pipe straight and hold the end of the tape measure while you measure out the right length. Once you have the pipe stretched straight out and measured it is easy to cut to length with a hand saw.

Putting in the star pickets can be easy or difficult. I have tried hammering them in with a club hammer, a sledge hammer and a claw hammer and they all fit into the category of "difficult". I recently got hold of a tool specifically designed to install star pickets, a post driver. It is basically a galvanised pipe with handles (see photo) and you lift it over the post and ram it down to drive it into the ground. It works very, very well, but is somewhat noisy if you are going to do more than a few at any one time I would recommend hearing protection of some sort.

Post Driver

In designing the cover I had to take into account the chook tractor and ensure that the distance between the star pickets would be enough to allow the chook tractor to be manoeuvred between them. The chook tractor is about 2 metres long so I allowed about 2.5 metres between the star pickets for the back veggie patch where I would have to take it through sideways. In building the front one, I have access to the front end of the patch so I can take the chook tractor in end-on so in this case the distance between was not critical and I opted for 1.5 metres (one at each end of the patch and one in the middle.

Most of the star pickets I had were of the 1350 mm long variety so I basically pounded them in until the post driver hit the ground, leaving about 770mm out of the ground which meant that there was over half a metre of star post in the ground. That seems to have worked pretty well.

It is possible to fit the hoops over the star by yourself but having another person helps! Once the hoops are over, pull them down until they have gone as far down the star pot as they will, for me that turned out to be when the end was still 450-500mm off the ground. That coupled with the bow of the 6 metre poly pipe meant the height under the middle of the bow is a bit over 2 metres.

The Hoops in Place

At this point I needed to affix the battens to the polypipe. To be absolutely sure I got the length right I measured it at the bottom of the star pickets rather than the bows, which are flexible and will move around a bit. With the two outside battens cut to size I fitted them by drill a hole and countersinking it, then drilling in one screw into each batten. I left the top two full length to form a bit of an overhang for the shadecloth. I also had to make sure that the battens were high enough for the chook tractor to fit under them. Another factor was that the shade cloth was 3600mm wide, so the outer

battens on each side could not be further apart than that or I wouldn't be able to attach one side.

Holding the battens in place prior to fixing

With the battens in place I pulled the shade cloth up and over the top of the structure so that the south end was level with the last bow and the north end hung down by about 1500mm to give extra cover against the hot northerly midday sun. To affix the shade cloth to the battens I used "Cooleroo" Timber fasteners. Just pull the shade cloth down over the end batten on each side and hammer a timber fastener (a metal rectangle painted green with 8 projections that stick into the wood) in every 200mm. This secured the shade cloth cheaply and effectively.

How Does it Work?

It made an immediate difference to the feel of the veggie patch, it was much more pleasant to walk around underneath. I have had problems with poor growth of some veggies (brassicas, celery) which were planted during the hotter times or were in full sun for most of the day. I think next year will be better even if it is as hot as this year has been.

One interesting side effect has been that I have not needed to water quite as much in the plots where I don't have ollas. On the down side, we have had some rain lately and when it is only light rain there is a tendency for some of it to collect and run off the sloping side panels of shade cloth, reducing the amount of rainwater getting to the veggies. Fortunately we have just had a day of heavy rain and everything is well and truly rehydrated.

In half a day I was able to put up a cover over a veggie patch 4500mm x 4000mm almost by myself and it is guaranteed to increase production next year so it is a worthwhile project for anybody to have a go at.

8.3 Recycled Veggie Patch Sun Covers

The Finished Product

Here in Western Sydney, the summer sun gets pretty savage and the veggies, especially the younger seedlings, require protection as they grow. The bed covers I built (you'll find an article on them above) were designed to cover a large area, but what if you wanted to cover the beds separately, and didn't have a lot of cash? Well a friend of mine, Vera, has come up with an idea based primarily around recycled materials, and here is what she did –

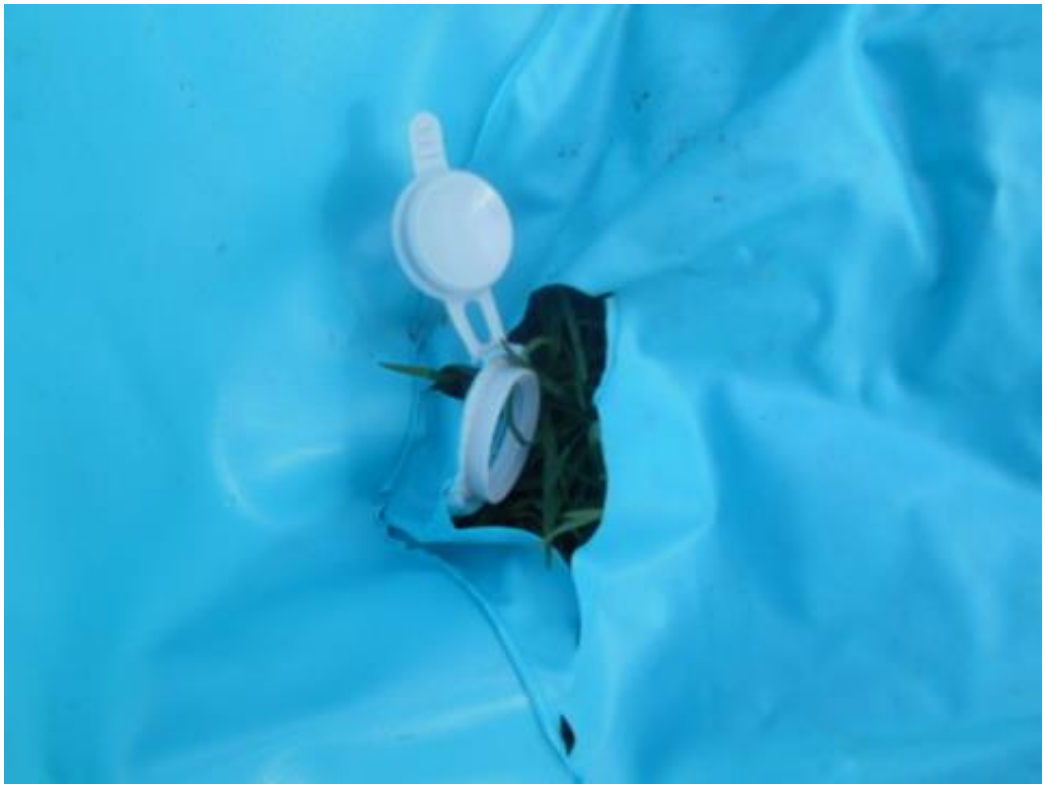
While she was out and about she noticed an old kiddy pool being thrown out because it was holed. She picked the whole thing up and brought it home, using the liner as a spare wheel cover but taking out the tubing supports for use in the garden.
The tubing supports came in two lengths and she pushed them into the garden with the shorter ones on the western side and the taller ones on the eastern side so that the cover would slope towards the west, reducing the effect of the harsh afternoon sun. She pushed them in at about 2 metre spacing along the bed.

With the supports in place she now set up the shade cloth, which she had hanging around. To reinforce the shade cloth where the attachments were to be wired on she used her sewing machine to sew on some woven cloth reinforcing tape. To make the attachments she cut some pieces of 12mm dowel into roughly 100mm lengths, drilled a hole in one end, and then wired them onto the reinforced section of the shade cloth. The width of the dowel is not critical so long as it fits inside the tubes!

To install the shade cloth it is just a matter of slipping the dowels down inside the support tubes, which can be done quickly and easily. The extra height on the southern side allows you to get in underneath and water the seedlings, remove pests etc.

This is a great design using mostly recycled materials and well worth installing to protect those tender veggies. Another benefit is that they act as protection in the event of a summer hail storm.

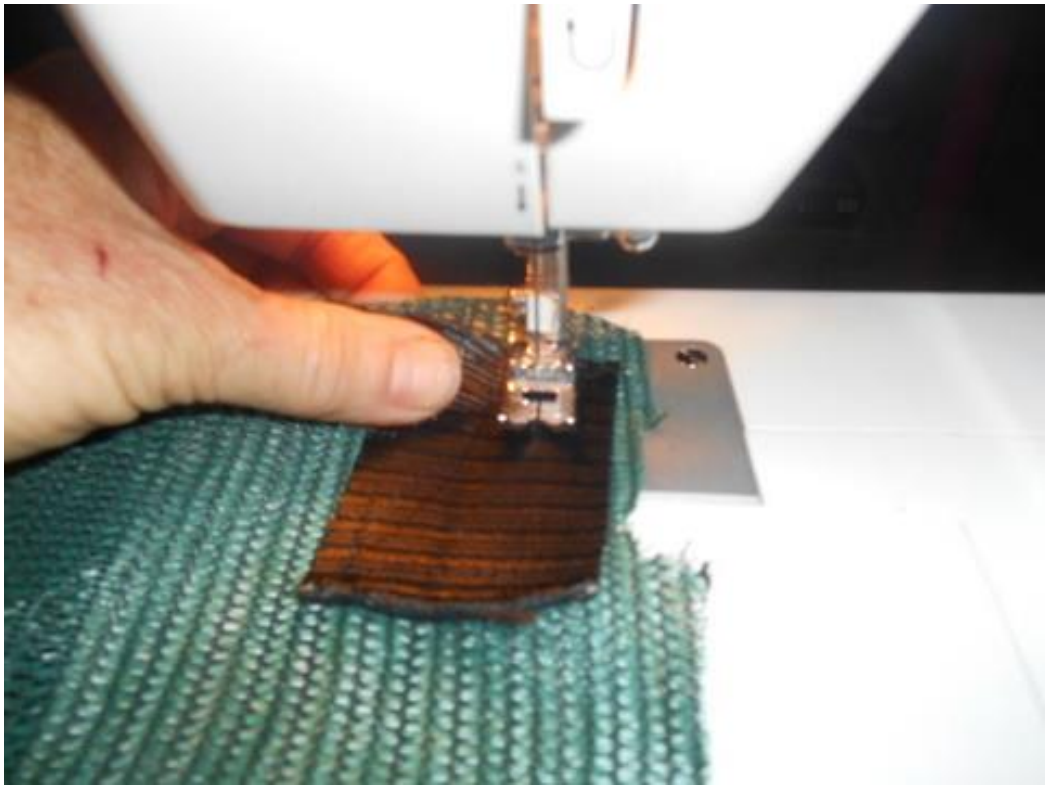
The Kiddy Pool



..... and why it was discarded!

Disassembled

Sewing on the reinforcing tape 1



Sewing on the reinforcing tape 2

Drilling the dowel

Inserting the wire 1

Inserting the wire 2

The dowel wired onto the shade cloth

The dowel inserted into the support tube

From the west

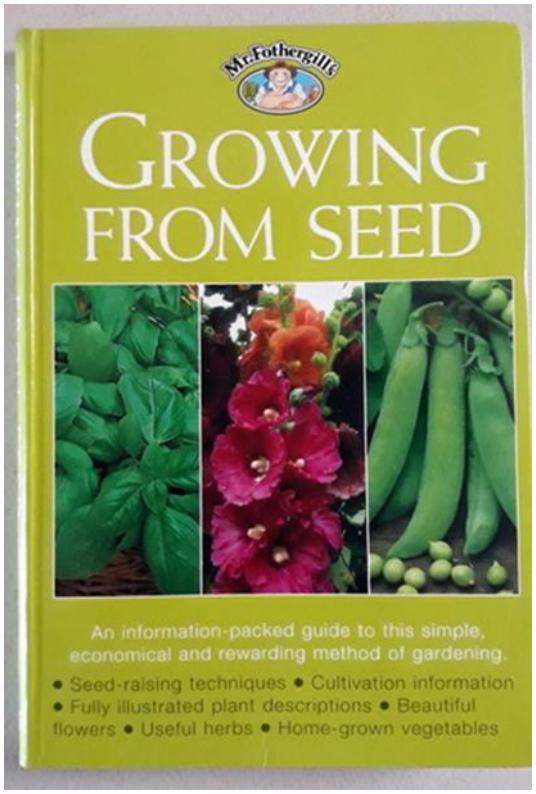
From the East

9.0 Resources

9.1 Raising Vegetables from seed Books

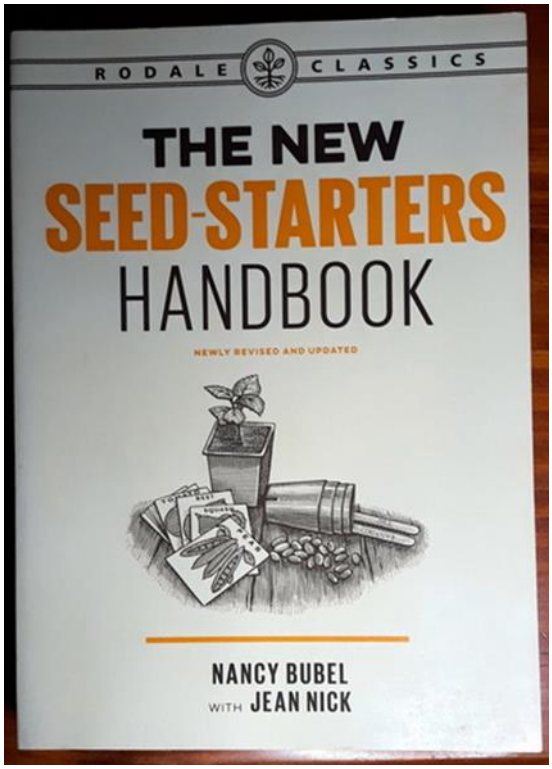
While there is at least a page or two on raising vegetables from seed in just about every book ever written on veg growing, it is rare to come across a book solely on the subject of growing from seed. In my experience I have only found two, and they are noted below.

Growing From Seed – Margaret Hanks – Murdoch Books (AUS) 2002 ISBN 978 0 86411 946 9 – This book was released under the 'Mr Fothergills' brand. The book is mainly broken down into two parts, the first part covers seed raising basics and includes how to plant seeds, types of seeds, the process used to get seeds into commercial packets, how seeds germinate, growing seedlings on, soil and potting mixes and pests and diseases. The second part of the book is a series of short entries on individual vegetables, flowers and herbs. Each entry gives a general description of the plant (and in the flower section that might be it!) but for vegetables, there is a general description including plant spacings and information about cultivation including when the seeds should be planted. This is followed by a description of varieties, presumably those available from Mr Fothergills'. At the very end of the book is a planting chart for the flowers, herbs and vegetable listed. Lots of colour photos, particularly of the flowers.



The New Seed Starters Handbook – Nancy Bubel & Jean Nick – Rodale Books (US) 2018 ISBN 978 1 63565 104 1 – At over 450 pages, this is a large and detailed book. The book is divided into five sections, section one talks about aspects of starting seeds indoors including containers, growing medium, light, sowing the seeds, germination, transplanting, potting on and possible problems. Section two talks about moving plants outdoors including soil preparation, hardening off, planting out, direct seeding, the fall garden, pests and planting seeds with children. Section three discusses growing under cover including cold frames, starting seedlings in a greenhouse and growing veg under cover. Section four is about saving and storing your own seeds including how seeds are

farmed, choosing the right seeds to save, collecting and preparing seeds, seed banks, seed viability and seed saving tips. Section five is an encyclopaedia of plants to grow from seed including gardens fruits and veg, herbs, garden flowers, wildflowers, trees and shrubs. Each entry is a paragraph or two long talking about how the seeds are fertilised, and how to save the seeds. The book has a small number of line drawings and the odd black and white photo.



9.2 YouTube

The 'Growing from Seed' playlist -
https://www.youtube.com/playlist?list=PLK8S4Ute842QceS_4BpqOM8aPG_4_HCer

Which is comprised of the following videos –

Making seed raising mix at home -
https://www.youtube.com/watch?v=uj1waEjfWZI&list=PLK8S4Ute842QceS_4BpqOM8aPG_4_HCer&index=1&t=3s

Sowing seeds into punnets -
https://www.youtube.com/watch?v=rbSWYJcxcUs&list=PLK8S4Ute842QceS_4BpqOM8aPG_4_HCer&index=2

Making and using newspaper pots –
https://www.youtube.com/watch?v=0rWTi1qJuwM&list=PLK8S4Ute842QceS_4BpqOM8aPG_4_HCer&index=3&t=6s

Making a Capillary bed -
https://www.youtube.com/watch?v=ph4hQWDdo-E&list=PLK8S4Ute842QceS_4BpqOM8aPG_4_HCer&index=4&t=1s

Capillary bed 2.0 -
https://www.youtube.com/watch?v=dVYcTg1UOHw&list=PLK8S4Ute842QceS_4BpqOM8aPG_4_HCer&index=6&t=2s

Making a mini-greenhouse from recycled materials -
https://www.youtube.com/watch?v=1WGzOo-PtHE&list=PLK8S4Ute842QceS_4BpqOM8aPG_4_HCer&index=5&t=51s

Checking seed for viability –
https://www.youtube.com/watch?v=biidwyRz6Bc&list=PLK8S4Ute842QceS_4BpqOM8aPG_4_HCer&index=7

Appendix 1 – Conducting a Seed Germination Test

The idea is to take a known number of seeds, keep them warm and moist for the required time, then take note of how many actually germinate. Expressing the number of seeds which germinated as a percentage of the total number of seed tested will give you the germination rate for that batch of seed.

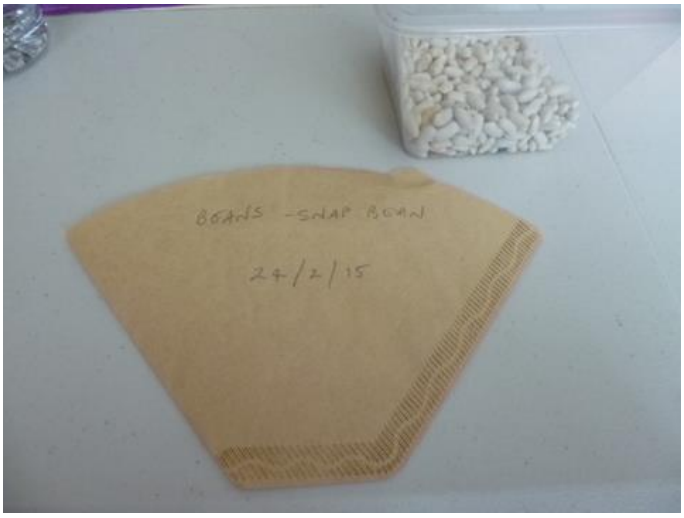
Coffee Filters

I used to use paper towel to place the seeds on and keep them wet, but recently I have found that coffee filter papers keep their shape better and are tougher when wet and so are all 'round easier to work with. I use size 4, designed for 10-12 cups of coffee, you can pick up a box of 40 filters for around $2.00 and they will last you quite a while.

Carrying out the Test

1. Give the seed a good mix and select a representative sample.
2. Write the name and variety of the seed, date and number of seed on your coffee filter (or paper towel or whatever) in pencil before you dampen it.
3. Dampen the filter and place the measured number of seed into the filter in a single layer, with some separation between the seeds where possible.
4. Fold the filter up and place it in a screw topped jar and place the lid on, to keep the moisture in. If the weather is cold place the jar in a warm place in the house, preferably around 25°C.
5. If you have a number of different types or batches of seed to test, you can repeat this procedure and place them all in the same jar if there is room.
6. Leave them in the warm place and check them every few days. Some seeds like peas and beans will germinate quickly but others like celery may take two weeks or more to germinate.
7. Once some seeds have germinated, make a note of how many and remove the germinated seeds from the paper and replace it in the jar.

8. Check again every day or two until no more seeds germinate.
9. To calculate divide the number of seeds which germinated by the total number of seeds originally placed in the jar and multiply the result by 100. This will give you the germination rate for your seeds, expressed as a percentage.



Labelled and ready to go!

Dampened down and in the jar

Checking the results

The germination rate, apart from alerting you to an infertile batch of seed will also enable you to work out exactly how much seed of a particular variety you need to plant to get the harvest you are looking for. So in general terms –

- If the germination rate is less than 10% – chuck them out
- If the germination rate is around 50 % then plant them thickly.
- If the germination rate is over 75% plant them normally.