

Selecting and Starting Seeds

Gretel Anspach
Lifetime Master Gardener
Massachusetts Master Gardener Association



 BURPEE.

2013

Territorial
SEED COMPANY

Performing
Seed, Plants,
Supplies

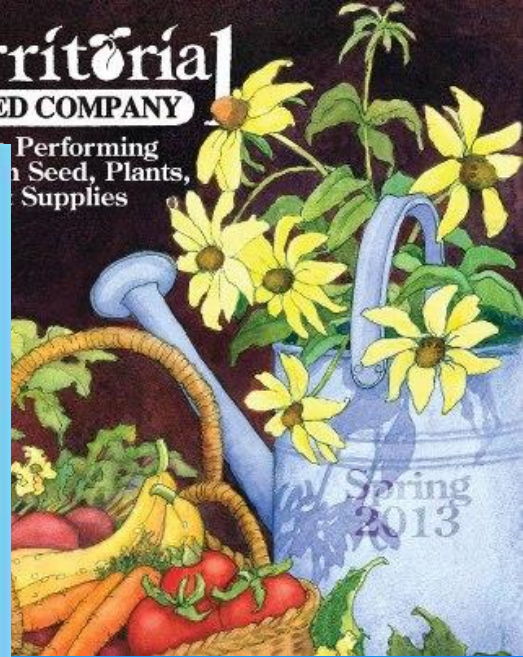
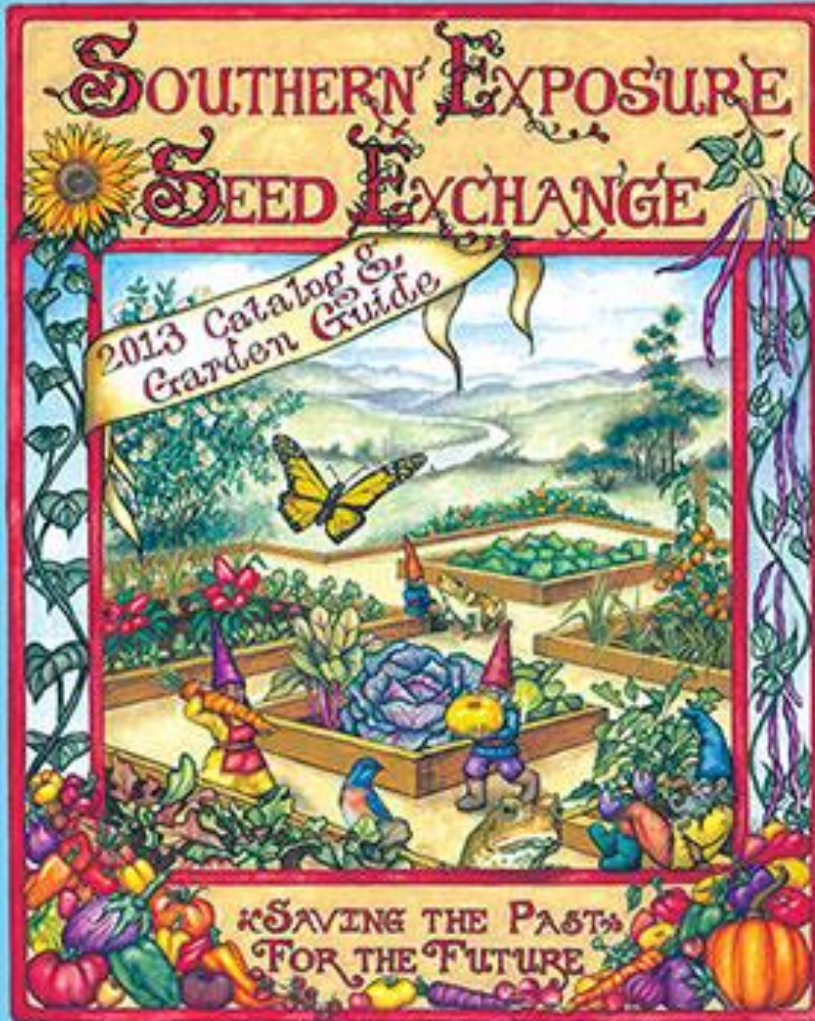
Baker Creek Heirloom Seeds
www.rareseeds.com



2013 PURE SEED BOOK



SAVE 10%
BECOME A MEMBER



Baker Creek Heirloom Seeds
2000 Pure Seed Book! www.bakercreek.com



The tradeoff

Start seeds because:

- Much more variety
- The latest cultivars
- Cheaper in quantity
- Can get the timing right
- Really cool!

Buy seedlings because:

- Don't have to fiddle with them all spring
- Takes less space inside
- Cheaper for small quantities
- Instant gratification



Martha Washington
Petunia
(may need to buy as
seeds)

Rose Wave™ Petunia
(available everywhere)



A compromise



Parsley, Plain Organic

Plain, flat, deeply cut dark green leaves with more pronounced flavor than Extra Curled Dwarf. Certified Organic.

Flat-leaved variety used in salad dressings, poultry, soups and as an ingredient of pesto. Flavor is much more pronounced than that of the more familiar curled type. Certified Organic Seed.

Sun: Full Sun, Part Sun

Height: 15-18 inches

Days to Maturity: 40-60 days

Sowing Method: Direct Sow/Indoor Sow

★★★★★ Be the first to **write a review**

Buy This Product

Item #	Order	Quantity	Price
60265A	1 Pkt. (600 seeds)	<input type="text" value="0"/>	\$4.95

 **ADD TO CART**

THE BURPEE GUARANTEE

WE PROMISE

If you are dissatisfied with your purchase let us know within a year, and we will refund your money or provide a replacement.

SHARE:



E-MAIL



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[How to Sow >](#)

How to Grow

How to Sow

Sow in full sun after danger of frost. In frost-free areas, sow from fall to early spring. Sow seeds thinly and cover with 1/4" of fine soil. Keep evenly moist. Seedlings emerge in 14-21 days.

- Some seeds can be sown directly outdoors
- It will say somewhere on the web site / catalog

Direct sowing versus starting indoors

Often direct sown

- Vegetables
 - Basil, Parsley
 - Beans, Peas
 - Corn
 - Cucurbits (Cucumbers, pumpkins, squash)
 - Leafy greens (lettuce, spinach)
 - Roots (beets, carrots, parsnips, turnips)
- Annuals
 - Annual asters
 - Bachelor buttons
 - California poppies
 - Marigolds
 - Nasturtium
 - Sunflowers

Almost never direct sown

- Vegetables
 - Brassicas (broccoli, cabbage, cauliflower)
 - Celery
 - Leeks, onions
 - Solanaceous (eggplant, peppers, tomatoes)
- Annuals
 - Dusty Miller
 - Geraniums
 - Impatiens
 - Pansies / violas
 - Snapdragons
 - Wax begonias

<http://extension.missouri.edu/p/G6570>

includes a nice table of when to start what, also a good source for more information

What does that mean?



Arikara Sunflower – heirloom



Holiday Sunflower – OP



Sunrich Orange Sunflower – F1



Zohar Sunflower – F1, OG

Terms – Heirloom

- Definition: A cultivar that originated at least 50 years ago
 - Or else at least 100 years ago
 - Or else before 1945
 - Or maybe it's 1951
 - Or maybe it was just handed down in a family
 - Or maybe it's just not a hybrid
- For sure:
 - Implication that it has more old-fashioned goodness and less commercial viability
 - Guaranteed it's open pollinated (not hybrid)

Terms – Open Pollinated vs Hybrid

Open pollinated



AA

x



aa

First generation
hybrid (F1)



Aa

2nd generation
hybrid (F2)



AA



Aa



Aa



aa

Terms – Organic (OG)

- Definition: Seeds grown per the rules of the USDA National Organic Program
 - Using only certified organic fertilizers and pesticides for several years on that land.
 - Does not mean no pesticides!
- Why buy organic seed?
 - Retain organic certification on your property
 - Support the concept of organic agriculture
- Why not buy organic seed?
 - Costs more (~15%)
 - Organic not always available
 - Minute amount of residual pesticide on seed probably not even measurable on grown plant

Size	Cost Conventional *	Cost Organic *	Organic / Conventional
175 seeds (pkt)	\$5.15	\$5.40	1.05
1,000 seeds	\$6.45	\$8.75	1.36
5,000 seeds	\$18.10	\$35.75	1.98
25,000 seeds	\$65.25	\$153.50	2.35
100,000 seeds	\$243.00	\$496.00	2.04

* Provider beans, Johnny's Selected Seeds, January 2022

Getting started

- Decide what to grow – and how much!
- Figure out where to do this.
- Figure out when to do this.
- Get the plants, pots, growing media, etc.
- Read the seed packet
- Figure out when to start
- Get going!

What are your goals?

If your goal is	Organic	Conventional	Species	Open pollinated cultivar	Hybrid cultivar
Saving seeds	OK	OK	Yes	Yes	No
Massive production	OK	OK	Maybe	Maybe	Probably
Disease resistance	OK	OK	Maybe	Maybe	Probably
Taste / aroma	OK	OK	Maybe	Maybe	Maybe
Preserving biodiversity - food	OK	OK	Maybe	Yes	No
Preserving biodiversity - environment	OK	OK	Yes	Maybe	No
Preserving organic certification	Yes	If organic not available	OK	OK	OK

Do some research – veg

- Production:
 - Cornell Vegetable Growing Guides
(<http://www.gardening.cornell.edu/homegardening/sceneb771.html>)
 - New England Vegetable Growing Guides
(<https://nevegetable.org/crops>)
- Disease resistance:
 - Web search of disease trials
- Variety / Timing / Flavor
 - Seed Savers Exchange (9,153 tomato listings versus 134 in Johnny's)
 - Cornell Vegetable Varieties
(<http://vegvariety.cce.cornell.edu/main/login.php>)
 - All American Selections
 - (calibrated) Seed Catalogs

Host (Latin Name)	Disease Resistance	Species and Cultivars with Noted Resistance
annual geranium (<i>Pelargonium</i> spp.)	bacterial leaf spot and stem rot	Lady Washington and Martha Washington (<i>P. domesticum</i>), Madame Loyal and Marie Vogel (<i>P. x domesticum</i>), Toronto, Peppermint (<i>P. tomentosum</i>), Countess of Scarborough (<i>P. scarboroviae</i>)
begonia (<i>Begonia</i> spp.)	bacterial leaf spot and blight	Rex and tuberous begonias are less severely infected than Rieger begonias. The least susceptible Rex include Duarten, Helen Teupel, Marion Louise, Pauline, Peace, Red Dot, Vesuvius
annual vinca, periwinkle (<i>Catharanthus</i>)	Phytophthora aerial blight	Cora and Nirvana series, Little Bright Eye, Little Linda, Little Pinkie
marigold (<i>Tagetes</i> spp.)	Alternaria leaf spot	Golden Guardian, Doubloon
pansy (<i>Viola</i> spp. and hybrids)	Cercospora leaf spot	Bingo Red & Yellow, Crown Blue, Crown Golden, Crystal Bowl Supreme Yellow, Crystal Bowl True Blue, Dynamite Red & Yellow, Majestic Giants Yellow, Sorbet Blackberry Cream Pansy Patiola series cultivars (Purple Passion, Pu Yellow, Pu Lemon, Pu Orange) were less susceptible to leaf spot than Colossus series cultivars
petunia (<i>Petunia</i> spp.)	botrytis flower blight	Fantasy Blue, Tidal Wave Hot Pink
annual phlox (<i>P. drummondii</i>)	powdery mildew	Most annual phlox are powdery mildew resistant
snapdragon (<i>Antirrhinum</i> spp. and hybrids)	rust	Few verified reports. Wisley Golden Fleece, White Monarch, and Orange Glow are resistant to most forms of the fungus Other reportedly resistant cultivars include the Rocket series and Amalia series
verbena (<i>Verbena</i> spp. and hybrids)	powdery mildew	Verbena Aztec Violet, Laskar Light Pink, Empress Strawberry, Tukana Deep RedBurgundy, Dark Blue Lascar White, Rapunzel Lilac, Aztec Dark Red, Coral, Pink Shades
zinnia (<i>Zinnia</i> spp. and hybrids)	powdery mildew	Oklahoma, Profusion, Crystal White, Ruffles, Panorama Red, State Fair

Do some research – ornamental

- Which species?
 - Beecology project (<https://gegearlab.weebly.com/plant-list.html>)
 - Missouri Botanical Garden plant finder
- Which cultivar?
 - All American Selections
 - Nurseries & botanical gardens
 - (calibrated) Seed Catalogs



Yellow Pear Tomato

“Enormous number”
“deliciously tangy”.

- *Burpee*

“tall, vigorous vines”
“Mild flavor”

- *Johnny’s Selected Seeds*

“loaded with hundreds of
... fruit”

- *Territorial Seed Company*

Sun Gold Tomato



“sweet-tart”
“large clusters”
“sweet and delicious”

- *Burpee*

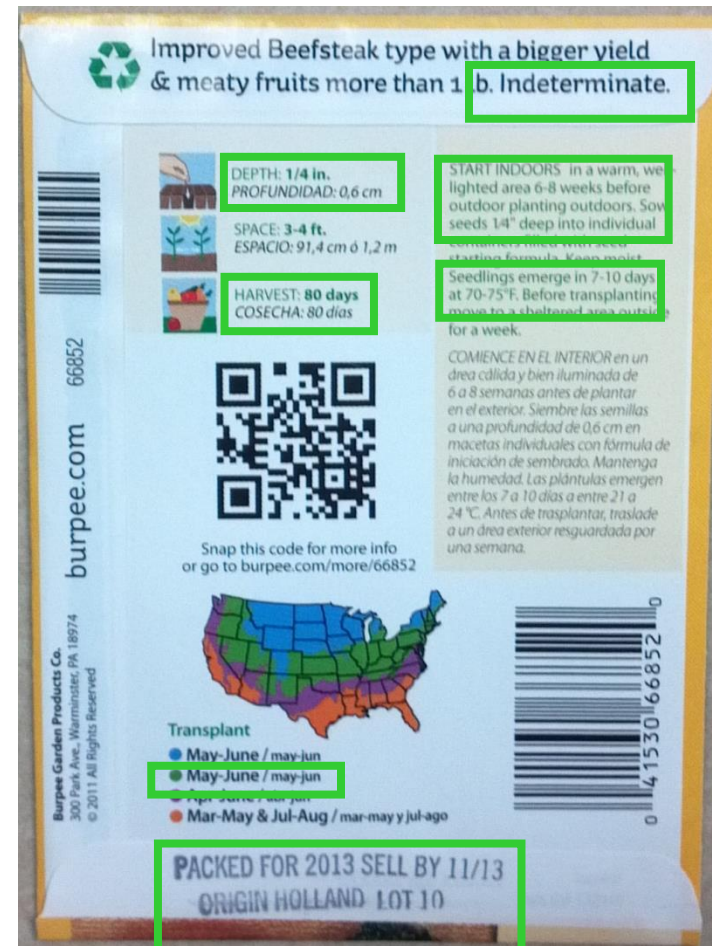
“Exceptionally sweet”
“Vigorous plants”
“taste can't be beat”

- *Johnny’s Selected Seeds*

“flavor is a big hit”
“vigorous indeterminate vines”

- *Territorial Seed Company*

Read the seed packet!



250-380 seeds per gram: 400 mg = 100-152 seeds

When to start

- Not too early
 - Direct seeded plants may be frost-killed or delayed
 - Indoor seeded plants can take overgrow available space
 - Plants can usually get caught up from a late start
- Consider soil temperature as well as air temperature
- Consider planting date – vacation schedule, etc.

When to start seeds



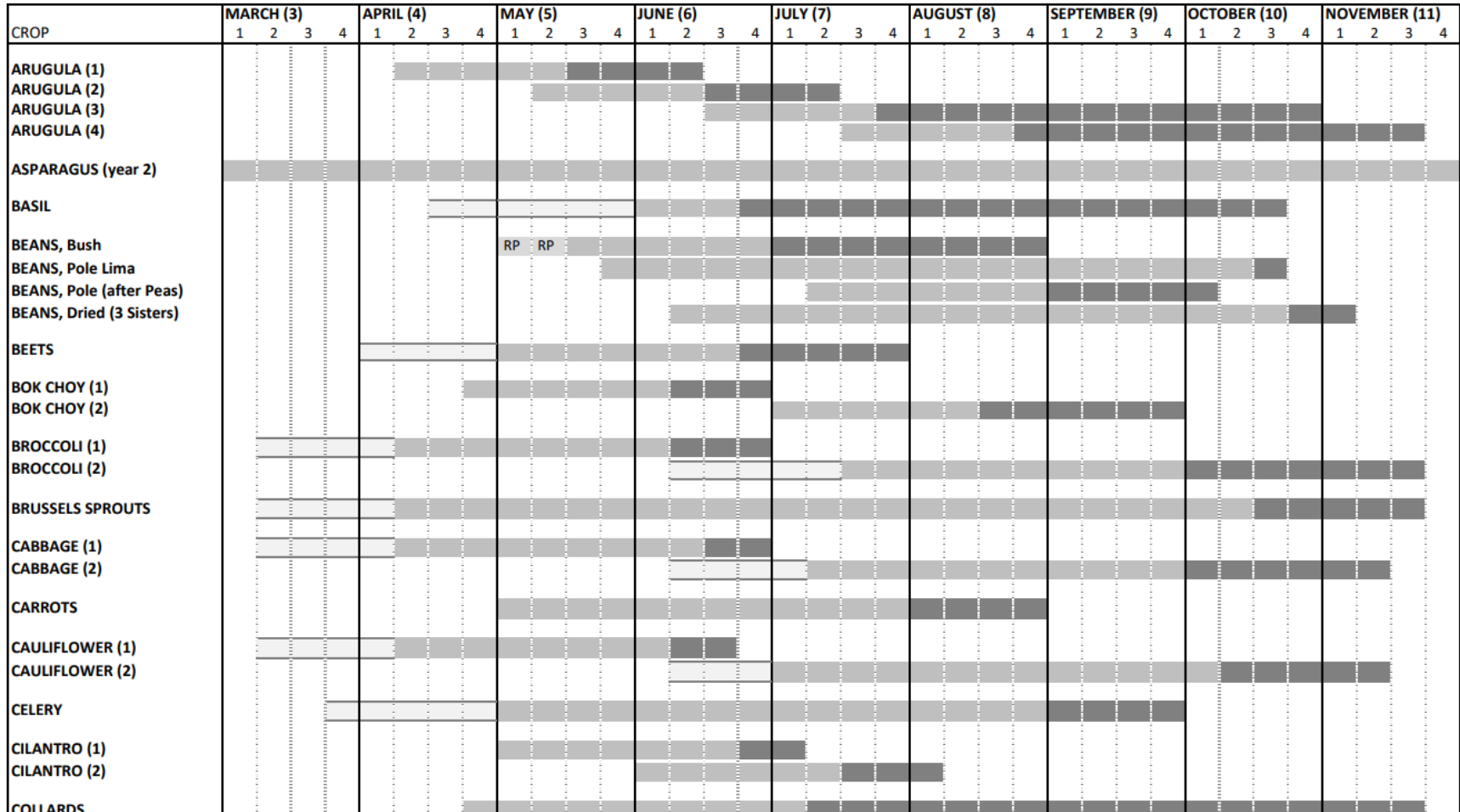
50% last frost date from derived from “NCDC freeze frost”

Estimated planting dates in zone 5 in <http://extension.missouri.edu/p/G6570>

Borrow someone else's schedule

2022 Robbins Farm Garden Gantt Chart

XXX XXX XXX Failed crop Indoors or nursery bed In main garden Harvesting in garden

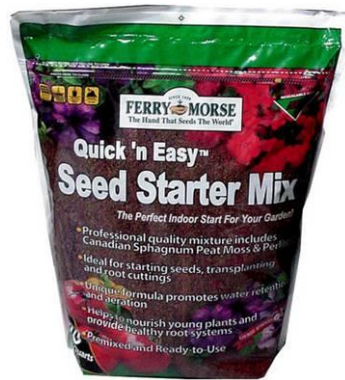


Cost



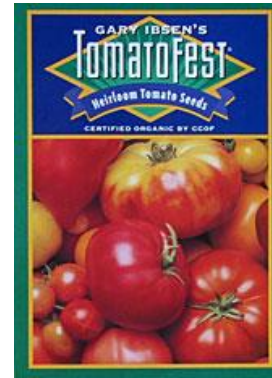
4" plastic pot
68c each

+



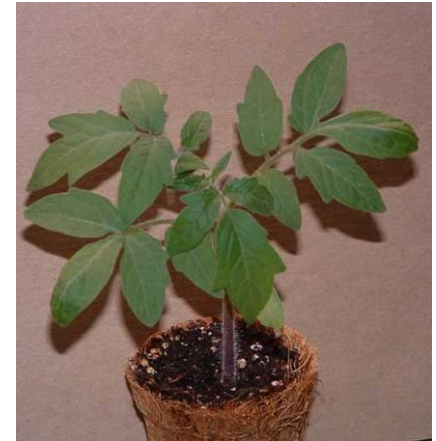
Seed starting mix
\$6.98/8 quart bag

+



Tomato seeds
\$5.95/pack
(35-40 seeds)

=



Number of plants	Pots	Seed starting mix	Seeds	Total cost	Cost per plant
1	\$0.68	\$6.98	\$5.95	\$13.61	\$13.61
20	\$13.60	\$6.98	\$5.95	\$26.53	\$1.33

Required Equipment – “Dirt”

- Seed Starting Mix a.k.a. Soil-less mix
 - Sterile – no fungus, no bugs
 - Very light – easy for seedlings to push through
 - Generally peat moss, perlite, vermiculite
- You can use potting mix
 - Generally heavier, a bit harder for seedlings to deal with
- DO NOT USE garden soil

Required Equipment - Pots



Jiffy-7



Peat pots



Newspaper pots

Seed starting One
plant per pot



Plastic flower pot



20 row seedling flat

Seed starting Many
plants per pot



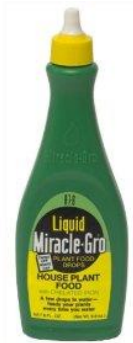
Flower pot



Large flat

Final stage
One plant per pot

Required Equipment – Fertilizer



- Any balanced liquid fertilizer will do
 - Balanced means that the three numbers (Nitrogen, Phosphorus, Potassium) are about the same (e.g. 5-5-5)

Required Equipment – Misc.



Labels

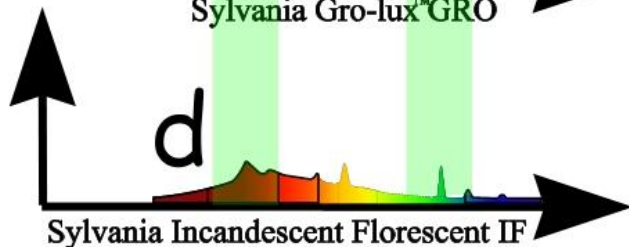
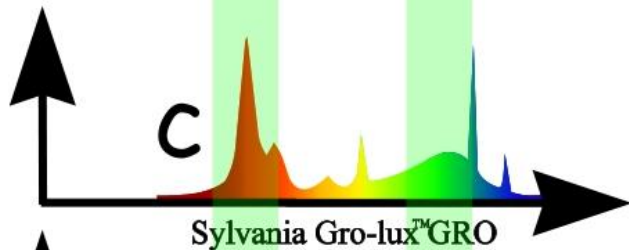
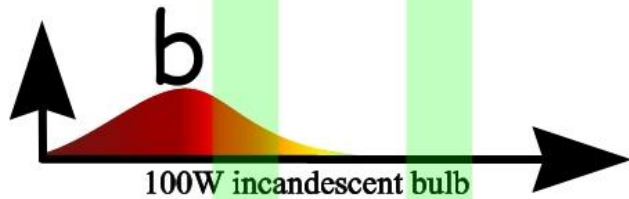
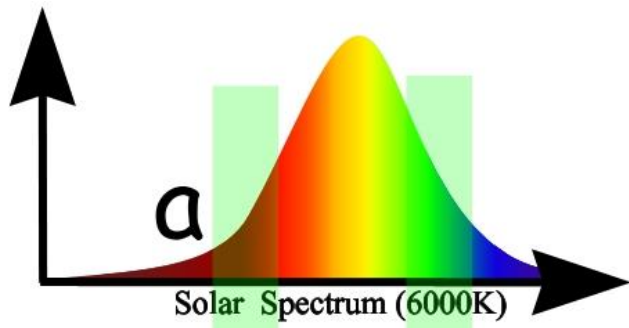
- Label when you plant, not the next day, because
- You will not remember which seeds you planted where, and
- All seedlings look alike



Watering tray

- Seedlings need to be watered a lot
- Bottom watering is best

Equipment you probably need – Light



If you have a sunny window or a greenhouse, you may not need supplemental light

Otherwise get a 4' shop light

- Cool white bulbs
- Each light handles an area about 1' wide x 3.5' long
- Light is cool so it can be adjusted to almost touch the plants



Another reason for artificial light



Optional Equipment – Heat

- Seeds germinate fastest if soil temperature is about 75 degrees
- Options:
 - Radiator, refrigerator with heating element on top
 - Seedling heat mat (~\$15)
 - Don't bother (they'll germinate soon enough)

Plant	Advertised germination time	Actual w/ heat mat
Alyssum	7 days	2 days
Calendula	10-14 days	2 days
Chamomile	7-14 days	3 days
Geranium	14 days	3 days
Kale	5-10 days	2 days
Lettuce	2-14 days	2 days
Marigold	7 days	2 days



How many seeds to start?

- Consider
 - How many plants you want
 - Area
 - Plant separation
 - Germination rate

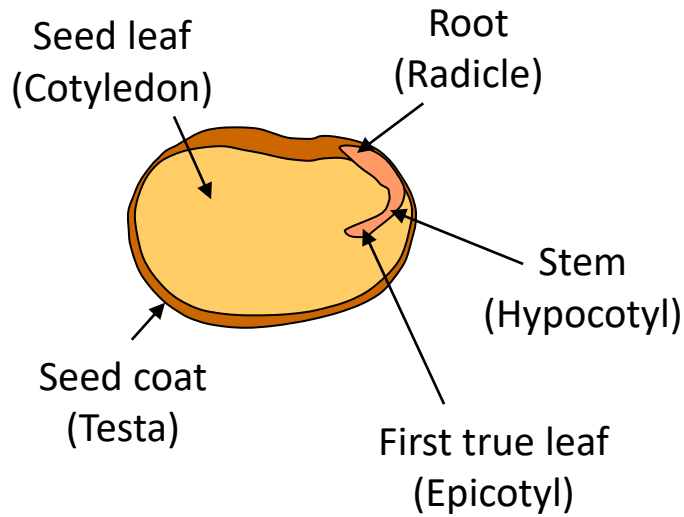
- For example

	Rows/bed	Separation in row	plants per bed-foot	Germination rate *	seeds per bed-foot	Row length	Start this many seeds
Eggplant	1	24"	0.5	60%	0.83	20	17
Leek	4	6"	8	60%	13.33	20	267
Pepper	1	18"	0.67	55%	1.22	20	24
Tomatillo	1	24"	0.5	50%	1.00	20	20
Tomato	1	24"	0.5	75%	0.67	20	13

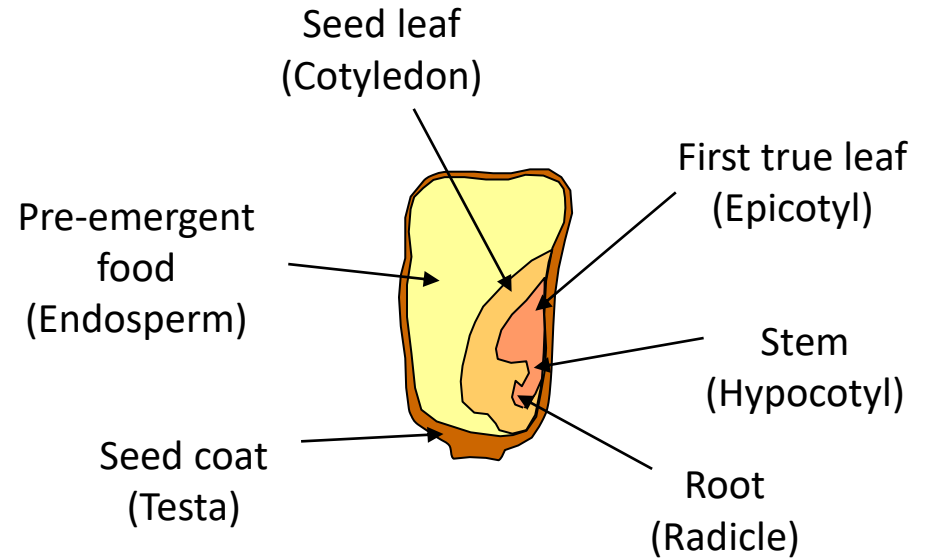
* Germination rates from

http://www.webgrower.com/information/seed_germ_standards.html

What's in a seed?



Bean Seed

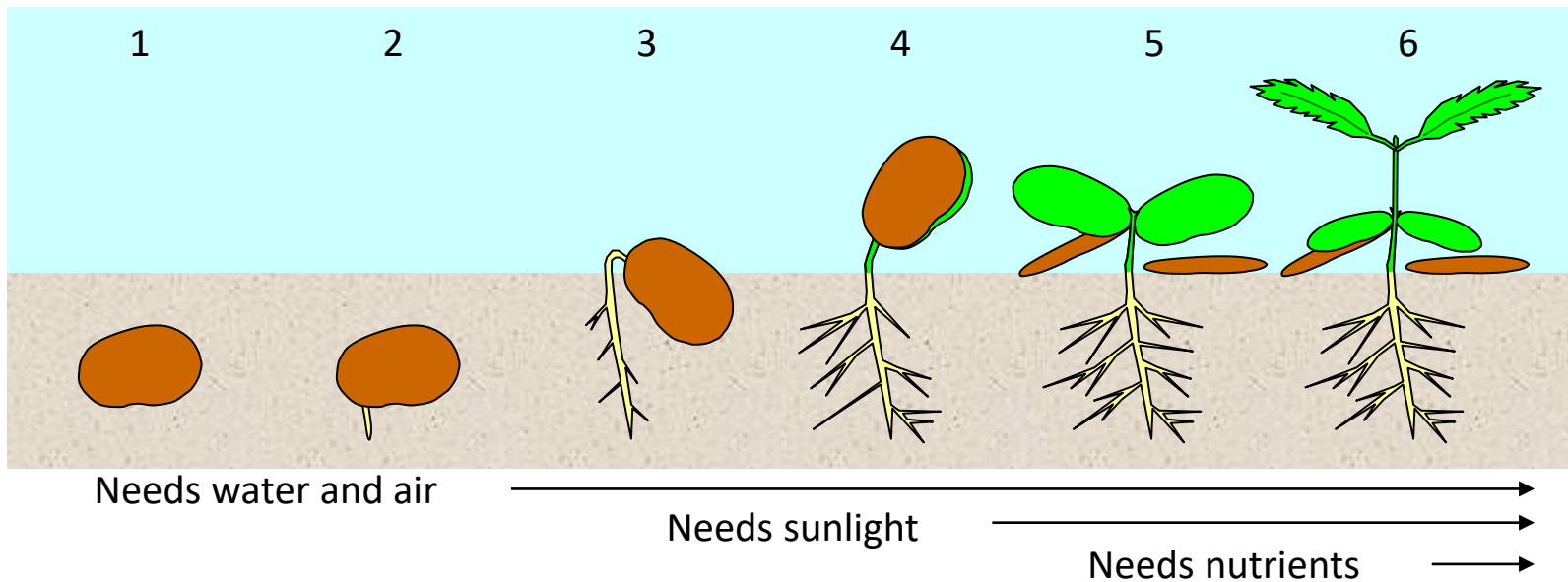


Corn Seed



How seeds sprout

- 1) The seed is planted. The seed coat begins to absorb water.
- 2) The root pushes through the seed coat into the soil.
- 3) More roots begin to develop. The stem forms a hook pulling the seed through the surface of the soil.
- 4) The stem straightens out, pulling the rest of the seed above ground.
- 5) The seed opens and the seed leaves deploy. The seed coat may drop off.
- 6) The stem gets longer and the first true leaves emerge. The seed leaves eventually fall off.



Growing 1 Pepper – planting

- Start in late March or early April
- Pour hot water on a Jiffy-7 pot till the pot puffs out and looks dark
- Make sure the pot is right-side up.
- Scratch a shallow hole in the top of the pot
- Drop in 2 seeds
- Shove the dirt over the seeds and squeeze a bit to make sure there is good soil-seed contact.

Growing 1 Pepper – germinating

- Put the pot in a very bright window and rotate the pot every few days to keep the seedlings growing up.
OR
- Put a fluorescent light directly above the seedlings (1 inch away)
- Keep an eye on the pot, looking for a bit of green poking up from where the seeds went in
- If you put the pot over a heat source (~ 70 degrees) the seeds will germinate quicker.
- Add water (bottom-water) if the pot doesn't feel cool.

Growing 1 Pepper – early growth

- Keep the light on 16-18 hours per day, off the rest of the time
- Water the pot when it feels warm.
- When the true leaves appear, add half-strength liquid fertilizer every time you water.

Growing 1 Pepper – the tough part

- With scissors, cut off the weaker of the two seedlings at the base.
- The alternative is to plant only one seed per pot, and throw out the pots where no seed germinated.

Growing 1 Pepper – transplanting

- When the roots grow through the side of the pot, it's time to put the seedling in a larger pot.
- Put about 1" of potting mix or seedling mix in the bottom of a 4" pot and firm it down.
- Strip the plastic mesh off the outside of the peat pot and set in the larger pot.
- Add more potting mix to fill the pot. The seedling should be planted at the same depth as before, and there should be $\frac{1}{4}$ " to $\frac{1}{2}$ " space at the top of the pot for watering.
- Water the pot till the water runs out the bottom.

Growing 1 Pepper – more growing

- Put the pot in a very bright window and rotate the pot every few days to keep the seedling growing up. OR
- Put a fluorescent light directly above the seedling (1 inch away)
- Water the pot when the soil feels warm. Add half-strength liquid fertilizer every time you water.

Growing 1 Pepper – hardening off

- About 1 week before you want to plant the outside, start hardening the plant off.
- Place the plant outside in the shade (tree shade, house shade, shade-cloth, etc)
- Water the pot when the soil feels warm. Add half-strength liquid fertilizer every time you water.

Growing 1 Pepper – planting out

- Dump the seedling out of the pot. If any roots are wrapping around the inside of the pot, pull them loose.
- Plant the plant in moist garden soil, preferably on a cloudy day.
- Water the plant in after planting to eliminate air pockets.
- Water weekly unless it rains.

Growing 25 Peppers – planting

- Start in late March or early April
- Fill a 4” pot with moist seedling mix.
- Scatter the seeds over the top of the soil.
- Cover the seeds with $\frac{1}{4}$ ” of seedling mix and firm it down to make sure there is good soil-seed contact.

Growing 25 Peppers – germinating

- Put the pot in a very bright window and rotate the pot every few days to keep the seedlings growing up.
OR
- Put a fluorescent light directly above the seedlings (1 inch away)
- Keep an eye on the pot, looking for a bit of green poking up from where the seeds went in
- If you put the pot over a heat source (~ 70 degrees) the seeds will germinate quicker.
- Add water (bottom-water) if the pot doesn't feel cool.

No differences

Growing 25 Peppers – early growth

- Keep the light on 16-18 hours per day, off the rest of the time
- Water the pot when it feels warm.
- When the true leaves appear, add half-strength liquid fertilizer every time you water.

No differences

Growing 25 Peppers – transplant

- When the seedlings in the pot look crowded, it's time to separate them.
- Slide the root ball out of the pot and drop it gently on its side. This will loosen the root ball.
- Grab each seedling by a seed leaf and tease it out of the clump.
- Plant the seedling at the same depth it was growing in seed starting mix or potting mix in a larger pot
- If you put each seedling in a 2" pot, you will need to repot them again. If you put them in a 4" pot, it will take up a lot of space for a much longer time.

Cold Stratification

- Late fall / early winter plant seeds in damp sand or peat or 50-50 blend
- Store pot in fridge for at least 2.5 months
- Remove from fridge, add light, and start growing
- Or else plant outside in fall

Recommended for

Milkweed (*Asclepias*)

Lupine (*Lupinus*)

Pincushion Flower (*Scabiosa*)

Perennial sunflowers (*Helianthus*)

Spider Flower (*Cleome*)

...and many more



PRODUCT DESCRIPTION

Spider Plant Seeds - Mauve Queen - Cleome

This beautiful Mauve Pink bloom is sure to be a crowning jewel in your garden, especially if you live in a hot, southern region! Cleome are lovely and tenacious, but can be difficult to establish from seed. We advise cold stratifying your seeds before planting for best success!



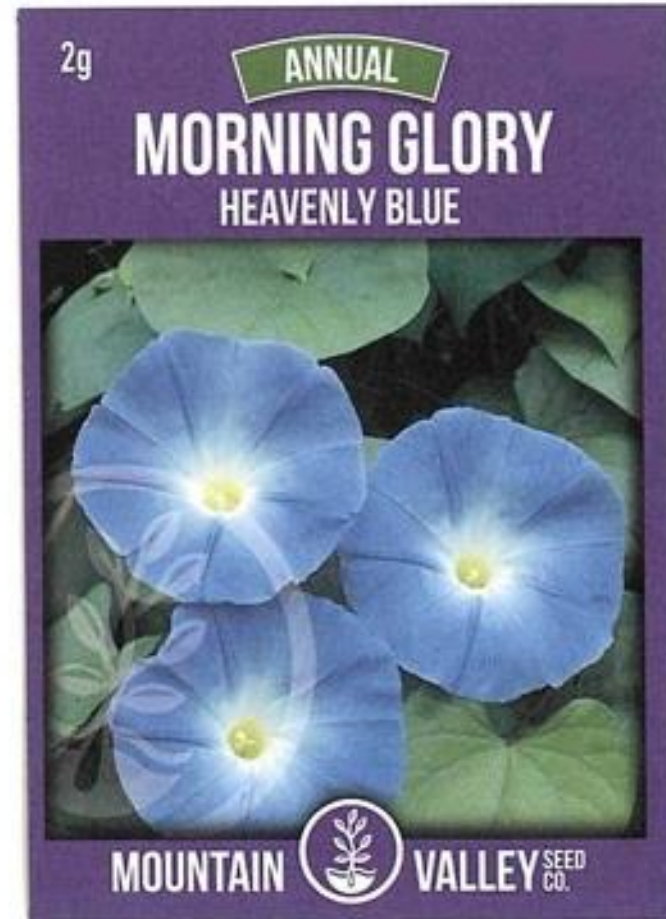
FAST FACTS



Soaking or Scarring

- Soak seeds overnight just before planting, or
- Scratch seed coating with sandpaper or knife

Recommended for
Joe Pye Weed
Lupine
Milkweed
Morning Glories
Nasturtiums
...and many more



To cover, or not to cover

- Some seeds require light to germinate
- Some seeds require dark to germinate
- Some are somewhat flexible

	Light (1)	Germination Temperature (2)	Growing Temperature (2)	Crop Time (3)
Annuals				
Snapdragon	L	70-75	60-65	8-10
Wax Begonia	L	70-75	60-65	10-12
Periwinkle (Vinca)	C	75-80	70-75	8-10
Celosia	C	75-80	70-75	7-9
New Guinea Impatiens	LC	75-80	70-75	8-10
Geranium	C	70-75	65-70	10-12
Petunia	L	75-80	65-70	8-10
Scarlet Sage (Salvia)	L	75-80	70-75	8
Coleus	L	70-75	65-70	8-10
Marigold	C	70-75	65-70	6-8
Pansy	LC	65-70	60-65	8-10
Zinnia	C	70-75	65-70	4-6

L = requires light
C – cover
LC – lightly cover

<https://hortnews.extension.iastate.edu/2017/01/seed-germination-guide>

Marigolds

Annual
Anual



BURPEE[®]

MARIGOLD

Jaguar

CALÉNDULA *Jaguar*

\$1.99
155 mg.

Marigold Scarlet Starlet
Caléndula Estrellita Escarlata



• Cheery Single Blooms • Ht. 12"



burpee.com

Full Sun



Pleno Sol

1/4 in.



1/2 cm

9-12 in.



23-30 cm

10 in.



25 m

Pétalos de color rojo bronce, delicadamente bordeados en color dorado, que rodean una corona de centros color amarillo contrastante. Las plantas, tupidas y enanas, son ideales para los bordes de los macizos. Anual.
SEMBRAR en tierra común a pleno sol después de que pase el peligro de helada. En zonas libres de heladas, sembrar desde el otoño hasta el comienzo de la primavera. Sembrar las semillas separadas por una distancia de 15 cm y cubrir con una capa de medio centímetro de tierra de buena calidad. Apisonar suavemente y mantener la humedad en forma pareja. Las plántulas aparecen en 7-14 días.

W. Atlee Burpee & Co.
300 Park Ave., Warminster, PA 18974
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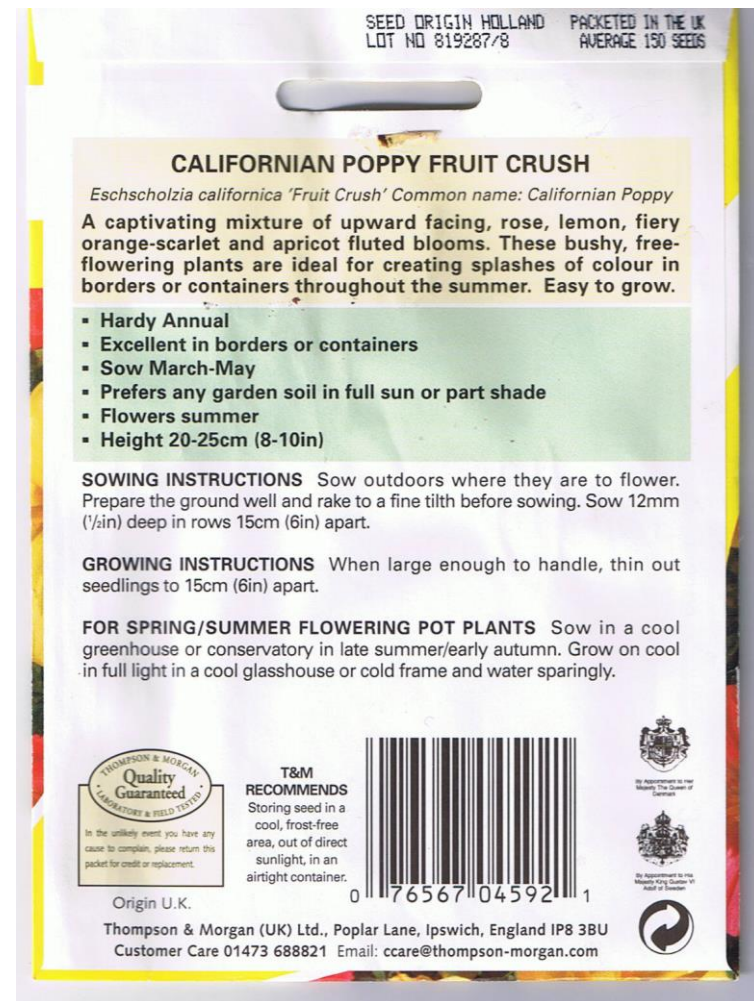
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★

PACKED FOR 2010 SELL BY 11/10
ORIGIN USA LOT 3

“Sow in average soil after danger of frost” means time from seed to bloom is relatively short (6-8 weeks)

Poppies



“Sow outdoors where they are to flower” means they hate to have their roots disturbed. The “growing 1 ...” approach will work. The “growing 25...” will not.

What can go wrong

- Dry seedling mix / potting soil will shed water. If you start seeds in dry mix, get a mister and keep misting the soil with warm water till it finally starts absorbing the water
- If you get the seeds wet and then let them dry out, they will die. They are very vulnerable from the time growth starts till when the first 2 true leaves appear.
- If you don't give the plants enough light, they will get very gangly. You can mitigate this somewhat when the plant is bigger by pinching the plant to encourage branching, but it is better to avoid.
- If you let the plant get root bound, it will never be as strong as if you can let it grow unbound.
- If you cover the seeds with a clear dome, it increases the chances of damping-off disease.

Resources

- How to start seeds
 - <https://extension.umn.edu/planting-and-growing-guides/starting-seeds-indoors#watering-and-fertilizing-1179613>
- How long do seeds last
 - <https://www.johnnyseeds.com/on/demandware.static/-/Library-Sites-JSSSharedLibrary/default/dw913ac4d0/assets/information/seed-storage-guide.pdf>
- Timing for vegetables
 - <http://www.gardening.cornell.edu/homegardening/sceneb771.html>
 - <https://nevegetable.org/crops>
 - <https://robbinsfarmgarden.org>
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 - All American Selections
 - Beecology project (<https://gegearlab.weebly.com/plant-list.html>)
 - Missouri Botanical Garden plant finder
- Seed Longevity
 - <https://extension.colostate.edu/topic-areas/yard-garden/storing-vegetable-and-flower-seeds-7-221/>

Questions?

What is “sufficient” separation?

Allium ampeloprasum	Leeks	1 mile
Beta vulgaris	Beets, Swiss Chard	1/2 mile
Brassica oleracea	Broccoli, Brussels Sprouts, Cauliflower, Cabbage, Kale	1 mile
Brassica rapa	Turnip	1/2 mile
Capsicum annuum/baccatum/frutescens	Peppers	500' or insect proof
Citrullus lanatus	Watermelon	1/4 mile
Cucumis melo / sativa	Melons, cucumbers	1/4 mile
Cucurbita argyrosperma / maxima / ficifolia / moschata / pepo	Squash, pumpkins, gourds	1/4 mile
Daucus carota	Carrots, Queen Anne's Lace	1/4 mile
Eruca sativa	Arugula	1/4 mile
Lactuca sativa	Lettuce	25 feet
Phaseolus lunatus	Lima beans	1 mile
Phaseolus vulgaris	Beans	almost 0
Pisum sativum	Peas	50 feet
Solanum lycopersicum / pimpinellifolium	Tomatoes	"Length of the garden"
Solanum melongena	Eggplant	1/4 mile or insect proof
Zea mays	Corn	1 mile