



University of Idaho  
Extension



**Growing in Northern Idaho**

# SEED STARTING ESSENTIALS FOR THE HOME GARDENER

Presented by:

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Certified Idaho Master Gardener  
Owner, The Coeur d'Alene Coop



## HUMBLE BEGINNINGS...

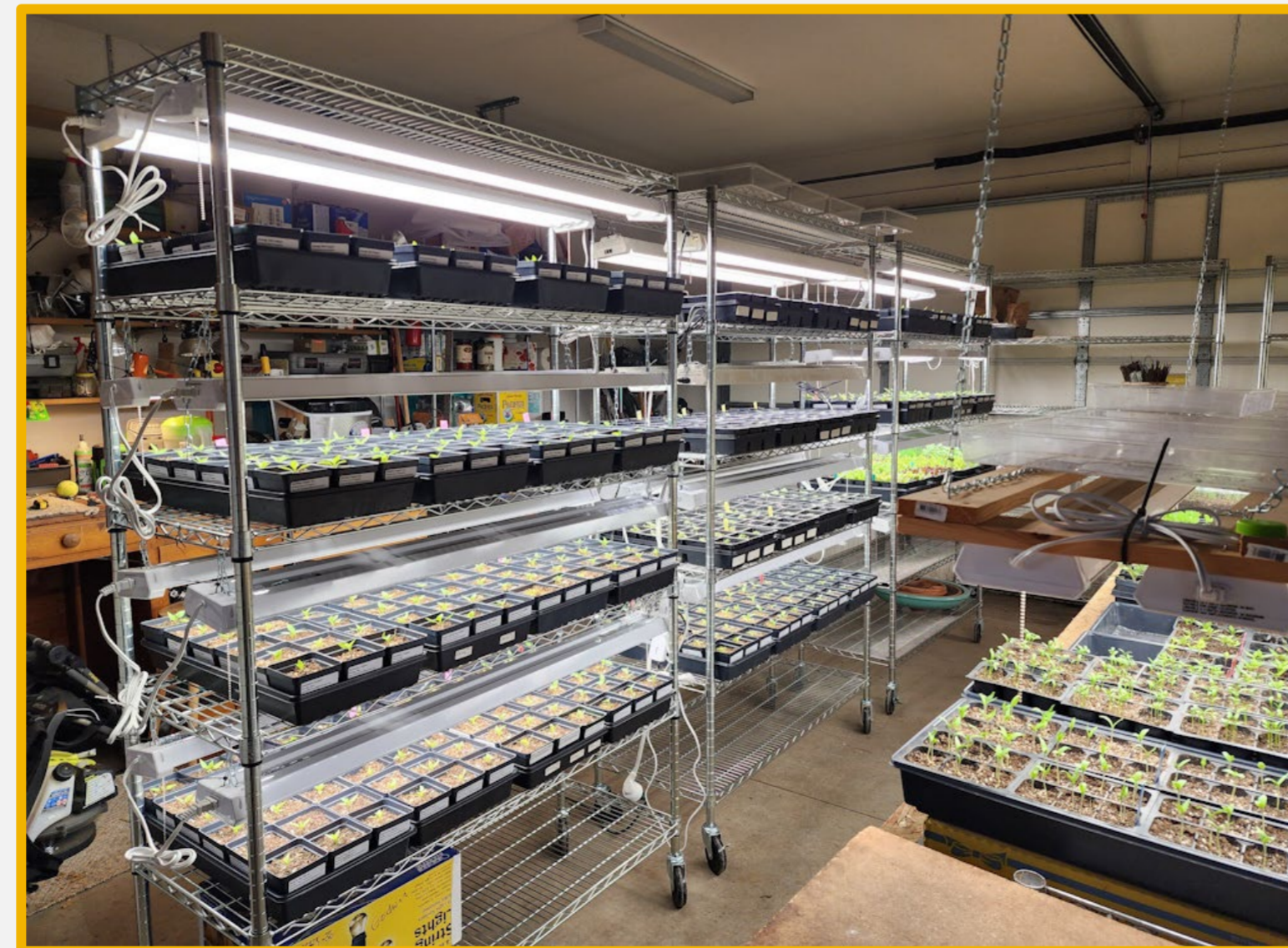
A packet of tomato seeds and a sunny, south-facing window...





**TODAY...**

A dedicated growing garage and a greenhouse!



**WORDS TO GARDEN BY...**

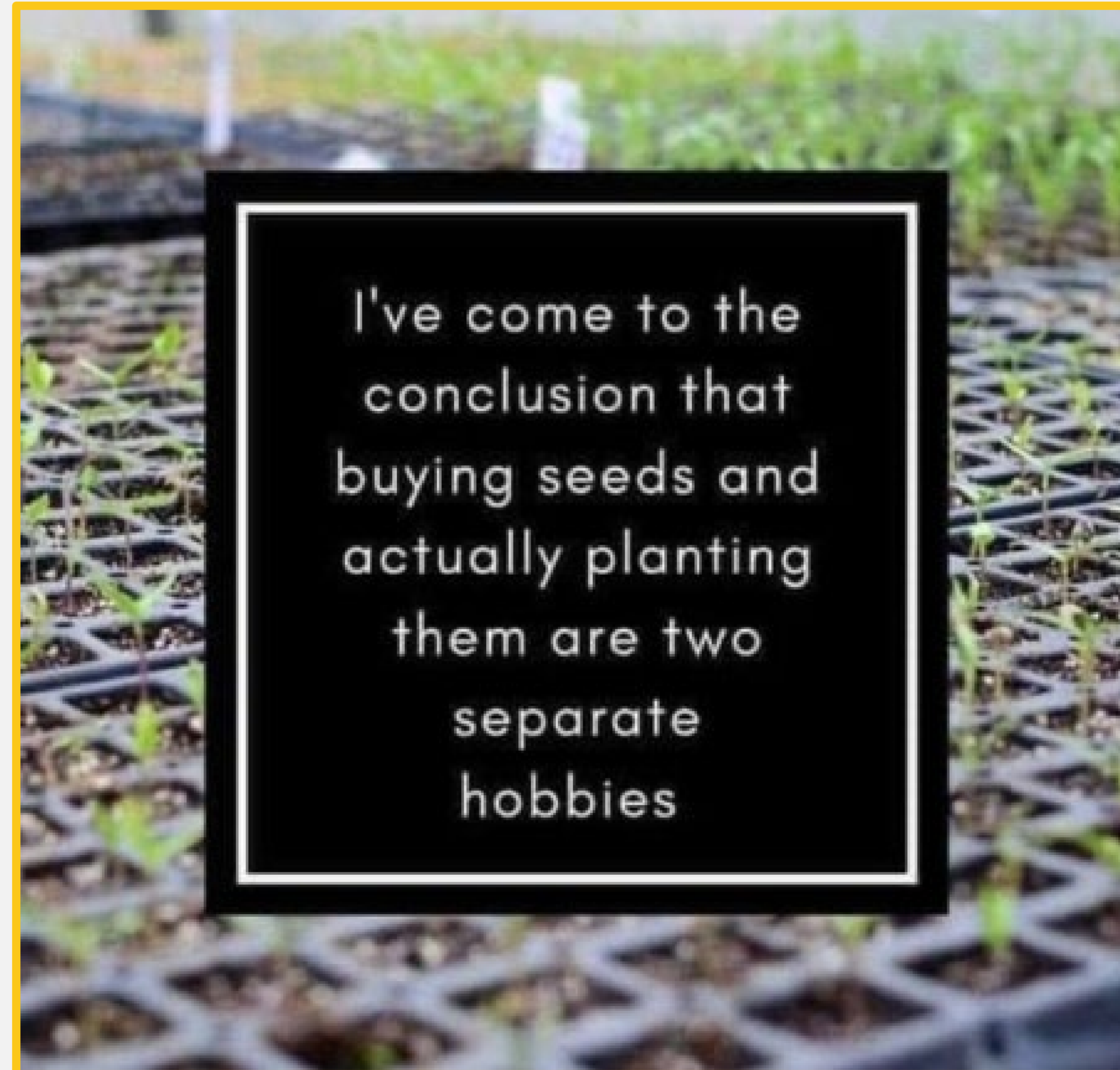
*“There are no gardening mistakes, only experiments!”*

— Janet K. Phillips





**IS THIS YOU?? LOL!!**





## WHAT WE'LL COVER TODAY

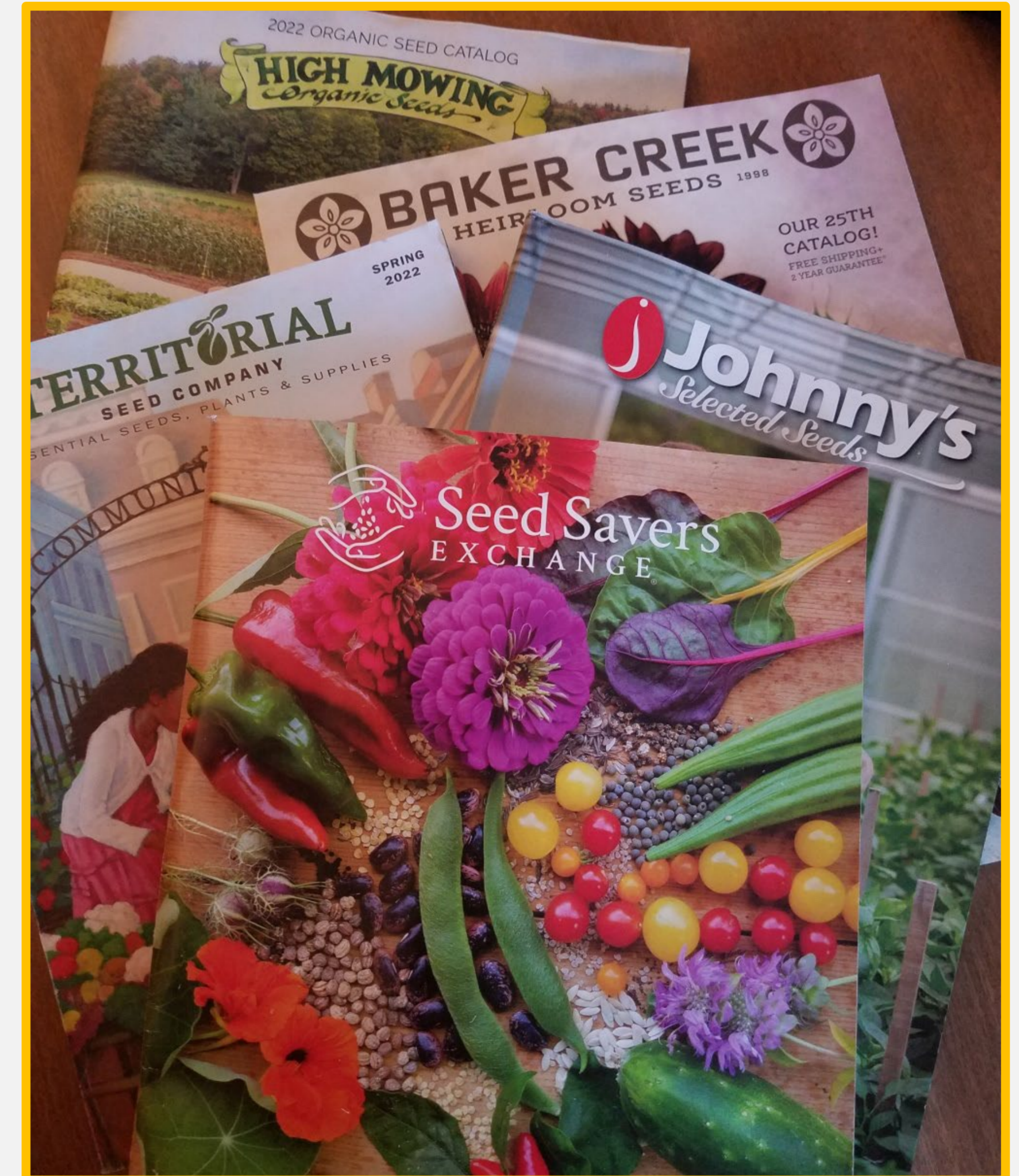
- Why Grow from Seed?
- Exploring the Seed Packet
- Seed Biology
- Germination Requirements
- How Seeds Germinate
- Why Seeds Fail to Germinate
- Timing/ When to Start
- Supplies & Equipment
- Potting Up and Hardening Off



## WHY GROW FROM SEED?

### My Top Reasons

- 1) **More Choices** for what to grow.
- 2) **More Control** over how your plants are grown.
- 3) **Money Saver!**
- 4) **Low Risk** to experiment.





## SEEDY TERMINOLOGY

- Open Pollinated
- Heirloom
- Hybrid
- GMO
- Organic





## **ORGANIC SEED: DOES IT MATTER?**

If you are Certified Organic by the USDA, you must use organic seed.

Here's what organic offers...

- Seed with little or no chemical influence
- Seed that is not weakened by constant chemical support
- Seed that is naturally more resilient to pests and diseases



## YOUR BEST FRIEND: THE SEED PACKET

Loaded with important information:

- Plant Name – Common and Botanical
- Variety and Cultivar
- Organic or Conventional
- Open Pollinated, Heirloom, or Hybrid
- Sowing Instructions
- Days to Germination and Maturity
- Freshness Date





**YOUR BEST FRIEND: THE SEED PACKET**



**LEEK**  
*King Richard*  
Allium porrum

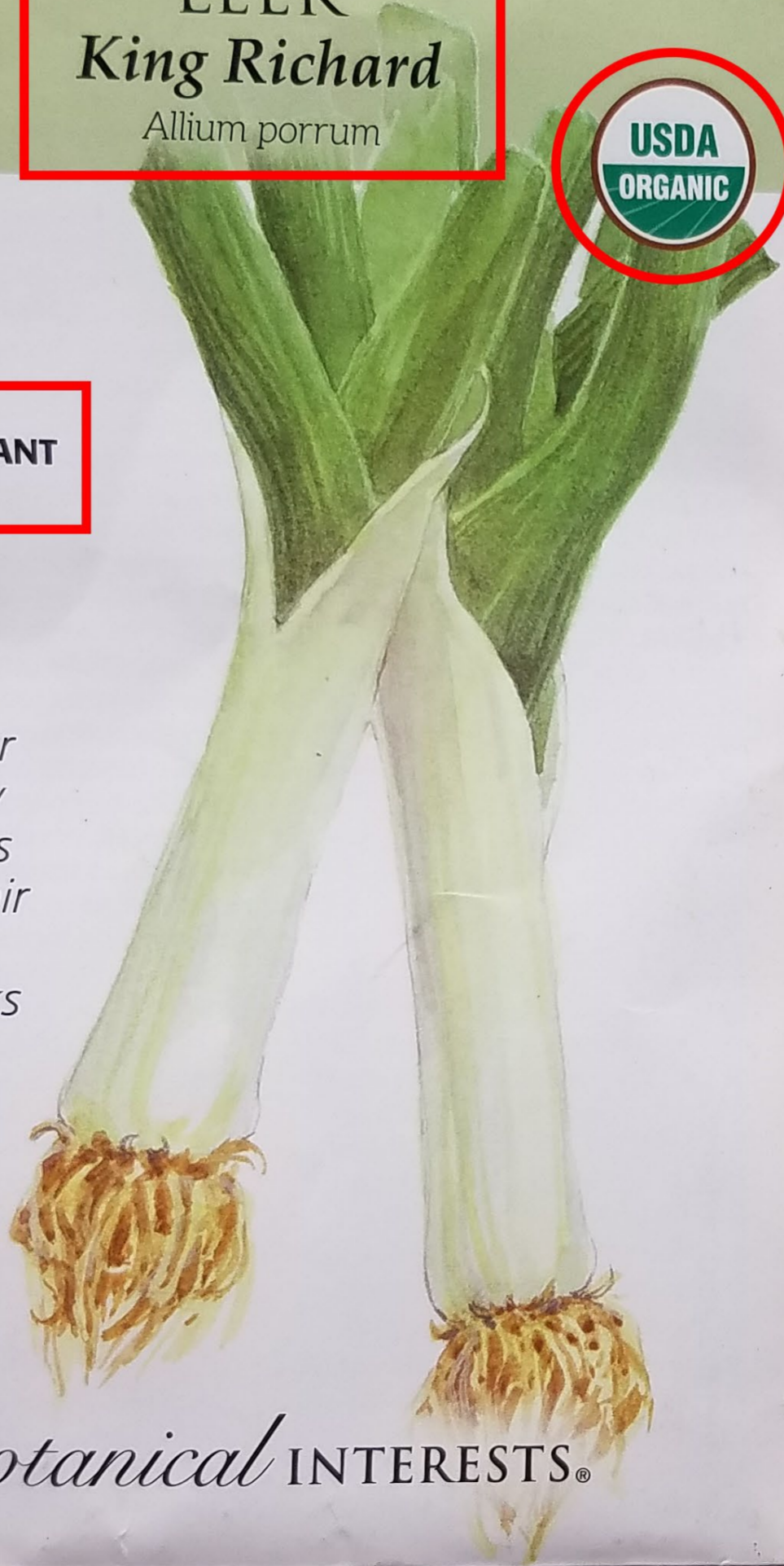


\$2.29  
750 mg

**FROST TOLERANT**  
**75 DAYS**

Sow in spring  
or summer

*The subtle onion flavor of this early variety gives gourmet flair to ordinary dishes. Leeks have been a staple in European kitchens for centuries!*



*Botanical* INTERESTS®

**PEPPER SWEET**  
*Canary Belle*  
Capsicum annuum

\$1.89  
30 seeds

**FROST SENSITIVE**  
**72 DAYS from transplanting**

after last chance  
of spring frost

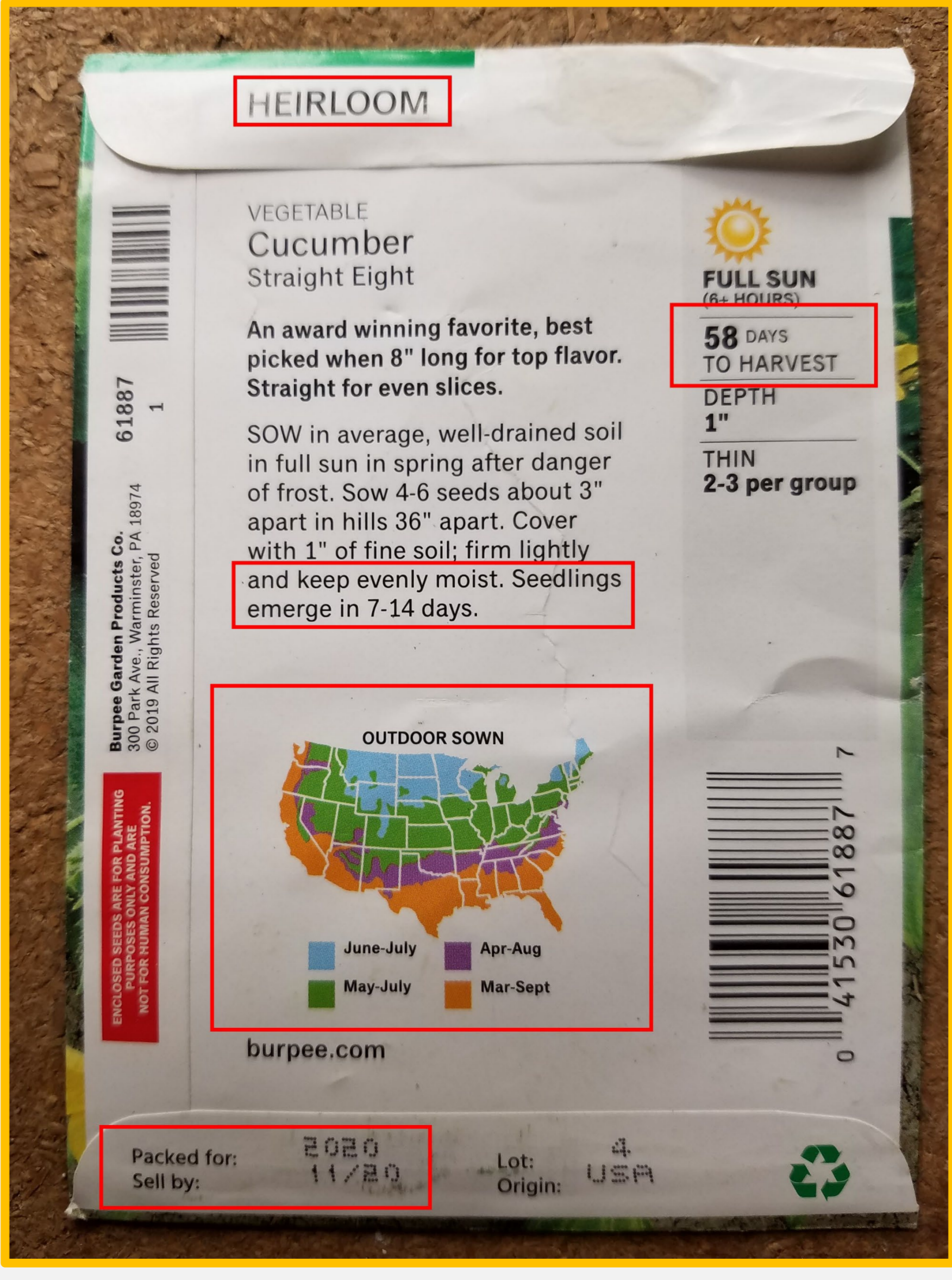
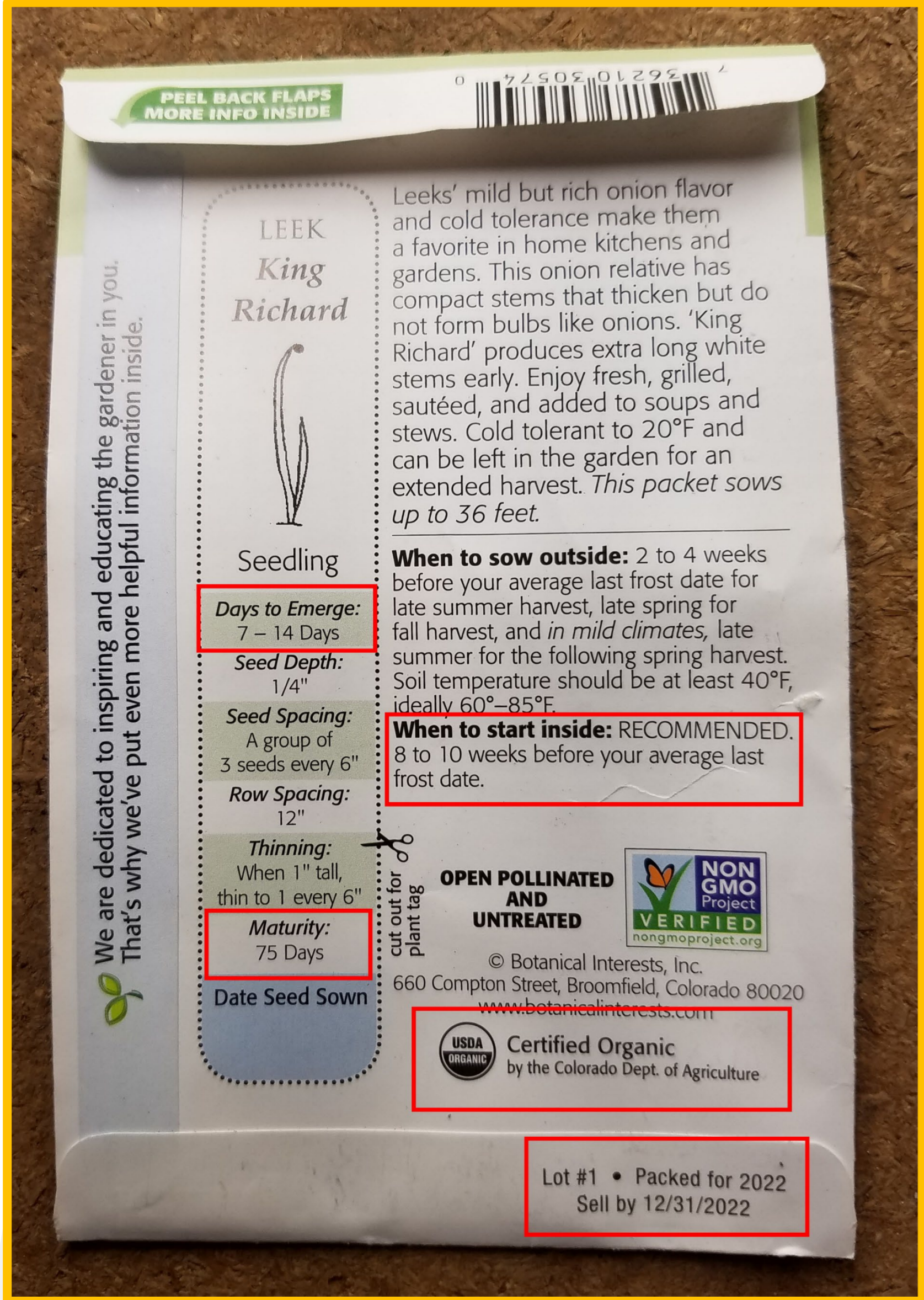
*So sweet, so crisp, so tasty! Productive plants for scores of delicious, brilliant yellow, thick-walled, beautiful fruit.*



*Botanical* INTERESTS®

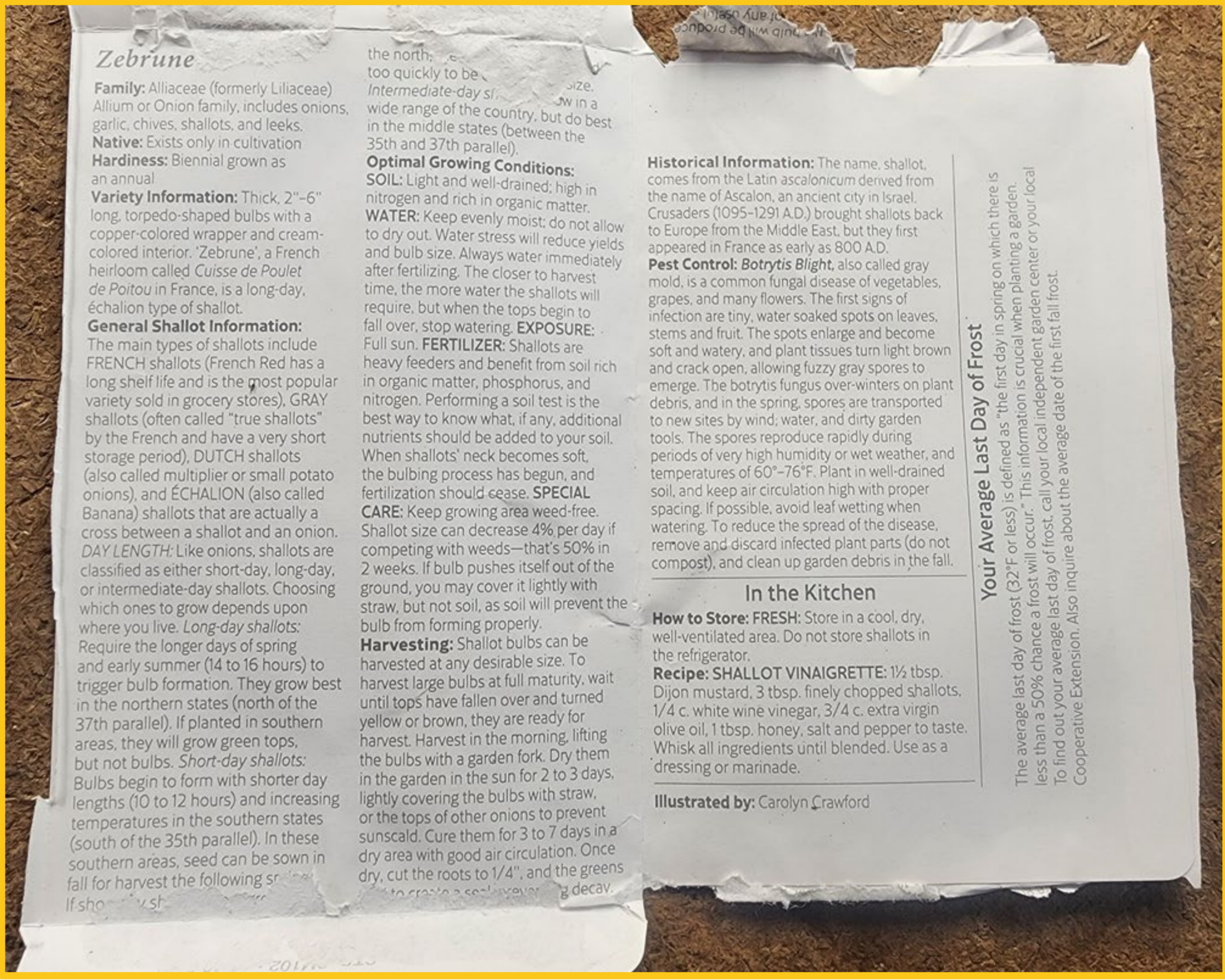
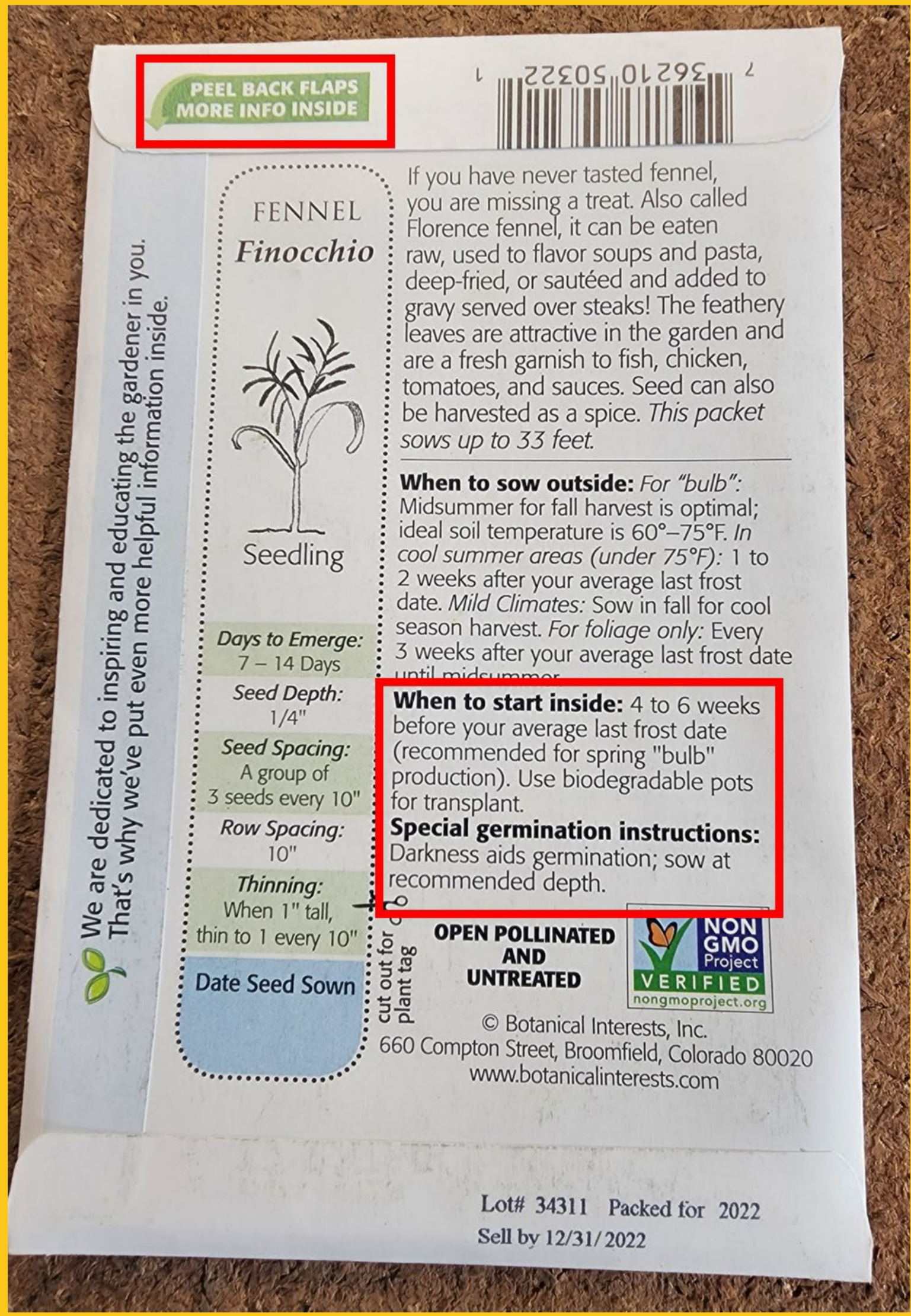


# YOUR BEST FRIEND: THE SEED PACKET





YOUR BEST FRIEND: THE SEED PACKET





# SEED BIOLOGY & GERMINATION



## SEED BIOLOGY

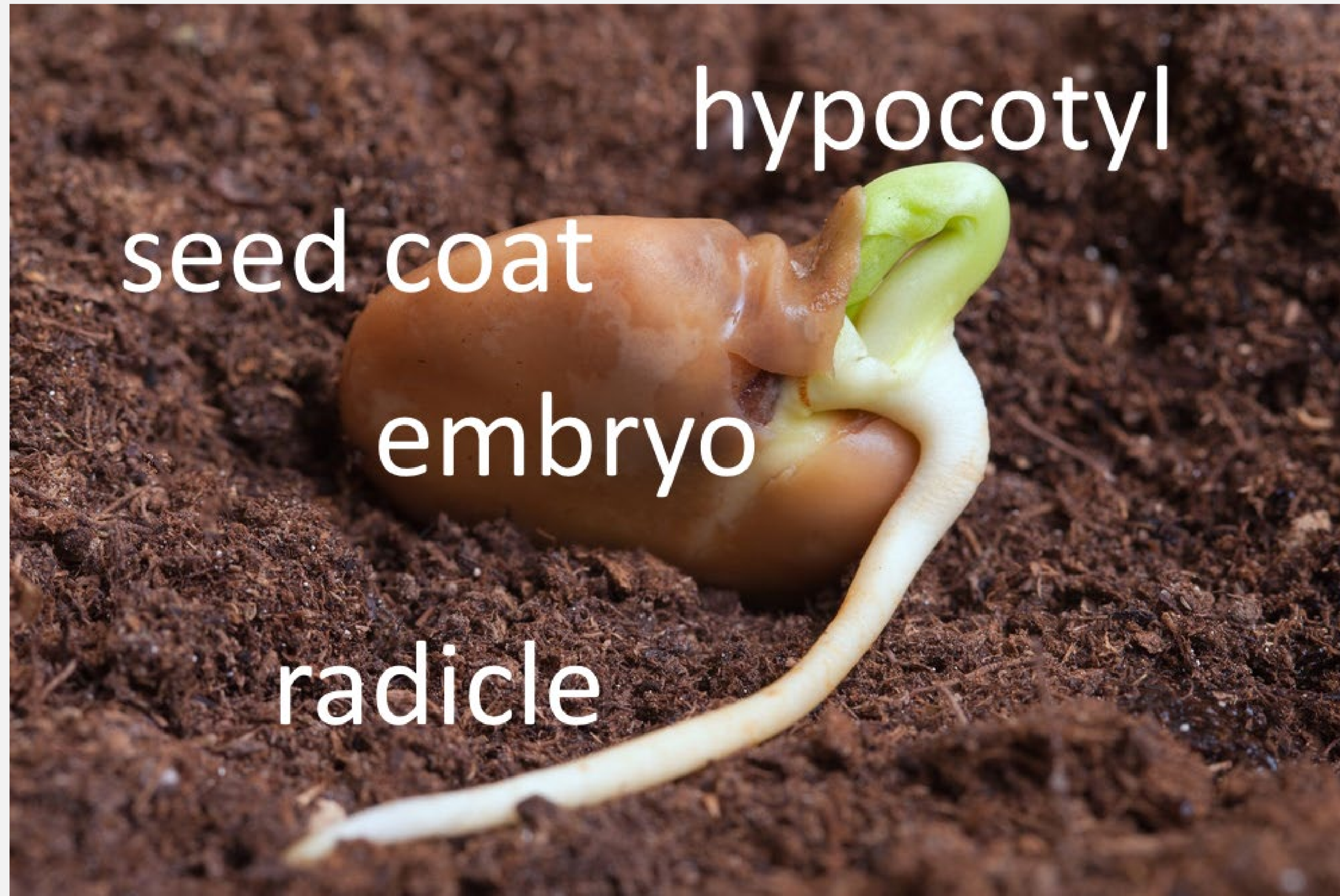
### Seeds are alive!

Inside every fully developed seed is a seed embryo or endosperm, which is wrapped in a seed coat. Endosperm contains all the food (energy) needed to send up the initial shoot and sustain the seedling for about 4 weeks.





**SEED BIOLOGY**







**SEED BIOLOGY**



## **SEED GERMINATION REQUIREMENTS: WHAT IT TAKES TO GROW!**

### **Five Elements Necessary for Germination**

- Proper Soil Temperature
- Soil Moisture
- Oxygen
- Light
- Seed to Soil Contact



## SEED GERMINATION REQUIREMENTS: WHAT IT TAKES TO GROW!

### Proper Soil Temperature

- Every seed has a specific minimum, maximum, and optimal soil temperature for germination.
- Above or below, the seed will remain dormant – Thermo-dormancy.
- The optimal temperature produces the most rapid and uniform germination.



## SEED GERMINATION REQUIREMENTS: WHAT IT TAKES TO GROW!

### Germination Soil Temps for Lettuce

- Germination temperature range: 40 to 80 degrees F.
- Optimal soil temp: 65 degrees F.
- Above or below, the seed will remain dormant.
- Cool-season crop; not often planted in summer.



## SEED GERMINATION REQUIREMENTS: WHAT IT TAKES TO GROW!

### Germination Soil Temps for Tomatoes

- Germination temperature range: 50 to 95 degrees F.
- Optimal soil temp: 70 to 80 degrees F.
- Above or below, the seed will remain dormant.
- Warm-season crop; started indoors 6-8 weeks before planting out.



## **SEED GERMINATION REQUIREMENTS: WHAT IT TAKES TO GROW!**

### **Soil Moisture**

Field capacity is the amount of water held in soil after the excess water has drained away.

Soil moisture should be 50 to 75% of field capacity.

Just remember: Damp Sponge!!



## **SEED GERMINATION REQUIREMENTS: WHAT IT TAKES TO GROW!**

### **Oxygen**

All living things require oxygen – including seeds!

Seeds need oxygen to begin metabolizing proteins.

Soil that is too saturated with water or compacted will inhibit oxygen and germination.



## SEED GERMINATION REQUIREMENTS: WHAT IT TAKES TO GROW!

### Light

All seedlings need light to grow.

Most seeds germinate best in dark conditions.

There are a few exceptions...





## **SEED GERMINATION REQUIREMENTS: WHAT IT TAKES TO GROW!**

### **Some Seeds Are Photoblastic**

Photoblastic: Germination is influenced by light or the lack of it.

Seeds that need light to germinate are “positively photoblastic.” Lettuces.

Seeds whose germination is inhibited by light are “negatively photoblastic.” Chives, onions, fennel, parsley.



## SEED GERMINATION REQUIREMENTS: WHAT IT TAKES TO GROW!

### Check the Seed Packet!



**When to sow outside:** RECOMMENDED. 2 to 4 weeks before your average last frost date, when soil temperature is at least 40°F, ideally 60°–70°F. *Successive Sowings:* Every 3 weeks until 2 weeks before your average first fall frost date. *Mild Climates:* Also sow in fall for winter harvest.

**When to start inside:** Transplanting is not recommended, although mesclun can be grown indoors on a sunny windowsill or under grow lights.

**Special germination instructions:** Light aids germination; sow shallowly. Soil temperatures over 80°F hinder germination; see inside packet for tips.

**THIS MIX OF 9 GREENS INCLUDES:**

COMMON NAME	PERCENT OF MIX BY WEIGHT
Lettuce Leaf Red Salad Bowl.....	25%
Arugula   Rocket .....	20%
Lettuce Leaf Tango.....	10%
Lettuce Leaf Royal Oak Leaf .....	10%
Lettuce Leaf Black Seeded Simpson.....	10%
Lettuce Leaf Grand Rapids TBR.....	10%
Lettuce Leaf Red Sails.....	5%
Curly Endive.....	5%
Mustard Mizuna .....	5%

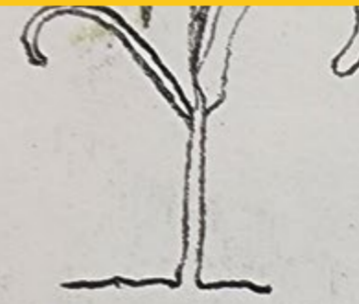
**Days to Emerge:** 5 – 14 Days

**Seed Depth:** Surface to 1/8"

**Seed Spacing:** Broadcast about 1/2" apart

**Row Spacing:** Not necessary

**Thinning:** Not required



Seedling

**Days to Emerge:** 7 – 14 Days

**Seed Depth:** 1/4"

**Seed Spacing:** A group of 3 seeds every 10"

**Row Spacing:** 10"

**Thinning:** When 1" tall, thin to 1 every 10"

**Date Seed Sown**


sows up to 33 feet.

**When to sow outside:** For "bulb": Midsummer for fall harvest is optimal; ideal soil temperature is 60°–75°F. *In cool summer areas (under 75°F):* 1 to 2 weeks after your average last frost date. *Mild Climates:* Sow in fall for cool season harvest. *For foliage only:* Every 3 weeks after your average last frost date until midsummer.

**When to start inside:** 4 to 6 weeks before your average last frost date (recommended for spring "bulb" production). Use biodegradable pots for transplant.

**Special germination instructions:** Darkness aids germination; sow at recommended depth.

**OPEN POLLINATED AND UNTREATED**



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660 Compton Street, Broomfield, Colorado 80020

cut out for plant tag

## SEED GERMINATION REQUIREMENTS: WHAT IT TAKES TO GROW!

### Seed to Soil Contact

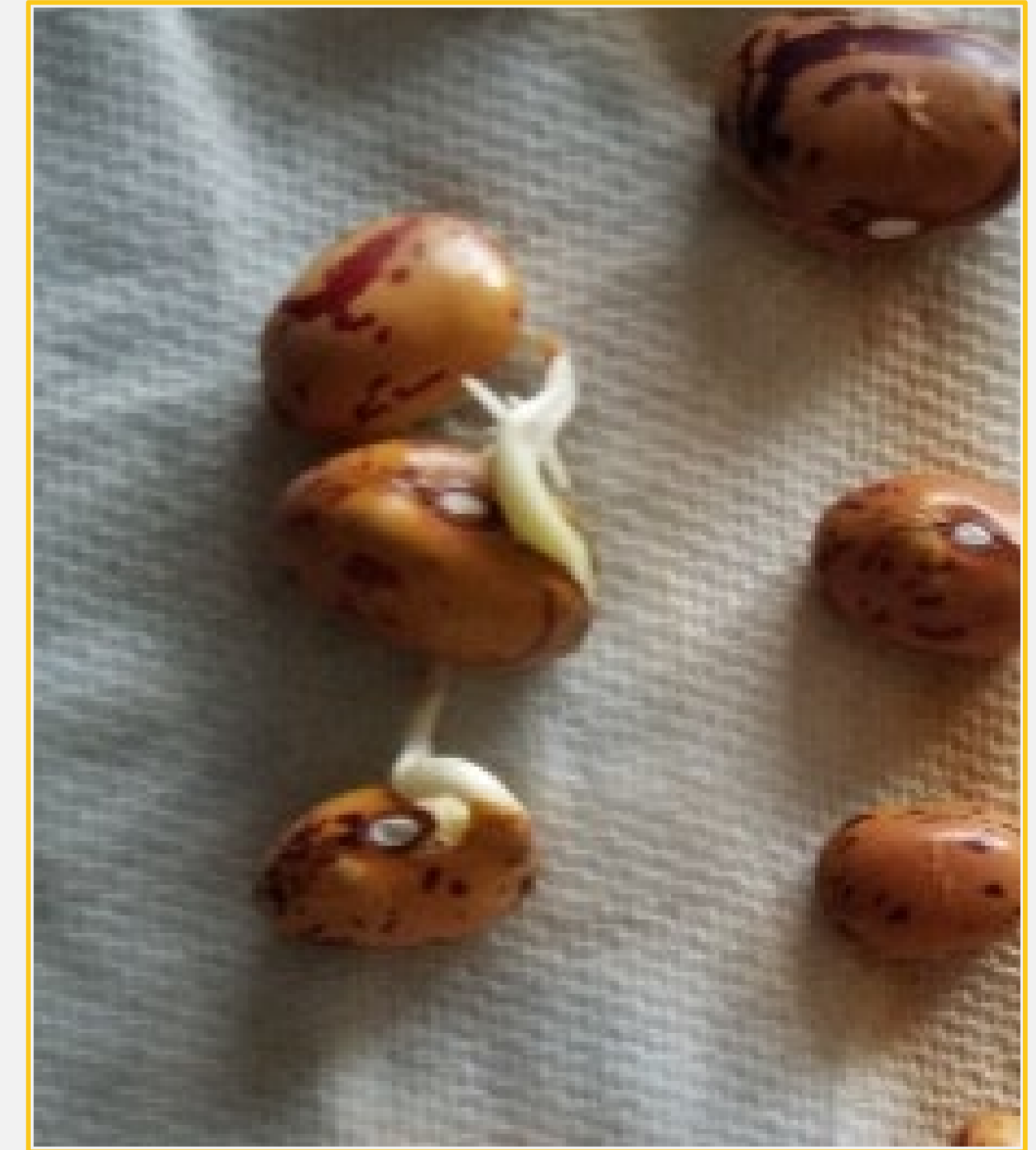
- Seeds need good contact with the soil for germination.
- Takes up water from the soil to break dormancy
- The seed radicle (infant root) draws moisture from the soil and it also anchors the seedling. It's the seed's lifeline.



## THE STAGES OF GERMINATION

### Stage 1: Imbibition

- When conditions are right for germination, a dry seed comes into contact with water to break dormancy. It takes up or “imbibes” water through the seed coat.
- This causes the seed to soften and swell, breaking dormancy, and triggers the metabolic process to begin.
- It wakes up or kick-starts the seed!



## **THE STAGES OF GERMINATION**

### **Stage 2: Interim, Lag, or Waiting Game!**

- The embryo begins to make proteins and metabolize the stored energy in preparation for actual germination.
- This stage causes the most “nail-biting” and anxiety for home gardeners!

## THE STAGES OF GERMINATION

### Stage 3: Emergence

- The seed produces a radicle – the first root of the plant.
- Next the hypocotyl forms its backward hook and begins to rise up through the soil.
- The hypocotyl breaks the soil surface and the first leaves, the cotyledons, open.
- <https://youtu.be/w77zPAtVTuI>



## THE STAGES OF GERMINATION

### Stage 3: Emergence!



# LET'S TAKE A QUICK BREAK!





## WHY SEEDS FAIL TO GERMINATE

### Number One Reason: The Soil Is Too Wet

- Overly wet soil forces oxygen out of the soil. The seed needs oxygen to germinate. Seeds will essentially drown and then rot.
- Remember the “dry sponge” for soil moisture!
- For seed starting, always err on the “dry-side.” Better to be a little dry than wet.



## WHY SEEDS FAIL TO GERMINATE

### Soil is Too Wet

- Risk developing the fungal disease “dampening off.” Plant stem rots at the soil line.
- Mold can grow on the surface.



## WHY SEEDS FAIL TO GERMINATE

### Using Incorrect Growing Medium/ Lack of Gas Exchange in the Soil

- Soil-less germination (seed-starting mix) is light/fluffy!
- Space for O<sub>2</sub> and CO<sub>2</sub> exchange between the embryo and the soil.
- Sterile – disease free.
- Avoid using coarse/heavy potting soils or garden soil for seed starting.



## WHY SEEDS FAIL TO GERMINATE

### Seed Was Planted Too Deep

- Find sowing information on the seed packet and follow it!!
- The seed can use up all its energy trying to reach the soil surface.
- Seed is positively photoblastic and requires light to germinate.

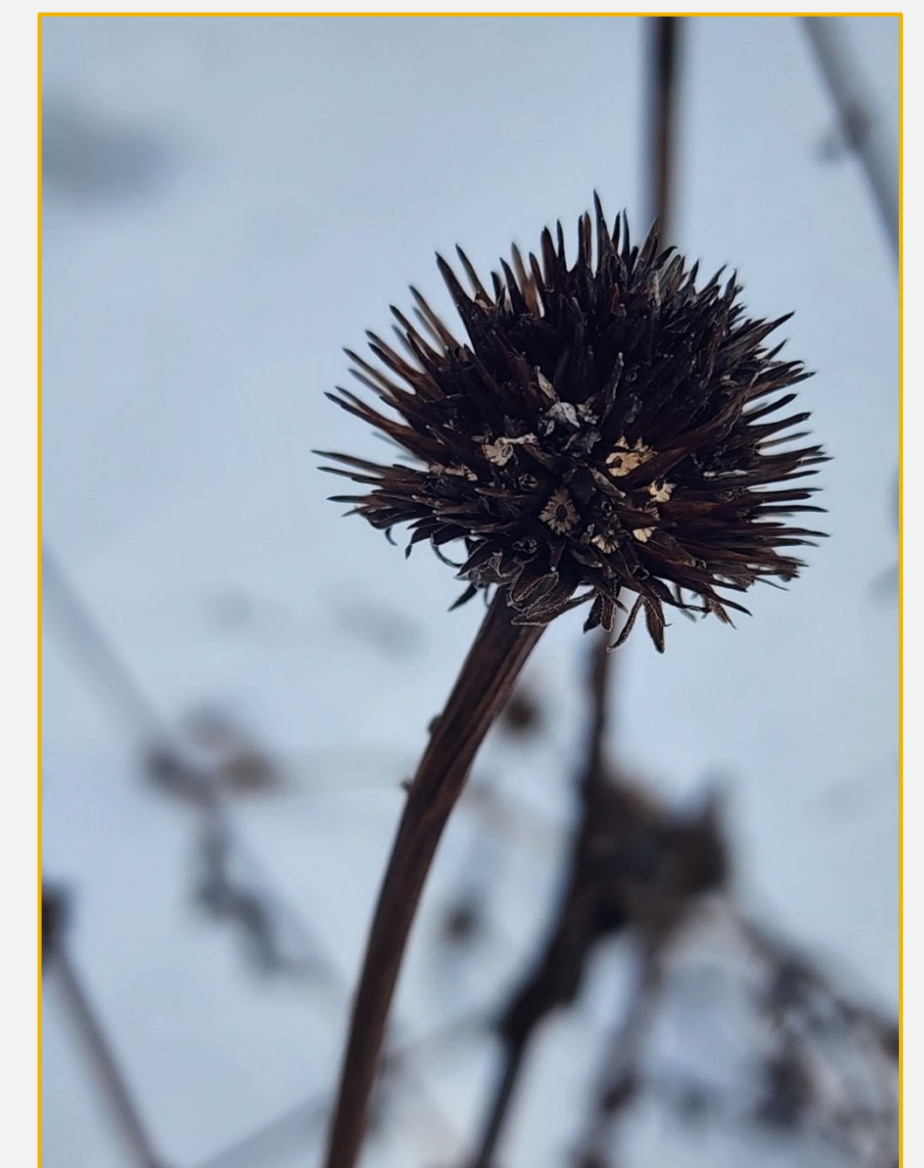


## WHY SEEDS FAIL TO GERMINATE

### The Seed is Chemically Dormant

Plant hormones inhibit germination and protects the seed from germinating too soon. Seeds need a period of exposure to moisture and cooler temperatures to break dormancy.

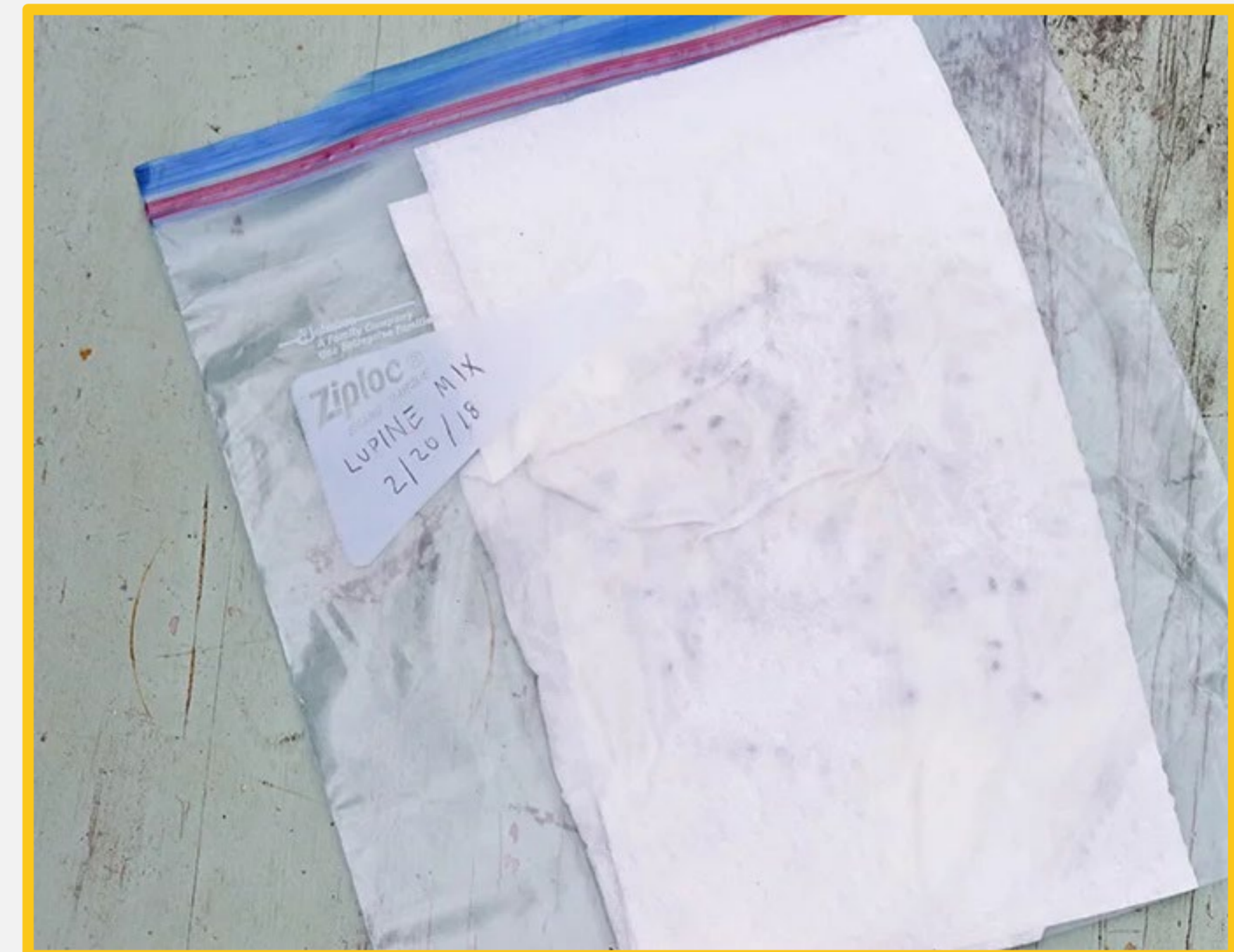
Common seeds include: coneflowers, rosemary, milkweed, pansies/violas, lupines.



## WHY SEEDS FAIL TO GERMINATE

# Overcoming Chemical Dormancy with Stratification

- Place seeds in damp paper towel or moist growing mix in a plastic bag, loosely sealed (needs air!).
- Refrigerate for 4 to 8 weeks. Time varies for each seed type.
- Check regularly for moisture.
- This artificial “cold snap” wakes up the seed!



## WHY SEEDS FAIL TO GERMINATE

### The Seed is Physically Dormant

Some seeds have a hard, thick seed coat which needs to be breached in some way to let moisture in.

Common seeds include: spinach, nasturtiums, peas, beans



## WHY SEEDS FAIL TO GERMINATE

### Overcoming Physical Dormancy with Scarification

- Remove part of the hard seed coat to allow moisture in. Use a file or sandpaper.
- Soak seeds in warm water.

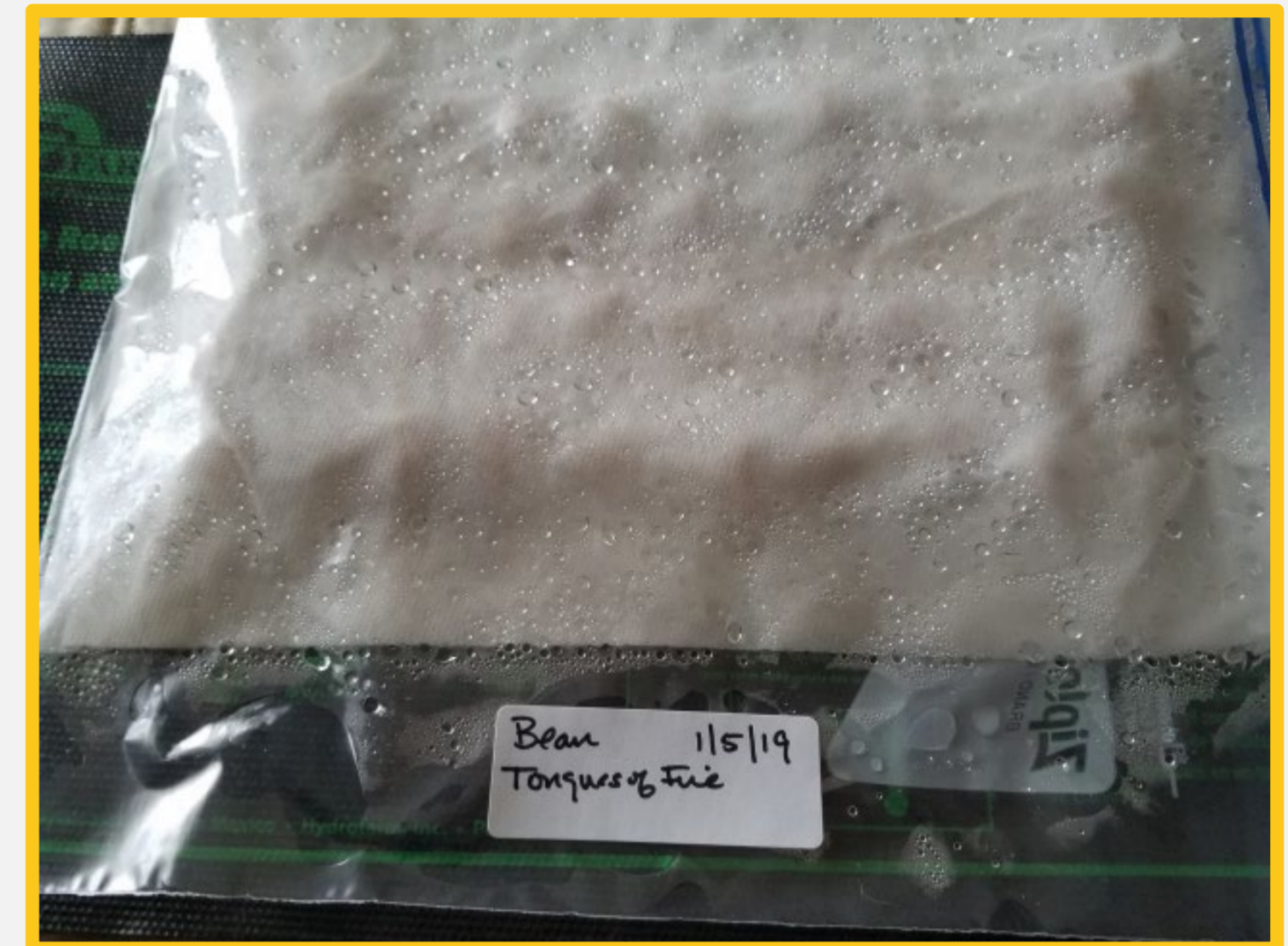




## WHY SEEDS FAIL TO GERMINATE

### The Seed Is Not Viable

- Old or poor quality seed.
- Unsure? Perform a germination test before planting.
- Store seeds properly in a dry, cool, dark place.
- Avoid hot/humid environments.
- Can be stored in the refrigerator or freezer.





# TIMING IS EVERYTHING



## WHEN TO START SEEDS -- TIMING IS EVERYTHING

- Our average growing season is 120 frost-free days from mid-May through September.
- USDA Growing Zone 6, *but* zone 5 may be more accurate for some varieties.
- Our region is prone to extreme temperature ranges.





## **WHEN TO START SEEDS -- TIMING IS EVERYTHING**

The most important date to know:

**YOUR LAST AVERAGE DAY OF FROST**

For Coeur d'Alene it is usually **May 15<sup>th</sup>**

**BUT,**

**Can Vary by WEEKS both Regionally and by Micro-climates**

**See Percentage of Frost Dates Handout to determine frost dates**

# WHEN TO START SEEDS -- TIMING IS EVERYTHING



### Kootenai & Shoshone Percentage of Frost Dates

Compiled by National Gardening Association

**I** University of Idaho  
Extension  
Kootenai County  
958 South Lochsa St  
Post Falls, ID 83854



Phone: (208) 292-2525  
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master  
GARDENER  
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Percentage = Possibility of that temperature on that date

Light frost 36° to 32° - Hard frost below 28°

Athol, Idaho

In the Spring

Temperature	10%	20%	30%	40%	50%	60%	70%	80%	90%
Last 20°	Apr 12	Apr 2	Mar 26	Mar 20	Mar 14	Mar 8	Mar 2	Feb 23	Feb 13
Last 24°	Apr 18	Apr 13	Apr 9	Apr 5	Apr 2	Mar 30	Mar 26	Mar 22	Mar 16
Last 28°	May 18	May 12	May 8	May 4	May 1	Apr 28	Apr 24	Apr 20	Apr 14
Last 32°	Jun 14	Jun 7	Jun 1	May 27	May 23	May 18	May 14	May 8	May 1
Last 36°	Jul 7	Jun 30	Jun 25	Jun 20	Jun 16	Jun 12	Jun 8	Jun 2	May 26

In the Fall

Temperature	10%	20%	30%	40%	50%	60%	70%	80%	90%
First 20°	Oct 14	Oct 23	Oct 29	Nov 3	Nov 8	Nov 12	Nov 17	Nov 23	Dec 2
First 24°	Sep 27	Oct 5	Oct 11	Oct 16	Oct 21	Oct 25	Oct 30	Nov 5	Nov 13
First 28°	Sep 16	Sep 22	Sep 26	Sep 30	Oct 3	Oct 7	Oct 11	Oct 15	Oct 21
First 32°	Aug 28	Sep 4	Sep 9	Sep 13	Sep 16	Sep 20	Sep 24	Sep 29	Oct 6
First 36°	Aug 21	Aug 26	Aug 30	Sep 3	Sep 6	Sep 9	Sep 12	Sep 16	Sep 21

## WHEN TO START SEEDS -- TIMING IS EVERYTHING

Use the information on the seed packet to determine when to plant:

*“Sow indoors 6 to 8 weeks before last average frost”*

Count back 6 to 8 weeks from May 15 or your date.

That’s the optimal time to start that particular seed indoors is between March 15<sup>th</sup> and April 1<sup>st</sup>





## **WHEN TO START SEEDS -- TIMING IS EVERYTHING**

Can you sow seeds too early?

**YES!**

Sowing seeds indoors too early results in stressed plants.

- Root bound, requiring more “potting up”
- Timing is off and plants will be ready to be transplanted outdoors before conditions are optimal
- Results in leggy, weak plants

Better to start a little late than early!

## DAYS TO GERMINATION

Generally 7 to 21 days  
Refer to the seed packet

Dependent upon:

- Soil temperature
- Soil moisture
- Seed quality
- Depth sown
- Light





## DAYS TO MATURITY

### What does *Days to Maturity* Mean?

The number of days it will take for the plant to produce a harvest (fruit or flowers).

Knowing and understanding DTM will help you determine if a variety will produce a harvest within your growing season.





## DAYS TO MATURITY

### How to “Count” Days to Maturity

- Direct sown seed: DTM begins once the seedlings emerge and have true leaves. Beans = 60 days from when true leaves pop out.
- Seeds sown indoors or transplants: DTM begins once they are transplanted into the garden/container. Tomatoes = 70 days from transplanting.
- Based on “optimal growing conditions” – days may vary!!

## SOWING INDOORS VS SOWING DIRECT

### Typically Sown Indoors

- Warm-season crops – tomatoes, peppers, eggplant
- Crops that take longer to germinate or mature – onions, leeks, chives, thyme
- Teeny-tiny seeds – thyme, snapdragons, pansies.

### Typically Direct Sown:

- Root crops – carrots, beets, parsnips, fennel
- Large seeds – squash, beans, and peas

**Check the Seed Packet**

**Don't Be Afraid to Experiment!**





# SUPPLIES AND EQUIPMENT





## SEED STARTING SUPPLIES & EQUIPMENT

- Seeds – grow what you love to eat!!
- Quality seed-starting medium
- Clean growing containers or disinfect 10:1 water/bleach 5 min.
- Plant trays – for watering, protecting surfaces
- Clear covers for containers (lids or plastic wrap)
- Plant tags – so important!!
- Spray bottle / small watering can
- LED shop or grow lights
- Garden Journal – keep track of what/when
- Optional: heat propagation mat

# SEED STARTING SUPPLIES & EQUIPMENT

## Let's Be Clear...



**Dirt is something you sweep off the floor...**



## Soil is what you plant in!



## SEED STARTING SUPPLIES & EQUIPMENT

### Soil Matters!

- Use a mix specifically for seed-starting.
- “Soil-less” -- usually finely screened peat or coir, with perlite or vermiculite.
- Naturally disease free.
- May contain some nutrients – worm castings or very fine compost.



## SEED STARTING SUPPLIES & EQUIPMENT

### Soil Matters!

- Potting soils may be too coarse for small seeds and may contain ingredients not needed – including fertilizers
- Garden soil is too heavy and too compact to provide sufficient air circulation within the space of a small growing container. And it carries the potential for disease pathogens.





# SEED STARTING SUPPLIES & EQUIPMENT

## Containers

- Just about anything can be used!
  - Food containers, yogurt cups, paper cups, toilet rolls
  - Clean (10:1 water/bleach 5 min.)
  - Needs good drainage
- Peat pots, plastic pots, cow pots, paper pots – Avoid peat plugs!!
- Modular plug flats, cell-inserts, flat trays.



## SEED STARTING SUPPLIES & EQUIPMENT

### LED Grow or Shop Lights

- Seedlings need at least 12 to 16 hours of light per day.
- Set lights on a timer
- Position lights about 3 to 4 inches over newly emerging seedlings. Move up as the seedlings grow.
- Be cautious with “hot” grow lights – LEDs are cooler and save energy.
- Terrific results with LED shop lights
- 2900 Lumens minimum



# SEED STARTING SUPPLIES & EQUIPMENT

## The “Extras” for Greater Success

### Germination Mat

- Greatly improves germination
- Remove once the seedlings emerge (or raise off the heat)





# SEED STARTING SUPPLIES & EQUIPMENT



## SEED STARTING SUPPLIES & EQUIPMENT

### A Few “Extras” Make a Difference!

#### Shelving Unit

- Great space saver!
- Fits up to 20 growing trays.
- Lights easily attach/raise up
- Drape with emergency heat blanket (silver foil) for added warmth.
- Storage for the off-season!





**HERE'S HOW I START SEEDS...**

# Quick Demo on Seed Starting



## POTTING UP

### Pricking Out & Potting Up

- Seedling can be potted up once the “true leaves” form.
- By 4-weeks of growth
- See roots emerging from the bottom of the cell.
- Transplant to 3.5 or 4-inch pots. One seedling per pot!
- Soil medium should be rich in organic compost, worm castings.



## POTTING UP

### How To Prick Out

- Use a spoon, or pop the plug from the bottom.
- Select the best/strongest seedlings
- Handle by the leaves – not the stem.
- Use a chopstick, dibbler, or your finger to create a hole and pop the seedling in.





## POTTING UP

### Watering Seedlings

- Recommend bottom watering
- Fill tray with about an inch of water
- Slow uptake of water
- Ensures even watering (water on flat surface)
- Keeps foliage dry & prevents disease
- Time saver.



## HARDENING OFF

### Ready for the Real World!

- Getting seedlings/young plants acclimated to outdoors.
- About 7 to 10 days before planting out.
- Strive for a warm, calm, overcast day.
- Shady area. Protect from wind and direct sun.



## HARDENING OFF

- Start with 30 minutes, gradually increase time and exposure.
- Plastic bins, cold frame, low tunnel, or greenhouse are great options.



## TIME TO PLANT OUTSIDE!

- Plant cool-season crops once the soil is workable.
- Keep frost protection handy!
- Do NOT plant warm-season crops until soil & air is at least 50 degrees.
- Most veggies need at least 6 hours of sunlight.
- Feed your soil with quality compost (1 to 2 inches) to reduce the need for fertilizers.



## KEY POINTS...

- Know your frost date
- Don't start too soon
- Start small
- Water with care
- Experiment
- Don't be afraid to fail – you'll learn more!
- **HAVE FUN!!**



# THANK YOU!

For Seed Charts & A Special Discount:

[TheCoeurdAleneCoop.com/Seed-Class](http://TheCoeurdAleneCoop.com/Seed-Class)



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