SEED STARTING

GUIDE to basic and more advanced seed starting

For Laramie

WHY grow your own seeds?

- You want to grow specific varieties of flowers esp. Natives or veggies .
- You want to have lots of plants without spending lots of money.
- You want to have fun watching things grow
- You want to see green growing plants while it's still snowing in March and April.
- You want organic plants, that will not harm pollinators.
- You want good roots on starter plants.

What do seeds need to germinate?

Water – but not too much
Oxygen
The correct temperature
Eventually, LIGHT.

What do you need to start seeds- A PLAN

1. pots/containers or Flats
2. some type of seed starting mixture/soil
3. Water supply
4. Light supply
5. Labels and WATERPROOF pen
6. Patience

and of course: SEEDS

THE SEED PACKET

There is a huge amount of information often found on pkt and often in seed catalogs.

It is important, especially if sowing seeds outside, that attention is given to soil temperature.
If the seeds are sown when it is too cold, they may sit there for a month or more or rot.
Some seeds, such as carrots, do not do well transplanted so it is important to try to optimize the situation.
Some seeds need some special treatment before seeding to optimize germination.

Decide what kind of plants –

Easiest Veggies for Laramie

1. Peas
2. Kale
3. Squash
4. Root crops
5. Beans
6. Short-season Tomatoes

Easiest Flowers

1. Cosmos
2. Marigolds
3. Sunflowers
4. Dahlias
5. Dianthus

Seed treatments

- sometimes found on seed packets or as "germination codes"

1. simplest – sow the seed.
2. dry cold stratification – seeds need a chill 1-3 months in fridge.
3. Moist cold stratification – seeds needs to be MOIST (not wet) for their 1-3 months in fridge.
4. Scarification – nick or rub between 2 layers of sandpaper.
5. Boiling water then soak, or just soak for 24 hours.
6. Liquid smoke
7. Some need combinations of several of these, or alternate warm cold treatments
8. Make sure they are always labeled!!
9. If cold moist stratifying – check periodically for germination and sow immediately.

SEEDING TIMING

This is important especially in Laramie with a short growing season. Plants ready too late or too soon don't produce as well.

Some plants like squash, cucumbers grow fast -3-4wks
Tomatoes need 6 weeks plus
Perennials can take 5 MONTHS
Experience and seed packets can help

Stratification of seeds

Frequently needed for many temperate or cold climate perennials.

Dry – put seed packet in fridge.

Moist - Mix with moist vermiculite or moist fine sand and place in bag in fridge – check for germination and spray to keep moist NOT wet.
OR – use moist paper towel method
OR – sow and place in cold place

Different species have differing needs can be 6 months , usually 30-60 days

- Growing Medium

- Perlite
- Vermiculite
- Peat moss
- Coconut coir
- others

PERLITE

White airy small blocky pieces

Used for Drainage , AERATION.

Low water retention.

Natural volcanic mineral – heated glass it is mostly silica

VERMICULITE

Small gray flaky pieces

Used for Water retention and improves soil structure

High water retention

Natural Phyllosilicate , small flaky mineral; silicate.

PERLITE

VERMICULITE

COCONUT COIR

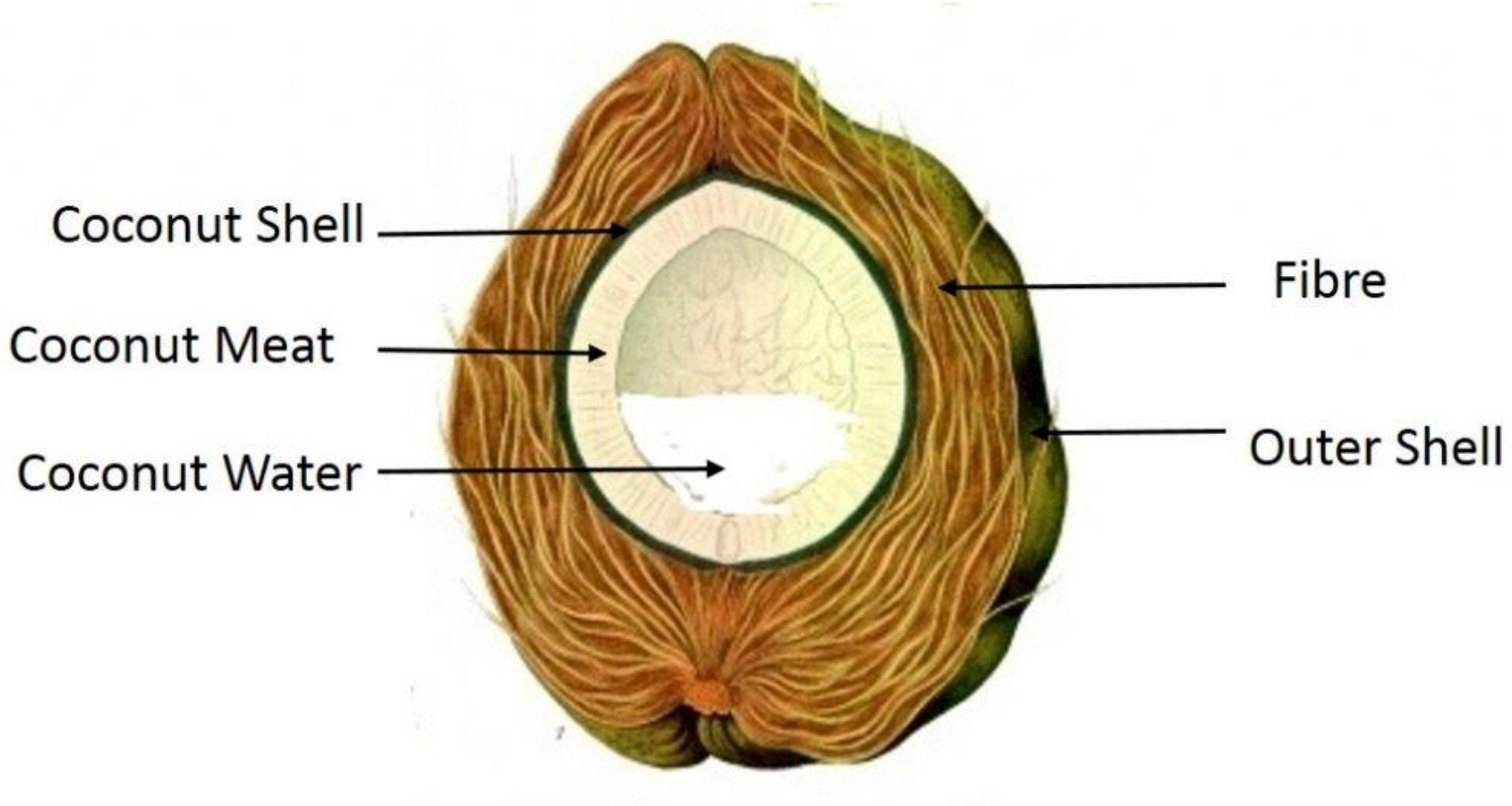
Seed mix is combination of ingredients depending on the needs of the plants

Can also include

Worm castings

Wool pellets used as binder in soil blocks

Coconut coir is made from processed fiber
Which is the thick fibrous layer between the outer shell and the Actual coconut. Intact ,as they fall off the tree, they are over 12’’ in every direction at least . They float and the fiber is the biggest part.



Coir versus Peat

COIR

- Very abundant and renewable
- Neutral pH
- Garden coir is washed to reduce salt
- VERY EASY to rewet
- Holds water well

PEAT

- Comes from centuries old bogs which are carbon sinks
- Acidic pH need to add lime
- Difficult and tedious to rewet .
- Both hold water well.

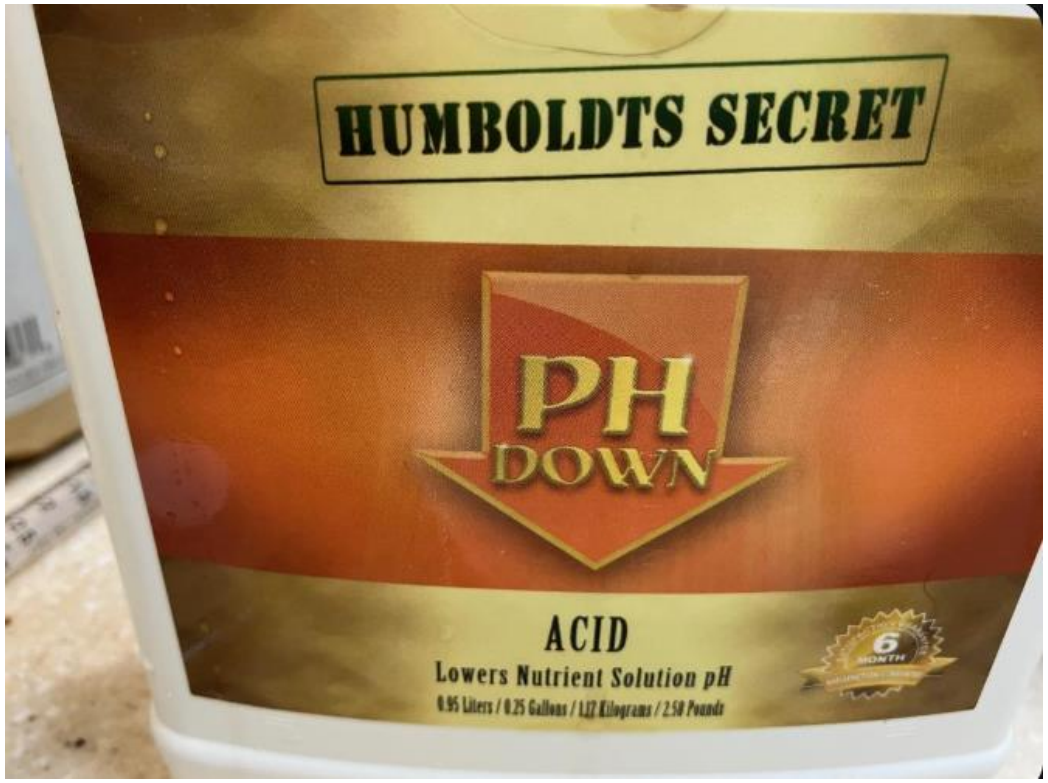
POTS- many options
Can use small individual starting pots, 6-packs , cell packs, reused containers, homemade paper containers or a soil-blocker or artificial blocks

LIGHTS – these days LED stripe plant lights are cheap and efficient. Make seed starting a LOT easier—OR use a very sunny window.

WATER – can use tap water, seedlings need to be moist not soggy, bottom watering is best, less soil compaction = more air space, and fewer gnats

TIMING – seed packet usually states how many weeks before anticipated last frost date to start the seeds. This is important or seedlings will be too tiny or stunted if left too long in small pots.

Laramie water has moderate EC and Ph 7.38 or so
0.5 ml of pH down will bring down 1liter to 5.6 or so



Another source of Phosphoric acid

CARBONATED WATER, CARAMEL COLOR, PHOSPHORIC ACID, ASPARTAME, POTASSIUM BENZOATE (TO PROTECT TASTE), NATURAL FLAVORS, POTASSIUM CITRATE, ACESULFAME POTASSIUM.($102.6 million + in 2024)

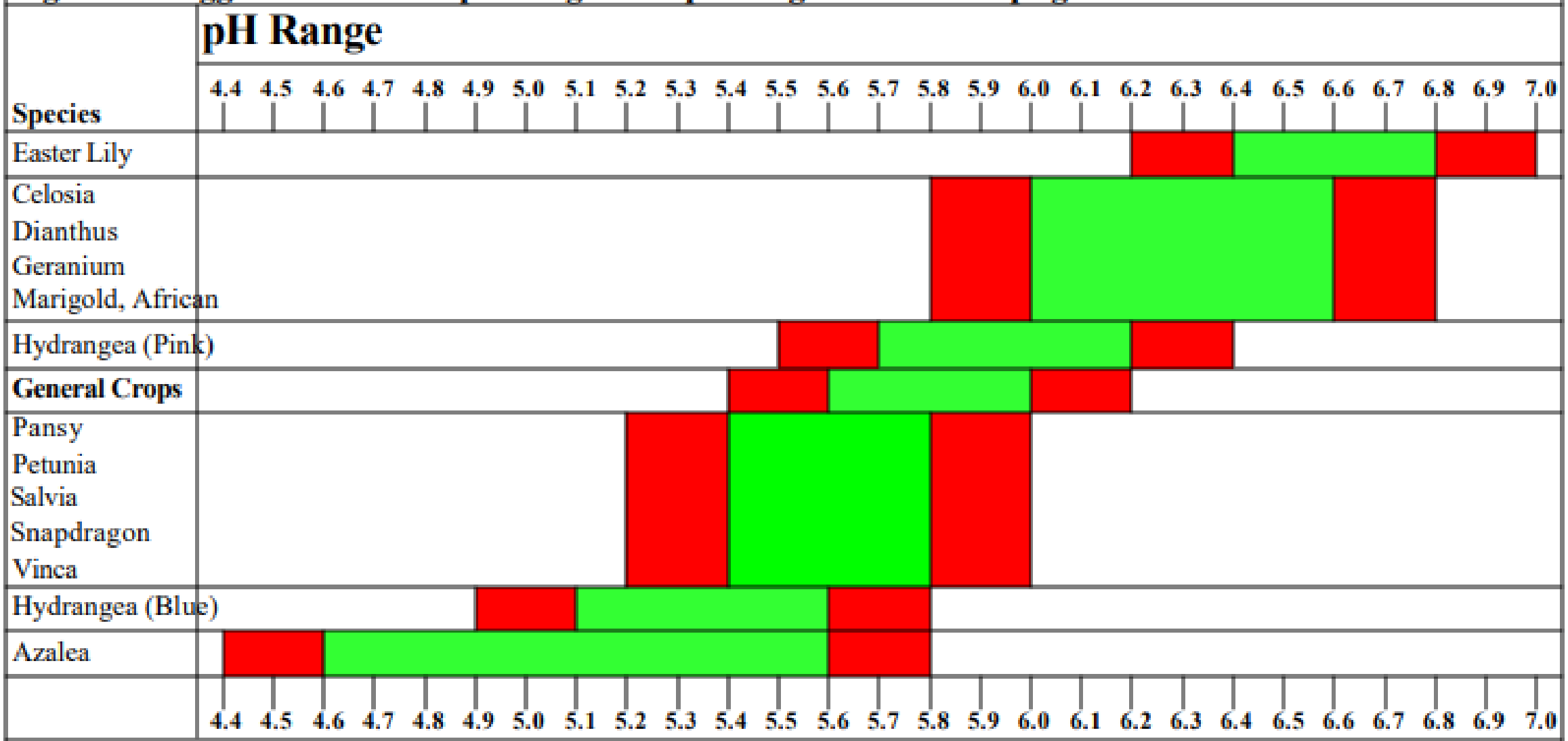
The pH of coca-cola zero is 2.78 (most sodas =/- 3.00

pH of vinegar is generally 2.50 or so

For short term (4-6 weeks) the pH is not that critical for most plants
Longer times may benefit from lower pH depending on varieties
There are additives to lower the pH.
Optimally around 6.5
As an FYI
Hydroponic tomatoes grown at 5.5 – 5.8 pH
Cucumbers 5.65

Lower pH makes nutrients more available

Figure 2. Suggested substrate pH ranges for specific greenhouse crops grown in soilless substrate.



M&M Key

Management Decision Range
(take corrective steps so the pH moves back into th acceptable range)

Target Range

OUTSIDE - Can sow in fall or on snow
Works for tough plants (and weeds)

- These extremely tough seedling have been growing most of this month outside in a south facing bed. They have gone through various snow events and low temps.
- They seeded themselves last year.
- They look like Larkspur .
- Do NOT try this with seed packets that say “ after all danger of frost”

Procedure -

Assemble pots, trays, medium, labels and seeds.
Fill pots with dry mix, place in tray and water from bottom. Can spray the surface so it is moist . Take a break so medium absorbs the water.
Watering from the top compacts the medium.
Put seeds in each cell or pot, 1-3 seeds per pot. If needed cover VERY LIGHTLY, no more than 2-3x their size. Do NOT cover pelleted seed or varieties that need light to germinate.
Spray to make sure moist .
Cover till they germinate (humidity)

Labels are very important, as many seedlings all look the same.

After thinning – the seedlings need dilute fertilizer to grow.

PELLETED SEED

Makes it easy to handle more expensive tiny seeds such as hybrid petunias and some tomatoes etc.

Seed coatings vary on seed seller

Do not cover, coating dissolves /falls off when wet - tiny seeds do not need to be deep.

Can use tweezers for ease of placement

A fine layer of vermiculite covering the seeds can maintain moisture levels and prevent algae growth.
A tray allows selection of most vigorous seedlings.

As germination occurs decrease the humidity and gradually adjust plant to ambient humidity

After germination when seedlings are growing indoors, 35-60% humidity will suffice and 45-55% is ideal. For germination however, humidity levels need to be higher, over 75%, to ensure proper germination.

A covering – in this case a gallon bag – allows for increased humidity for seedlings

NEXT – LABEL WELL with waterproof pen.
Cover for humidity
Check for germination and uncover as they Germinate.

Seedlings in pots and as they grow

Seedling roots – Roots develop first and need a good seeding mix and space.

PROBLEMS in seed starting

Overwatering (much more than underwatering)
Root rot, diseases, gnats , algae

Fungus gnats

Wrong timing

AS THEY GROW

- You may need to thin seedlings to one per pot for optimal growth.
- You may need to treat for “fungus gnats.“
- Bacillus thuringiensis spp israelensis is a bacteria that kills the larvae of the gnat. The larvae eat the roots of seedlings .
- Mosquito bits and yellow stickies very harmless.
- Other methods include pyrethrin and neem but there can be phytotoxicity .
- Water from below.

Mosquito bits 2.86% Bt

Knock out Gnats 37.4% Bt

Fungus gnats go through complete metamorphosis (egg, larva, pupa, adult) and like moist, shaded areas within decaying matter. One generation takes about 4 weeks. Mated females lay 100 to 200 microscopic eggs. Eggs are oval, smooth, shiny white and semi-transparent, and hatch in 4 to 6 days.

YELLOW STICKY TRAPS – catch the adults and give an idea as to how many there are as visually it can be deceiving . Each female lays 200 eggs or so, optimal conditions 75F and moist soil . (seedling pots) they hatch in 3-4 days .

Adult fungus gnats do not feed on or damage plants but are a cosmetic nuisance. Fungus gnat larvae typically feed on decaying organic matter and fungi in the soil. However, if larval numbers are high, they may damage roots by feeding on root hairs or tunneling into the roots themselves.

Bacillus thuringiensis subspecies israelensis is effective against larvae in potted plants. It is toxic for 2 days and doesn't kill egg-laying adults, so repeat applications are necessary.

Other methods:
Let surface dry
Bottom water
Diatomaceous earth -use mask and shaker
Scented oils , cinnamon

POTS and BLOCKS

ROOTBOUND plants are stressed plants, they undergo epigenetic change and will never be as big and/or productive as well rooted plants. Plants left in a small pot develop circling roots . When these are transplanted if the roots are not cut, shredded etc the roots will continue growing in a circle .

Basket containers, soil blocks are an effort to " air prune" roots so they don't circle
Potting up well also prevents this

Benefits of Soil Blocking

Reduces Transplant Shock: Soil blocks help prevent root-binding by air pruning, so roots don't tangle or stress before transplanting. This means less transplant shock and steady, healthy growth—no sulking seedlings here!

TIMING of seeding becomes very important

Roots on Petunia seedlings – aoir pruned sides, growing at bottom

Circling roots are a problem for ALL plants transplanted NOT JUST trees .

To prevent your Bonsai from being pot-bound and ultimately starving to death, It's crucial to repot, or transplant regularly.

WHAT HAPPENS to root bound plants ????

1. They are stressed , become stunted, do not reach their potential.

2. They bolt - cabbages may flowers as seedlings.

3. Some varieties are very susceptible to being root bound ie cucurbits (squash, cucumbers etc.).

ROOT WASHING

Some people recommend root washing when transplanting ANY PLANT . Certainly -if the pot medium is significantly different than the soil it is going – this will increase healthy roots and plant vigor.

Imagine a bought plant in a light potting mix dumped in small hole in dense clay .

Imagine its roots circling and circling and DEAD

GOOD PLANTS grow from a STRONG ROOT SYSTEM

1, Circling roots will continue to circle.

2. Root pruning causes new roots to branch and grow

3. Pots, or Abrupt change in soil texture, do cause root circling .

SOME OTHER METHODS

Encircling binding roots

Ancient soil blocking

SOIL BLOCKING was used by the Aztec culture of the Chinampas, a wetland area near the current Mexico city. Pre Spanish era. With interest in regenerative low waste agriculture, it has been rediscovered and modified. The soil blocks without containers have the effect of good air circulation AND air pruning of the roots so " root bound- encircling roots" do not develop.

Soil blocks can be made in different sizes

Little ones can fit inside of the bigger ones

Many different recipes and premixed available

Benefits of Soil Blocking

•It creates a great environment to start off the healthiest plants.

•It automatically air prunes the roots that reach the end of the soil.
•It practically eliminates overwatering your seedlings.

•There is less transplant shock.

•It's eco-friendly; reducing plastic because soil blocks don't require any pots.

•It saves space (both because there are no pots and they grow closer together).

The supercharged plant health happens because the automatic air pruning stimulates more root growth at the base of the plant. The more roots close to the main plant, the healthier the plant. Also, no chance of roots circling around and around, because again, no pot to constrain them.

- the initial cost of the soil-blocking equipment
- not ideal for larger vegetables like pumpkins or squash
- Not ideal for some seeds that take a long time to grow (blocks fall apart)
- can be a little more time-consuming than other methods- different equipment
- Definitely messier
- a sharper learning curve initially than traditional seed starting

BLOCKS MADE FROM OTHER MATERIALS

Various such as -

Foam mostly artificial although a biodegradable one coming

Rock wool – made from melted spun basalt – the most porous

Various formed blocks of cellulose, coir etc

Usually do not “ lose their integrity” ie they do not fall apart

Rockwool is made from basalt rocks + that are melted and then “ spun” into fibers. It is used for insulation and hydroponics

400Pcs 1inch Rockwool Cubes for Hydroponic, Rockwool Grow Cubes Starter Plugs for Seed Starter Soilless Cultivation Hydroponics, Soilless...

★★★★½ 15

$31.93

It is alkaline and needs “ prepping” and rinsing
It is not palatable to fungus gnats
It holds it shape – does not disintegrate

Mineral wool or "stone wool" is a natural product made mostly from volcanic rocks. Natural rocks (such as basalt, dolomite and bauxite) may be supplemented with recycled mineral wool and slag from the steel industry. The stone wool manufacturing process consists of the following eight steps that ROCKWOOL has continued to refine over the course of our 80-year history.

Other seed starting methods

Rock wool spun melted basalt rock

Light weight, clean , holds its shape , good root penetration

Needs acidic pre wash .

Fungus gnats avoid it – inedible

Gazania seedlings

Another use - cuttings
MARCH 5
Cuttings placed in center of blocks
Humidity lid applied

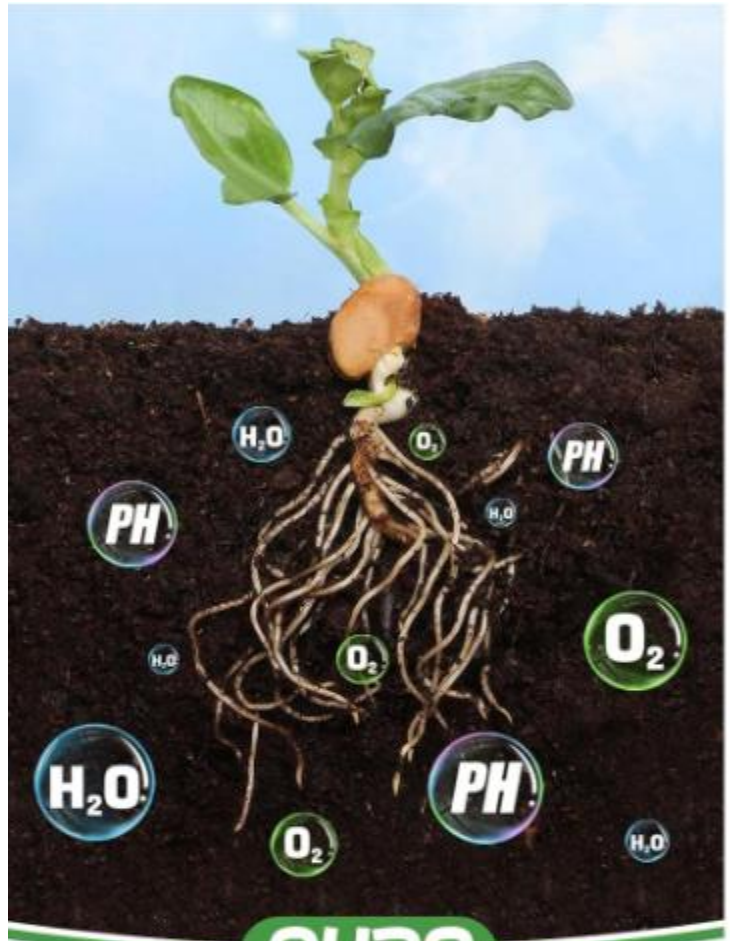
March 18
– long straight roots
Potted up intact

Plants in pots with good roots, 13 days after cutting .
A vast amount of the fancier petunias etc. are grown by propagation
Not seeds

Velocigrow – hyperroots plugs

•Sustainable Seed Grow Plug: This grow plug alternative replaces traditional coir, peat, and rockwool grow plugs with an environmentally-friendly, compostable option made from sustainable, renewable materials, helping to reduce waste and environmental impact compared to non-biodegradable grow media. The grow plugs can be directly planted into the soil, eliminating the need for transplanting and reducing stress on seedlings.
•Perfect Nutrient Balance: The grow plugs include a balanced blend of macronutrients (nitrogen, phosphorus, potassium) and micronutrients to support robust and healthy plant growth from seed to harvest, providing essential nutrients to nourish plants throughout their lifecycle and reducing the need for additional fertilizers in many cases.

•Needs soaking for 4 hours before use – keep moist



OURS

High-quality grow sponge

- Dense and breathable
- Balance PH
- Biodegradable
- High germination rate
- Strong moisturizing ability

OTHERS

Inferior grow sponge

- Loose and not-breathable
- Can't balance PH
- Not biodegradable
- Low germination rate
- Poor moisturizing ability

Breathability	Hydrophilicity	EC Value	PH Value
15%	450%+	0.4-0.6	5.9-6.3

MADE OF PEAT and COCONUT COIR
Hydroponic growth sponge - tezkoles

•3.High Performance: Made from natural peat and coconut fiber, it features a micro-porous structure that provides excellent ventilation and balances oxygen and water. The square design holds more substrate, facilitating the lush growth of seedling roots

•Soak 3-5 mins before use

Usage Steps

01

Soak in water for 3-5 minutes

02

Put seeds in the middle center

03

Put into nursery tray or hydroponic garden

04

Wait for seeds to germinate

Planting Tip for Grow Sponges: After soaking the sponge, use a toothpick or tweezers to create small holes in the planting area. This helps roots penetrate the sponge more easily. Avoid compacting the material to maintain airflow.

Seedlings are growing - now what?

Can “pot up“ into larger pots to allow more growth – do not pull on stem of plant, squeeze pot, hit from bottom. BE GENTLE.

After the seedlings become small plants, it is NECESSARY to “harden them off.”
A series of plant hormones and complex genetic activation lead to cold/heat/dry tolerance.

Can be done in several ways , but if NOT done, plant may wilt and die fast depending on temperature and humidity change from its growing location indoors. The more tropical the plant, the faster it dies, i.e. tomatoes, eggplants, peppers.

Potential Problems to Avoid

1. Seeds are too old, dried out , non-viable.
2. Seeds planted too deep.
3. Seedlings too crowded.
4. Unfavorable soil mix
5. Too much or too little water
6. Grown at wrong temperature
7. Too little/too much light
8. Dirty soil/container leading to infection
9. Growing seeds too early/late in season
10. Improper hardening off
11. Pot bound.

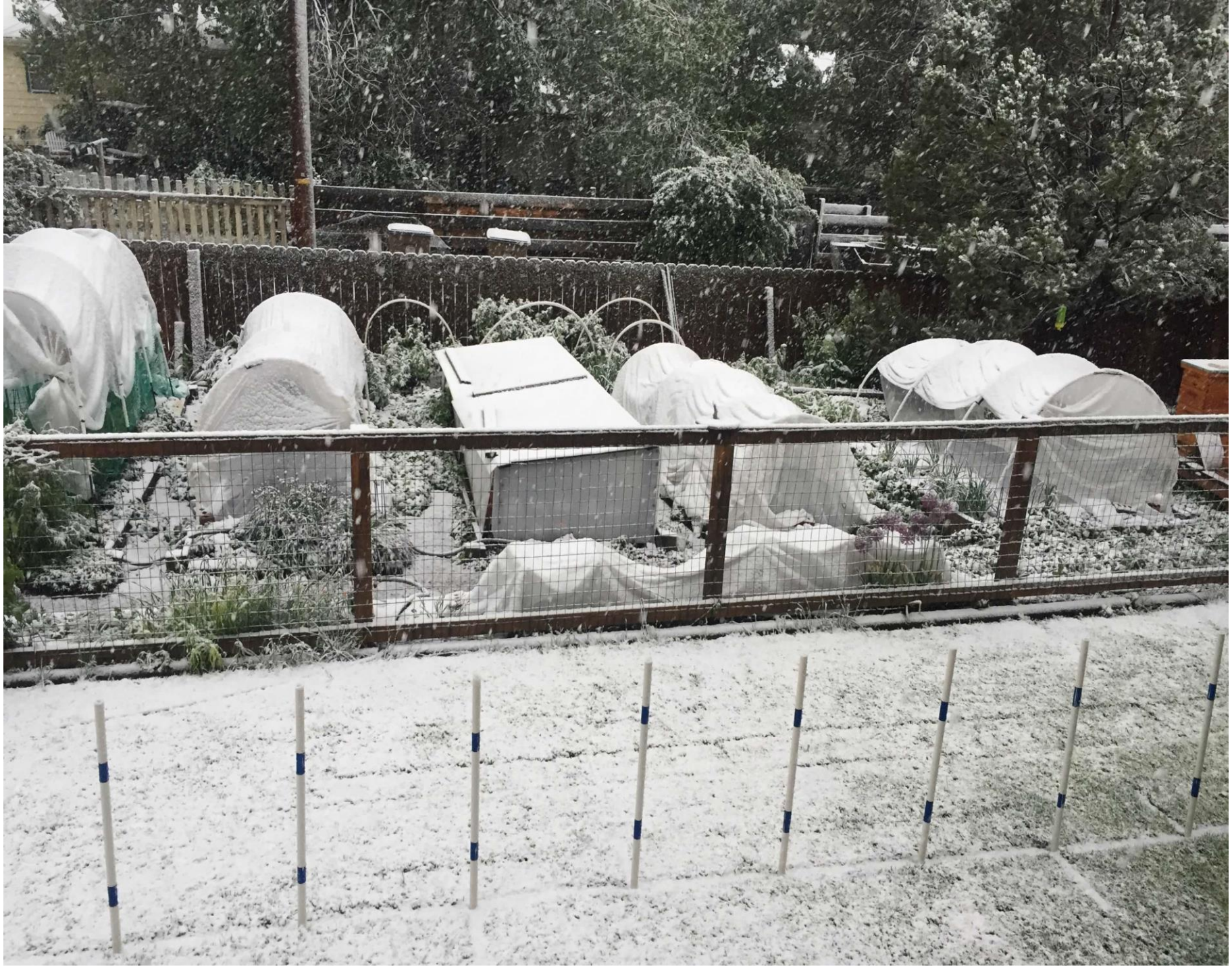
Sowing seeds outside.

This is extra difficult in Laramie - seeds like to be constantly moist and reasonably warm and have high humidity.

- Our bright cloudless days dry the soil rapidly, along with the low humidity and WIND. This results in the seeds dying or going into prolonged dormancy.
- Our Spring climate includes Spring—even JUNE—snowstorms and hail. One or two warm weeks and then a freeze. Last AVERAGE day of frost is June 10 .
- SOLUTIONS
- Plant next to a soaker hose and COVER with row cover to decrease evaporation and also keep birds away and warmth in.
- CHECK the long-range weather forecast.
- Don’t start too soon. Even check soil TEMP

Another problem with seeding outside.
These have been kept moist and at 65-70 day and night and it has taken 7 days to get this far .WEED seedlings are faster, stronger, and usually more adapted and take over rapidly when watered.

Icelandic poppy seedlings day 7 on left
Achillea white marshmallow on right
Delicate seedlings can be pampered inside.



SNOW EVENT
June 8 6pm
2020

Snow event
June 9, 7am
2020

May 18, 2017
Laramie gardeners definitely need to watch the weather.
Don’t rush to plant too early.
Protect the plants.

Hail event
June 17, 2019

SOLUTION #2

It takes much higher temperatures and moisture to germinate a seed than it does generally to maintain and grow seedlings/young plants.
Therefore it is possible to PRESPROUT or grow to a small seedling stage and then plant these out with protection.
This works great with peas, small brassica (bok choy, kale).
Larger seedlings can be grown for broccoli, brussels sprouts, cabbages, etc.

(DO NOT LEAVE in small pots too long or the plants can bolt.) It only takes about 4 weeks at room temperature to grow good kale, broccoli, etc. seedlings – the bigger ones do NOT transplant that well and may bolt.

The root system anchors a plant and absorbs water and minerals, it is important to develop a good root system – not stunted .

Presprouting Peas – it is going to take at least 5 days

FIRST – spread peas out on very wet paper towel and then cover with wet paper towel.

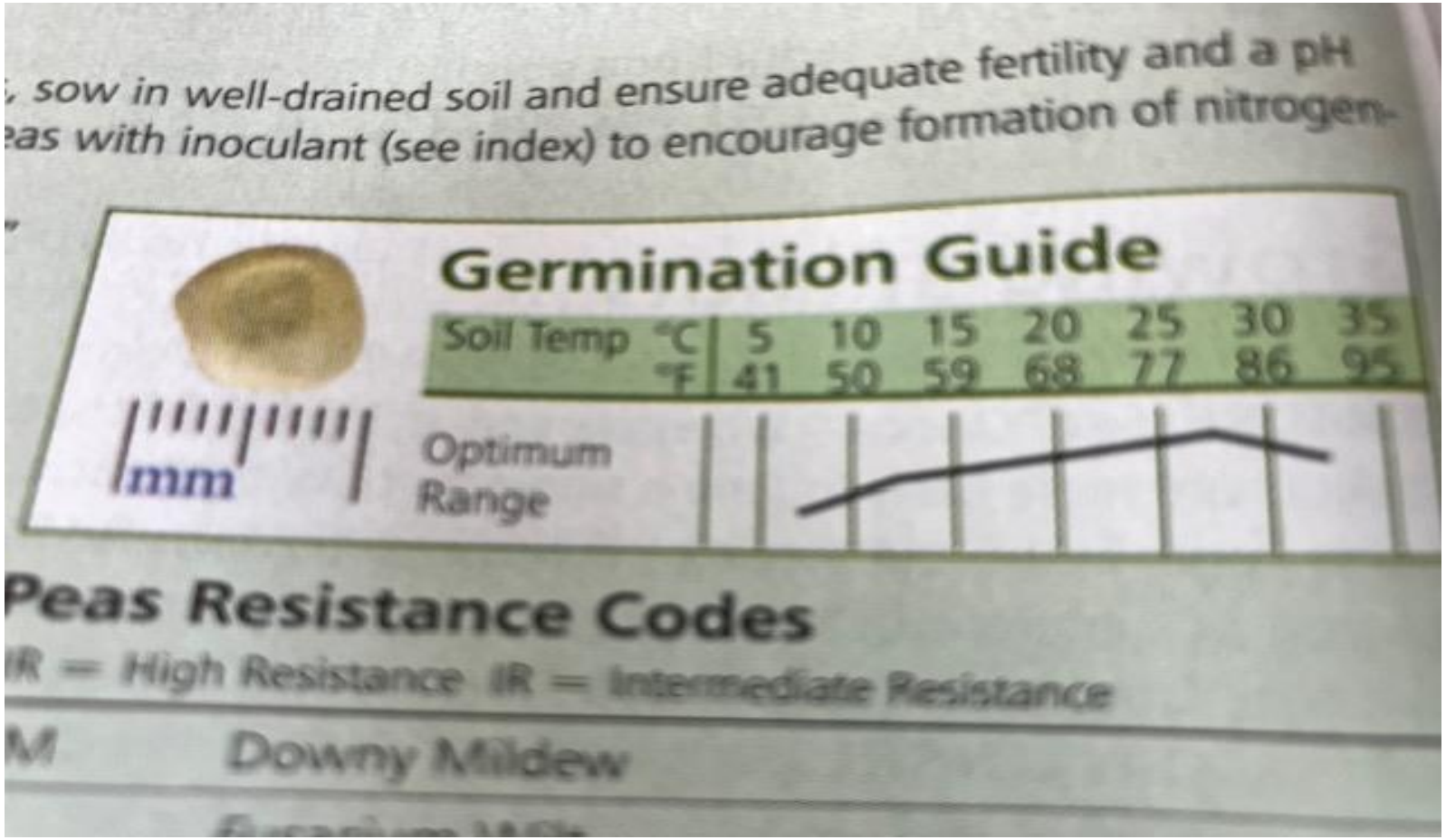
For the first part – the roots grow first and do NOT need light.

After the roots have grown somewhat, a green shoot appears – then they need light and need to be kept constantly moist until they are planted.

Second – have watering system ready, soil all ready, trenches or individual holes dug. Plant the sprouted pea so it is at least 1” deep and the roots reach down straight.

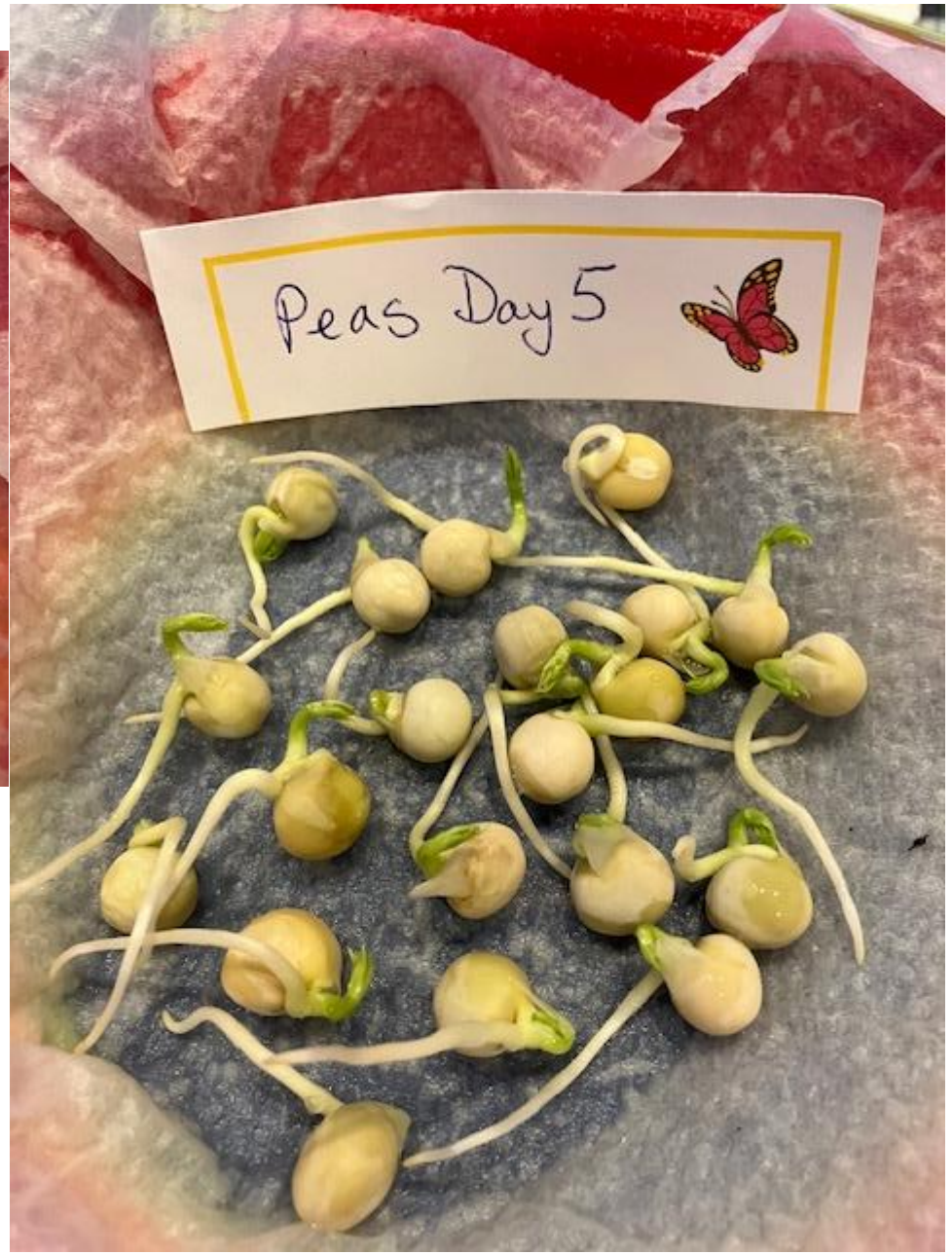
Third (optional) – cover with row cover for a few days depending on weather – to help harden off/acclimatize/protect from birds, etc.

Planting out peas like this can be done mid April – May. They will survive frost, snow, etc.



Growth of peas

Growth of Peas – day 3-5



It is possible to keep them longer , but you need to keep them watered which is 3-4x a day under a paper towel . Planting them make the hole a little longer than the root length.

BEANS

All beans are very frost sensitive and also NEED warm soil to germinate. (best 60F plus)
Like other seeds, they like moisture (constant).
If you plant too early because of warm weeks in May, and then it snows/freezes they will DIE if not protected.
Again it is a good idea to water well and have a watering system (e.g., soaker hose) set up.
Plant next to hose about 1" deep. Do not presoak.
Cover entire bed with a row cover to protect from climate (sun, hail, wind,) and BIRDS . Add BRICKs.
Remove row cover AFTER green leaves are seen.
Optimal soil temp for fastest germination is 86F.

Soil Temperature Conditions for Vegetable Seed Germination

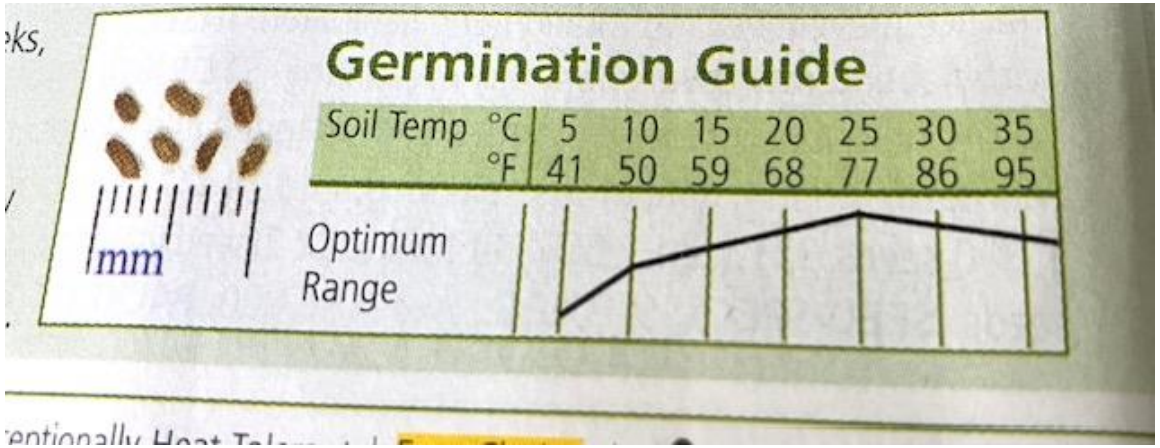
Vegetable	Soil Temperature (°F) Minimum	Soil Temperature (°F) Optimal Range	Soil Temperature (°F) Maximum	Soil Temperature (°F) Optimum
Asparagus	50	60–85	95	75
Bean, Lima	60	60–85	85	85
Bean, Snap	60	65–85	95	80
Beet	40	50–85	85	85
Cabbage	40	45–95	100	85
Carrot	40	45–85	95	80
Cauliflower	40	45–85	100	80
Celery	40	60–70	85	70
Chard, Swiss	40	50–85	95	85
Corn	50	60–95	105	95
Cucumber	60	60–95	105	95
Eggplant	60	75–90	95	85

YAYA

Sampler 8 48672 02710 5 Pack for 20

Seed Depth	Seed Spacing	Soil Temp for Germ.	Days to Germination	Thin Plants to
¼"	4 per inch	45-85°F	6-21	1-3"

Sowing Indoors-Not recommended.
Sowing Outdoors-Direct sow from March through mid-July. Carrots may be slow and erratic to germinate and the soil needs to be kept moist.
Growing Tips-Till or spade the bed deeply (12-16 inches) to allow roots to elongate and develop to their full size.
Fertilization Tips-Carrots require very little



To germinate carrot seeds, keep them WARM and MOIST.