

Warm-Season Companions

Guide 7 · Warm-Season Track

Tomatoes · Cucurbits · Beans · Corn · Sweet Potatoes

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RELATED GUIDES

This guide is one of seventeen in the Dragoon Mountains Growing Guides Library: - **Guide 1 — Hydroponic Primer & Library Map** · the front door + master multi-crop calendar - **Guide 2 — Peppers in the Dragoons** · soil + hydroponic + variety-specific staking - **Guide 3 — Bato Bucket Hydroponic Systems** · system build, water treatment, operations - **Guide 4 — Hydroponic Nutrients** · Masterblend + DIY + pH + Indoor/LED - **Guide 5 — Grapes in the Dragoons** · Cochise County viticulture - **Guide 6 — Cool-Season Crops** · brassicas + alliums + greens + roots - **Guide 7 — Warm-Season Companions** (this guide) · tomatoes, cucurbits, beans, corn, sweet potatoes - **Guide 8 — Herbs in the Dragoons** · annual + perennial · soil & hydroponic - **Guide 9 — Backyard Orchard in the Dragoons** · figs, pomegranates, jujubes, stone fruits - **Guide 10 — Pest, Disease & Wildlife** · IPM + Cochise wildlife exclusion - **Guide 11 — Foundations: Soil & Seed** · soil-building, composting, seed-starting, propagation - **Guide 12 — Harvest, Preservation & Storage** · canning, fermenting, drying, cellaring - **Guide 13 — Water in Cochise County** · sourcing, testing, treatment, rainwater, conservation - **Guide 14 — Season Extension Structures** · cold frames, low tunnels, hoop houses, high tunnels - **Guide 15 — Native Food Crops of the Sonoran-Madrean Region** · the indigenous food complex of the Dragoons and the wider sky-island region - **Guide 16 — Companion Plantings & Polycultures** · the design layer — companion matrix, anti-companions, cover crops, 9 Dragoons-specific guild designs - **Guide 17 — Recipes & Kitchen Integration** · what to cook with what came out of the garden this morning · by-crop recipes + seasonal menus

This is the warm-season counterpart to **Guide 6 — Cool-Season Crops**, and the broad-shouldered companion to **Guide 2 — Peppers in the Dragoons**. Where this guide touches water treatment, EC/pH chemistry, or hydroponic recipes, it points back to Guides 2 and 3 rather than restating their content. The bicarbonate water-treatment protocol is in **Guide 3 §4**; Masterblend feeding charts (including the canonical tomato chart) are in **Guide 4 Part 1**; DIY locally-sourced substitutions are in **Guide 4 Part 2**; pH-up / pH-down recipes for alkaline Cochise County water are in **Guide 4 Part 3**; the canonical Bato bucket build and daily operations are in **Guide 3**; the canonical pepper hydroponic system and reservoir routine are in **Guide 2 §6**.

How to use this guide

Pepper season runs April through October. Inside that same window — sometimes finishing earlier, sometimes lapping into a second crop — the rest of the warm-season garden runs alongside peppers: tomatoes, cucumbers, summer squash, zucchini, melons, beans, sweet corn, sweet potatoes, and eggplant. None of them tolerate frost. All of them want soil temperatures peppers love. Most of them get pushed by the same monsoon rains, eaten by the same hornworms, scorched by the same June heat spike, and rewarded by the same cool September nights that finish peppers off so well.

The guide is in thirteen chapters, organised by botanical family:

1. **Common ground for the warm season** — the Dragoons frost-free window, monsoon dynamics, soil temperature targets, the 95 °F heat-stress threshold, and what it means for every crop in the book.
2. **Master warm-season planting calendar** — every crop in this guide on one chart.
3. **Tomatoes** — the longest chapter, mirroring **Guide 2** for peppers. Full soil track and full hydroponic track for the single most-grown crop in Cochise County.
4. **Eggplant** — short chapter. Where the biology is the same as peppers, this chapter says so and points back to Guide 2.
5. **Cucumbers** — full soil chapter plus a brief hydro pointer.
6. **Summer squash & zucchini** — full chapter with the squash-vine-borer protocol.
7. **Melons** — cantaloupe, watermelon, honeydew, French *Charentais*.
8. **Beans** — snap, dry, fresh shellies (matured beans eaten fresh from the pod, between snap and dry stage), and *Phaseolus acutifolius* (teparies — native to the Sonoran Desert; the most drought-tolerant cultivated bean), the indigenous Sonoran Desert bean.
9. **Sweet corn** — variety types, isolation distances, heritage varieties, pollination block geometry.
10. **Sweet potatoes** — slip propagation, the late-May plant date, the curing rule (the trickiest step in Dragoons soil gardening).
11. **Pest & disease summary** — one cross-cutting table for the warm-season pest community.
12. **Crop rotation handoff with cool season** — what to plant where after pulling warm-season crops in October. Pairs with **Guide 6 §7**.

LOCAL TIP

The warm season in the Dragoons is shorter and weirder than newcomers expect. From a national perspective Cochise County has “150+ frost-free days” — true, but misleading, because June heat shuts down fruit set on nearly every crop in this guide for 2–4 weeks. The functional warm season is two parts: an

April-June *push* window where plants establish, and a July-September *production* window after the monsoon breaks the heat. The single biggest mistake is timing the calendar around the frost-free date alone. The 95 °F daytime ceiling matters as much as the 32 °F overnight floor.

1 · Common ground for the warm season

The Dragoons window · monsoon dynamics · soil temperature · the 95 °F threshold

1.1 The Dragoons warm-season window

The Dragoon Mountains sit at roughly 4,700 ft in USDA zone 8a. The warm-season window runs from the last spring frost (typically March 15–April 5) through the first fall frost (typically October 25–November 10). Long enough for nearly any warm-season annual to finish on paper — 220 frost-free days in a good year. The catch is what happens *between* April and October. The season has three distinct phases, and crops behave very differently in each.

Phase	Months	Conditions	Crop behaviour
Spring push	Apr – mid-June	Days 75–90 °F, nights 45–60 °F, dry, 10–15 % humidity, intense UV	Establishment phase. Soil warming through 60–75 °F. Roots run; tops grow slowly. Fruit set possible on early varieties.
Pre-monsoon heat	Mid-June – early July	Days 95–105 °F, nights 65–72 °F, very dry, 5–15 % humidity	The blossom-drop and heat-stress phase. Fruit set largely shuts down. Plants survive but pause.
Monsoon production	Mid-July – late September	Days 85–95 °F, nights 60–70 °F, 50–70 % humidity, afternoon rain	The real production window. Fruit set resumes. Plants surge. This is when 80 % of the season's harvest happens.
Fall tail	Oct	Days 70–82 °F, nights 45–55 °F, dry	Ripening, final tomato push, end-of-season green-tomato use. Frost watch begins late October.

This is the climate pattern every crop in this guide is designed around. A tomato variety that ignores the pre-monsoon heat (heat-tolerant cherry types, *Phoenix*, *Heat-master*) crushes the season. A heat-sensitive heirloom (*Brandywine*) sets only spring and fall fruit, with a 3-week summer hole.

1.2 Frost-free dates and the calendar around them

The published average last-frost date for the Dragoon Mountains base elevation (4,700 ft) is April 5. The functional last-frost date — the one you plan to — is closer to **April 15**. Above 5,000 ft and on north-facing aspects, push to **April 25**. Cold-air drainage off the high ridges produces late frosts in low spots through the third week of April even in mild years.

The published first-fall-frost date is October 25. The functional first-frost date is **October 20 in cold years, November 5 in warm ones**. The earliest plant-killing frost in our records was October 8 (2019); the latest was November 14 (2021). The variance is real and matters for tomato and pepper harvest planning.

Site condition	Functional last frost	Functional first frost
4,500 ft, south slope, sheltered	April 5	November 5
4,700 ft, level ground, mid-valley	April 15	October 25
5,000 ft, open exposure	April 25	October 15
Cold-air drainage pocket (any elevation)	May 1	October 10

The 50 °F soil rule for transplant. No warm-season transplant — tomato, pepper, eggplant, cucurbit, sweet potato slip — goes in the ground until the soil at 4-inch depth has held above 60 °F for five mornings in a row. A 50 °F nighttime air temperature is a separate, less reliable signal. The soil-temperature criterion is what actually drives root establishment. In a typical Dragoons year that threshold falls around May 1 in raised beds and May 10 in unraised ground.

1.3 Monsoon dynamics — the season-maker

The North American Monsoon is the single most important climate event for warm-season Dragoons growing. It begins (officially) June 15, but the meaningful rains start two to four weeks later — typically July 5-15. From that point through about September 20, afternoon thunderstorms deliver 6-12 inches of rain in 8 weeks. Humidity climbs from 10 % to 60 %. Nighttime temperatures drop 8-12 °F overnight. Fruit set, which had stopped in late June, resumes within days.

What the monsoon does for warm-season crops:

- **Breaks the heat dome.** Daytime highs drop from 100 °F+ to the mid-80s. Photosynthesis resumes its full pace.
- **Restores humidity.** Tomato pollen rehydrates; cucumber and squash flowers no longer wither at noon; bean pods set without dropping.

- **Delivers nitrogen.** Lightning-fixed nitrogen in monsoon rain feeds heavily — many growers see a visible green-up flush within a week of the first major storm.
- **Triggers pests.** Squash vine borers emerge with the first big rain. Cucumber beetles surge. Hornworms appear on tomatoes. Plan pest pressure to peak two weeks after the monsoon breaks.

What the monsoon can damage:

- **Splitting tomato fruit.** A long dry spell followed by a 1-inch rain in an afternoon splits ripening tomatoes overnight. Cover with shade cloth and pick fruit at first blush rather than full color during heavy monsoon.
- **Powdery mildew on cucurbits.** The first humid week brings the first mildew on squash, cucumbers, and melons. Plan a preventative spray (potassium bicarbonate or milk dilution) in early July.
- **Wind damage.** The biggest monsoon storms bring 40–60 mph gusts that flatten unstaked tomatoes and snap corn stalks.

LOCAL TIP

Watch the second week of July. The monsoon “officially” starts mid-June but the meaningful storms — the ones that drop an inch of rain and cool the soil — almost always arrive between July 5 and July 15. Two crops to prep for that week: cucumbers (apply row cover or pyrethrin pre-emptively for the cucumber beetle surge that follows the first rain) and squash (lay fresh aluminum foil at the stem base of every squash and zucchini plant). The borers and beetles are dormant in the dry pre-monsoon and explode out within 48 hours of the first wet afternoon.

1.4 Soil temperature targets

Soil temperature drives transplant success, germination rate, and root activity. Each crop in this guide has a different minimum.

Crop	Minimum soil temp for transplant or direct-sow	Ideal soil temp	Notes
Tomato (transplant)	60 °F	70–75 °F	Below 60, growth stalls 2–3 weeks
Pepper (transplant — see Guide 2)	65 °F	70–75 °F	Slower than tomato to recover from cold
Eggplant (transplant)	70 °F	75–80 °F	The most heat-loving — wait the longest

Crop	Minimum soil temp for transplant or direct-sow	Ideal soil temp	Notes
Cucumber (direct-sow)	65 °F	75–85 °F	Germination time halves between 65 and 80 °F
Cucumber (transplant)	65 °F	75–80 °F	Roots resent disturbance — use peat pots
Summer squash, zucchini (direct-sow)	65 °F	75–85 °F	Same as cucumber
Melons (direct-sow)	70 °F	80–90 °F	The fussiest germinator — late May is reliable
Bean — snap, pole (direct-sow)	60 °F	70–80 °F	Below 60, rot pressure exceeds germination
Bean — tepary (direct-sow)	70 °F	80–95 °F	Native to hot desert — happy at temps that hurt other beans
Sweet corn (direct-sow, sugary)	60 °F	70–80 °F	Below 60 means poor stand
Sweet corn (direct-sow, supersweet sh2)	65 °F	75–85 °F	Stricter than standard sugary types
Sweet potato (slip plant)	70 °F	75–85 °F	Plants in cold soil sit and rot

The single cheapest, highest-return tool in the warm-season garden is a soil thermometer. A \$12 dial probe pushed 4 inches into the bed in the morning tells you what no calendar can. Dragoons soil warms from late March through late May; in a normal year it crosses 60 °F around April 25, 65 °F around May 5, 70 °F around May 15.

1.5 The 95 °F heat-stress threshold

This is the most important number in warm-season Dragoons growing. Above 95 °F daytime, nearly every crop in this guide slows or stops fruit set. The biology is consistent across species:

- **Tomato pollen** desiccates above 95 °F. Anthers crack; pollen sterility rises sharply.

Few or no fruits set during the hottest week.

- **Pepper blossoms** drop above 95 °F day / 75 °F night. Same mechanism — pollen sterility.
- **Cucumber, squash, melon flowers** wither at noon if daytime air exceeds 100 °F with humidity below 15 %.
- **Bean blossoms** drop above 95 °F. Pod set stops.
- **Sweet corn pollen** dies within 30 minutes above 100 °F. A heat-wave week during tasseling means a miss of that year's crop.
- **Sweet potato vines** keep growing at 100 °F+ — they're the only crop in this guide indifferent to the heat.

In a typical Dragoons year, daytime highs cross 95 °F about June 10 and stay there until the monsoon breaks (around July 10–15). That four- to six-week window is when fruit set is suspended on most crops. The fruit you eat in August was set in May (the spring push) or in late July (after the monsoon broke).

The two-season opportunity. Almost every fruiting warm-season crop in the Dragoons sets two distinct crops separated by the pre-monsoon heat hole. The first set ripens June–early July (small, intense, the spring crop). The second set ripens August–October (the bigger, longer monsoon crop). A grower who plans for both windows gets twice as much production as one who plants for a single mid-summer harvest. This is why heat-tolerant varieties (which set fruit *through* June heat) and short-season heirlooms (which finish before the heat) often outperform mid-season “main-crop” types here.

1.6 Why the warm season has fewer separate planting events than the cool season

Cool-season gardening in the Dragoons (Guide 6) involves roughly 35 distinct sowings if you run all the successions. Warm-season gardening is structurally simpler — most crops have one main planting window in May, with second sowings of squash, cucumbers, and (occasionally) beans late July. A practical warm-season planting plan has about 12 events; the timing discipline is concentrated in a 4-week window in May.

The trade-off: each event is higher-stakes. A tomato transplanted into 55 °F soil sits for three weeks, doesn't recover until June, and misses the spring fruit set. A cucumber direct-sown April 15 rots in cold ground; the seed packet says “after last frost” but the soil temp says “wait two more weeks.” The Dragoons reward calendar discipline in May like the cool season rewards it in October.

2 · Master warm-season planting calendar

This is the planting calendar that ties the whole guide together. Every crop in the eight families fits somewhere on this chart. Cross-reference it with your bed plan before each season. The largest single cluster of work falls between May 1 and May 25 — the warm-season planting wall — when soil temperature crosses the thresholds in §1.4 and most warm-season crops go in within three weeks of each other.

Crop	Sow indoors	Transplant out	Direct sow	First harvest	Final harvest
Tomato (main)	Feb 15 – Mar 10	May 1 – May 20	—	Late June (early types) – mid-July	First frost (Oct 25 – Nov 10)
Tomato (fall succession)	May 25 – Jun 15	Jul 10 – Jul 25	—	Late September	First frost
Eggplant	Feb 15 – Mar 10	May 15 – Jun 1	—	Mid-July	First frost
Cucumber (main)	Apr 15 – May 1 (peat pots)	May 10 – May 25	May 10 – May 25	Late June	Heat pause then fall pickup
Cucumber (fall succession)	—	—	Jul 20 – Aug 5	Mid-September	First frost
Summer squash / zucchini (main)	Apr 20 – May 1 (peat pots)	May 5 – May 20	May 10 – May 25	Late June	Heat / borer cull
Summer squash / zucchini (fall)	—	—	Jul 25 – Aug 5	Mid-September	First frost
Melons (cantaloupe, watermelon, honeydew)	Apr 25 – May 10 (peat pots)	May 20 – Jun 1	May 20 – Jun 1	Early August (early types)	Mid-October
Beans — snap, pole	—	—	May 1 – Jun 15 (succession every 3 wks)	50–60 days after sow	First frost
Beans — snap, bush	—	—	May 1 – May 25	50 days after sow	Heat cull, replant Aug 1

Crop	Sow indoors	Transplant out	Direct sow	First harvest	Final harvest
Beans — dry, heritage (Anasazi, pinto, Hopi)	—	—	May 15 – Jun 5	(single harvest)	Sept – Oct
Beans — tepary (<i>P. acutifolius</i>)	—	—	Jun 20 – Jul 15 (monsoon-timed)	(single harvest)	Oct
Sweet corn (sugary, su)	—	—	Apr 15 – May 10	65–75 days after sow	Jul – Aug
Sweet corn (supersweet sh2)	—	—	May 1 – May 25	75–85 days after sow	Aug
Sweet corn (heritage flour/dent — Hopi blue, Painted Mountain)	—	—	May 10 – Jun 1	(single dry harvest)	Sep – Oct
Sweet corn (O’odham 60-day, monsoon-timed)	—	—	Jul 1 – Jul 15	(single harvest)	Sep
Sweet potato	(slip production starts Feb 1)	May 20 – Jun 10 (slips)	—	Oct 1 (vine kill or first frost)	Single dig

LOCAL TIP

Tape a printed copy of this calendar inside the shed door — same drill as the cool-season calendar in Guide 6. The warm-season calendar has fewer separate events, but the cluster from May 1–25 is unforgiving. A tomato transplanted May 1 in 55 °F soil sits three weeks; the same plant transplanted May 15 in 70 °F soil catches and passes the first by July. Date discipline matters less in this calendar than soil-temperature discipline.

3 · Tomatoes

The single most-grown crop in Cochise County · soil + hydroponic · the long chapter

Tomatoes (*Solanum lycopersicum* — part of the *Solanaceae*, the family that also includes peppers, eggplant, and potatoes) are the warm-season anchor crop of the Dragoons. More gardens grow them than peppers; more square footage is dedicated to them than to any other crop in this guide. They reward attention more than any other crop here and punish neglect more sharply. This chapter mirrors **Guide 2 — Peppers in the Dragoons** in structure: a deep variety reference, a complete soil track, a complete hydroponic track, then pest and harvest sections.

If it's your first season. Start with cherry tomatoes — *Sun Gold* or *Juliet*, one of each. They set fruit through the pre-monsoon heat, forgive irregular watering better than slicers, and produce so heavily that a first-year grower will have tomatoes to give away. Add one *Phoenix* or *Heatmaster* slicer if you want sandwich tomatoes. Save the heirlooms (*Cherokee Purple*, *Brandywine*) for year two, after you've watched the bloom-drop-and-monsoon-recovery cycle once with your own eyes.

3.1 Why tomatoes work in the Dragoons — the two-season opportunity

Tomatoes are native to the Andes — high-elevation, cool-night, dry-air country. They are biologically much closer to Dragoon conditions than to humid lowland Eastern gardens. The traits that make tomatoes “difficult” in Florida or Ohio (need full sun, hate humidity, want big diurnal swings, fail under disease pressure in wet soil) read as a description of the Dragoons growing environment.

Factor	Dragoons condition	Why tomatoes love it
Summer days	85-95 °F	Above the photosynthesis sweet spot but below pollen sterility (until heat dome weeks).
Summer nights	60-72 °F	Ideal for fruit set; tomatoes set best with nights below 75 °F.
Diurnal swing	30-40 °F daily	Concentrates sugars and acids — Dragoon tomatoes taste markedly better.
Monsoon humidity	50-70 % July-Sept	Restarts fruit set after the June heat. Tomato pollen rehydrates.

Factor	Dragoons condition	Why tomatoes love it
UV intensity	15-20 % higher at elevation	Faster ripening, deeper color, stronger lycopene.
Fall season	Sept-Nov, warm days, cool nights	Long ripening window — fall tomatoes are some of the best of the year.
Disease pressure	Very low	Dry climate suppresses early blight, late blight, septoria; humidity returns only during monsoon.
Frost	First frost Oct 25 – Nov 10	200+ frost-free days at base elevation.

The two-season opportunity (§1.5) applies most strongly to tomatoes. Almost every grower who plans for it gets two distinct waves:

- **Spring wave** — June 25 through July 10, the early-set fruit on the lowest two trusses, ripening before the pre-monsoon heat dome shuts pollen down. This wave is small (2-4 tomatoes per plant on indeterminates, 4-8 on cherries) but unbeatable in flavor — concentrated by the spring dry-heat sun and the long diurnal swing.
- **Monsoon wave** — August through first frost, the main crop, set after monsoon humidity restarts pollination around July 15. This is 80 % of total season yield on most varieties.

A grower who plants only late-season heirlooms (*Brandywine*, *Mortgage Lifter*) gets only the second wave. A grower who plants early heat-tolerant varieties (*Phoenix*, *Heatmaster*) plus cherries (*Sun Gold*, *Juliet*) catches both. The variety selection in §3.2 is built around this split.

3.2 Variety reference

Pick varieties by three criteria, in order: (1) determinate vs indeterminate, (2) heat tolerance through pre-monsoon June, (3) fruit type (cherry / saladette / slicer / paste). Long-season East-Coast heirlooms run into the same problem as long-season European brassicas in Guide 6 — they need a longer uninterrupted production window than the Dragoons reliably provide.

Variety · profile	Type	Days · Habit	Dragoon-fit	Dragoon notes
<i>Sun Gold</i> F1	Cherry · orange	57 d · indeterminate · 6-8 ft	●●●●●	The best all-around tomato for the Dragoons. Heat-tolerant, sets through pre-monsoon, candy-sweet, prolific. If you grow one tomato, grow this one.
<i>Juliet</i> F1	Saladette · red	60 d · indeterminate · 6-7 ft	●●●●●	Pollen-fertile through 100 °F days. Crack-resistant — survives monsoon splitting. Holds long on the vine. The Dragoons workhorse.
<i>Phoenix</i> F1	Slicer · red	72 d · determinate · 4-5 ft	●●●●●	Bred specifically for high-heat fruit set (TAMU). Sets fruit through 95 °F days. The single best summer slicer here.
<i>Heatmaster</i> F1	Slicer · red	75 d · determinate · 4-5 ft	●●●●●	Same heat-set genetics as <i>Phoenix</i> . Slightly larger fruit (10 oz vs 8 oz). Pick either, not both.

Variety · profile	Type	Days · Habit	Dragoon-fit	Dragoon notes
<i>Solar Fire</i> F1	Slicer · red	72 d · determinate · 4 ft	●●●●○	Excellent heat-set, slightly smaller fruit than Phoenix. Good fall determinate.
<i>Sungold Sweet</i> OP	Cherry · orange	65 d · indeterminate · 6 ft	●●●●○	Open- pollinated derivative of <i>Sun Gold</i> . Save seed. Slightly less prolific but stable.
<i>Sweet Million</i> F1	Cherry · red	65 d · indeterminate · 6–8 ft	●●●●○	Classic red cherry. Heat-tolerant. Excellent fresh and dried.
<i>Black Cherry</i> OP	Cherry · purple-black	65 d · indeterminate · 6 ft	●●●●●	Heirloom cherry with strong heat tolerance. Complex flavor — best fresh.
<i>Cherokee</i> <i>Purple</i> OP	Slicer · purple-pink	80 d · indeterminate · 6 ft	●●●●●	The heirloom that works at Dragoon elevation. Sets a little less in June heat than <i>Phoenix</i> , but the monsoon wave is exceptional. Earthy, smoky, tannic.

Variety · profile	Type	Days · Habit	Dragoon-fit	Dragoon notes
<i>Black Krim</i> OP	Slicer · purple-black	75 d · indeterminate · 5-6 ft	●●●●	Cool-night-loving heirloom from Crimea — likes the Dragoons climate notably. Heavy fruit (10-12 oz). Crack-prone during monsoon — pick at breaker stage.
<i>Brandywine</i> OP (Sudduth's)	Slicer · pink	85 d · indeterminate · 6 ft	●●●○	The classic heirloom flavor benchmark, but a heavy June dropper. Plant if you have space for one and accept fall-only production.
<i>Roma / San Marzano</i> OP	Paste · red	75 d · determinate or semi · 4 ft	●●●●○	Standard sauce paste. <i>San Marzano</i> (true Italian) is fussier than <i>Roma</i> but the canning result is worth it. Plant 4+ for a sauce harvest.
<i>Amish Paste</i> OP	Paste · red	80 d · indeterminate · 6 ft	●●●●○	Larger and meatier than <i>Roma</i> . Indeterminate — keeps producing through fall. Best paste for monsoon-region growers.

Variety · profile	Type	Days · Habit	Dragoon-fit	Dragoon notes
<i>Principe Borghese</i> OP	Drying cherry · red	75 d · determinate · 3-4 ft	●●●●	The Italian sun-drying tomato — small thick-walled fruit, low water. Dragoon fall sun is ideal for sun-drying without a dehydrator.
<i>Early Girl</i> F1	Slicer · red	50 d · indeterminate · 5 ft	●●●○	Old-school early variety. Beats the June heat for first fruit but pollen sterility kicks in July. Useful as an early plant alongside heat-tolerant types.
<i>Stupice</i> OP	Slicer · red	55 d · indeterminate · 4-5 ft	●●●●○	Czech short-season heirloom. Sets in cool spring nights better than almost any other variety. Excellent for early June fruit.
<i>Mortgage Lifter</i> OP	Slicer · pink	85 d · indeterminate · 6 ft	●●○	Famous heirloom; an outright June dropper at Dragoon elevation. Plant only with realistic expectations.

Variety · profile	Type	Days · Habit	Dragoon-fit	Dragoon notes
<i>Yellow Pear</i> OP	Cherry · yellow	70 d · indeterminate · 6 ft	●●●	Mild flavor, decorative; self-sows aggressively if fruit drops. Heat-tolerant.
<i>Tomatillo</i> (<i>Physalis</i>)	Husk fruit	75 d · indeterminate · 4 ft	●●●●○	Different genus, included here because it grows on the same calendar. Plant two — they need cross- pollination. Excellent monsoon-set crop for salsa verde.

The Dragoon tomato trio. If you plant three tomatoes, plant *Sun Gold* (cherry, heat-tolerant, all-season), *Phoenix* or *Heatmaster* (slicer, heat-set, mid-season), and *Cherokee Purple* (heirloom flavor, monsoon-wave slicer). This trio covers June through frost across cherry/slicer/heirloom, sets through 95 °F highs, and gives you both the spring and monsoon waves. Add *Roma* or *Amish Paste* if you make sauce.

WARNING

Indeterminate vs determinate is not interchangeable. Determinate varieties (*Phoenix*, *Heatmaster*, *Roma*) grow to a fixed height (4–5 ft), set all their fruit in a 2–3 week window, then decline. Indeterminate varieties (*Sun Gold*, *Cherokee Purple*, *Black Krim*) keep growing and setting through first frost — they need bigger stakes, more pruning, more reservoir for hydroponics, and a longer string trellis. Mixing them in the same bed without planning produces a tangle by August. Group determinates together; group indeterminates together.

3.3 Choose your track — soil or hydroponic

Almost every Dragoon grower starts in soil and eventually adds a hydroponic row. Tomatoes do extremely well in both. The decision matrix mirrors the Guide 2 §4 framework for peppers.

Factor	Soil Track (§3.4–3.7)	Hydroponic Track (§3.8–3.12)
Up-front cost	Low — compost, stakes, drip	Moderate — Bato buckets, pump, reservoir
Daily attention	Low-moderate — pruning, drip check	Moderate — daily pH/EC, weekly reservoir change
Water use	Higher — 1.5-2 gal/plant/day peak	50-70 % lower — recirculating
Local soil limits (caliche, pH 8)	Major obstacle — needs raised beds and sulfur	Bypassed entirely
Well-water hardness	Tolerated; soil buffers	Must be pre-treated — see Guide 3 §4
Yield ceiling	Moderate — 8-12 lb / indeterminate plant	High — 15-25 lb / indeterminate plant under good management
Sugar / flavor	Excellent — Dragoon diurnal swing	Excellent — same swing applies, plus EC (electrical conductivity, in mS/cm — a measure of dissolved nutrient salts) tuning
Disease pressure	Soil-borne fungi (rare in Dragoons), splitting in monsoon	<i>Pythium</i> root rot (a warm-water fungal root pathogen common in hydroponic reservoirs above 72 °F)
Best for	All heirlooms, determinates, paste varieties	Indeterminate cherries, slicers, single high-value plants
Failure mode	BER (calcium delivery, watering), splitting	<i>Pythium</i> , EC drift, blossom drop from reservoir heat
Pruning workload	Single-leader optional; multi-leader common	Single-leader strict — Florida-weave or string trellis

Pick the track, not the system. A 4-bucket Bato row of *Sun Gold* and *Juliet* alongside a raised bed of *Cherokee Purple* and *Roma* is the most common Dra-

goon tomato setup. The hydroponic row produces 30–40 lb of cherries over the season; the soil bed gives you sandwich tomatoes and a paste harvest. The same nutrient program covers both with adjustments. Read both tracks before committing.

RELATED GUIDES

The Bato bucket build, water treatment, and daily operations live in **Guide 3 — Bato Bucket Hydroponic Systems**. The canonical Masterblend feeding chart for tomatoes is in **Guide 4 — Hydroponic Nutrients**, §1.4.1. Read both before committing to the hydroponic track in §3.8.

3.4 Soil track — site, bed prep, and amendments

The soil-track recipe is the same as for peppers (Guide 2 §5.1): sandy loam base, pH driven from 7.5–8.5 down to 6.5, organic matter built up to 3–5 %, drainage improved if there's caliche underneath. Tomatoes are heavier feeders than peppers and want a slightly more fertile bed.

Soil chemistry targets

Parameter	Target for tomatoes	Typical Dragoons baseline	Adjustment
pH	6.2 – 6.8	7.6 – 8.1	Elemental sulfur 1–2 lb per 100 sq ft worked in 4–6 weeks before transplant; acidify drip water to pH 6.5
Organic matter	4 – 6 %	1 – 2 %	3–4 inches finished compost worked into top 10 inches each spring
Drainage	Excellent	Variable — often shallow caliche	Raised beds 12–18 inches deep where caliche is shallow
Texture	Sandy loam	Variable	Add coarse sand 20 % by volume to clay pockets
Nitrogen	Moderate at planting; reduced at flowering	Low	Composted manure or feather meal at transplant; side-dress at first flower; <i>taper N</i> after first fruit
Phosphorus	High at planting	Low-moderate	Bone meal 1 lb per 100 sq ft in transplant hole
Calcium	High — BER prevention	Naturally high in Dragoons (caliche)	Usually sufficient. BER here is almost always a <i>watering</i> problem, not a Ca shortage

Parameter	Target for tomatoes	Typical Dragoons baseline	Adjustment
Potassium	High during fruiting	Moderate	Wood ash 1 cup per 10 sq ft worked in fall, or kelp meal at side-dress

Pre-plant bed routine

1. **Mid-March:** Pull cool-season residues; broadfork the bed to 12 inches; remove rocks larger than a marble (less critical than for root crops, but still helpful for transplant root run).
2. **Late March:** Spread 3–4 inches of finished compost. If your fall soil test was alkaline, broadcast 1 lb elemental sulfur per 100 sq ft and work in.
3. **Early April:** Water deeply once. Let bed rest.
4. **Mid-April:** Test soil temperature in the morning at 4-inch depth. When it holds above 60 °F for five mornings running, you can transplant.
5. **Transplant day:** Dig hole 12 inches deep × 12 inches wide. Mix in 1 cup bone meal, 1 cup composted manure, and 1 tablespoon Epsom salt. Set transplant deep — see §3.5.

3.5 Soil track — transplant timing, depth, spacing, watering

Spring transplant window

Variety type	Earliest safe transplant	Optimal transplant	Latest useful transplant
Short-season (<i>Stupice</i> , <i>Early Girl</i>)	April 25	May 5	May 25
Heat-tolerant determinates (<i>Phoenix</i> , <i>Heatmaster</i>)	May 1	May 10	June 1
Cherries (<i>Sun Gold</i> , <i>Sweet Million</i>)	May 1	May 10–15	June 5
Main-season indeterminates (<i>Cherokee Purple</i> , <i>Black Krim</i>)	May 5	May 15	June 1

Variety type	Earliest safe transplant	Optimal transplant	Latest useful transplant
Heirloom long-season (<i>Brandywine</i> , <i>Mortgage Lifter</i>)	May 5	May 15	June 1 — later loses the spring wave entirely

Fall succession window

A second tomato planting in July catches the late-monsoon and fall windows. Use determinate or short-season indeterminate varieties; transplant by July 25 to get any meaningful harvest before frost.

Variety type	Transplant out	First harvest	Last harvest
Determinate (<i>Phoenix</i>)	July 10-20	September 20	First frost
Short-season indeterminate (<i>Stupice</i> , <i>Early Girl</i>)	July 10-20	September 25	First frost
Cherry (<i>Sun Gold</i>)	July 10-20	September 30	First frost

Plant deep — the load-bearing tomato planting rule

Tomatoes form roots along any stem buried below soil line. A leggy transplant set deep produces 2-3× the root mass of a shallowly planted one. **Strip leaves from the bottom 6-8 inches of the stem and bury that portion.** For tall transplants, dig a trench rather than a deep hole — lay the plant sideways with the top 6 inches angled up. The buried stem sends out new roots within a week and accelerates the plant ahead of its calendar.

Spacing

Variety type	In-row spacing	Between rows	Notes
Determinate (caged)	24 in	36 in	Cage at transplant; no further pruning
Determinate (staked)	18 in	30 in	Single 5-ft stake; tie loosely
Indeterminate (single-leader, staked or strung)	18-24 in	36 in	Aggressive pruning to one stem

Variety type	In-row spacing	Between rows	Notes
Indeterminate (multi-leader, Florida weave)	24 in	36 in	2-4 leaders per plant; weave string monthly
Cherry (sprawling, indeterminate)	36 in	48 in	Can be cage-only if pruning skipped — turns into a thicket but produces heavily
Paste (determinate <i>Roma</i>)	24 in	36 in	Cage; no further pruning

Watering

Tomatoes want deep, even watering — closer to the brassica rhythm than the pepper rhythm. Inconsistent watering is the cause of nearly every soil-grown problem: blossom end rot, splitting, sunscald, and bitter flavor all trace back to a dry spell followed by a deep soak.

- **Drip lines, not overhead spray.** Splash from overhead irrigation spreads soil-borne disease; also wastes 30 % to evaporation in dry desert air.
- **Two emitters per plant.** A single emitter on a tomato plant produces uneven root growth. Two emitters 8 inches apart on opposite sides of the stem give even distribution.
- **Frequency:** every 2-3 days early season (May-June, deep watering 6 inches down); every 1-2 days through peak summer; every 3 days in fall as temperatures drop.
- **Volume target:** 1.5-2 gallons per plant per day at peak production (July-August). About half that in May; about a third in October.
- **Mulch heavily.** 3-4 inches straw or wood chips after the soil hits 70 °F. Reduces evaporation 40-60 %, keeps soil temperature stable, slows splitting.

Even watering prevents blossom end rot. BER (dark sunken spot on fruit bottom) is the most common tomato complaint in the Dragoons, and it is *not* a calcium shortage in our soil — the caliche delivers all the calcium needed. BER is the symptom of *uneven calcium uptake* caused by uneven watering. The plant can't pull calcium through dry roots. Fix the watering, not the soil. The classic pattern: a heat wave week with skipped irrigation, followed by a deep soak — the next fruit set shows BER, the fruit set two weeks later doesn't.

3.6 Soil track — fertilization

Tomatoes are heavier feeders than peppers but more sensitive to excess nitrogen at flowering. The right pattern is *front-loaded N* (at transplant), *tapering N + boost K* (at first flower), *high K + Ca* (through fruiting).

Stage	Timing	Amendment	Method
Transplant	May 1-25	1 cup composted manure + 1 cup bone meal + 1 tbsp Epsom in the planting hole	Mix into the bottom of the hole; do not let bare roots touch concentrated bone meal
Establishment	2 weeks after transplant	1 cup fish emulsion (dilute 1:5) per plant	Drench around base
First flower	5-6 weeks after transplant	Side-dress 2 cups composted manure per plant, plus 1/4 cup wood ash	Scratch into top inch of soil 6 inches from stem
First fruit set	8 weeks after transplant	1 tbsp Epsom salt dissolved in 1 gal water	Drench at base — magnesium for the heavy fruit-set demand
Peak fruiting	Through August	Side-dress 1 cup composted manure every 3 weeks, plus 1/4 cup wood ash	Same
Late season	September	Stop nitrogen; potassium only	Pull off N side-dresses entirely; encourage ripening

WARNING

Don't push nitrogen at flowering. Too much nitrogen at first flower triggers vegetative growth at the expense of fruit set. The plant builds leaves and skips flowers. Cut all high-N inputs (fresh manure, blood meal, feather meal) once the first flower buds appear. Switch to potassium-and-calcium-dominant side-dresses.

3.7 Soil track — pruning and staking

Tomatoes are vines pretending to be shrubs. Most cultivated varieties tip over and sprawl without support. The Dragoons add wind to the equation — a 50 mph monsoon

gust will flatten any unstaked tomato in the bed. Staking and pruning matter more here than in calmer climates.

Single-leader vs multi-leader

Method	Best for	Yield	Workload	Disease pressure
Single-leader (one stem, all suckers removed)	Indeterminates on string trellis; hydroponics	Highest per square foot	Highest — prune weekly	Lowest — best airflow
Two-leader (main stem + first sucker below first flower truss)	Indeterminates on a Florida weave; soil-grown cherries	Higher than multi	Moderate	Low
Multi-leader (3-4 stems allowed to develop)	Indeterminates in cages; soil heirlooms	Highest total fruit per plant; lower per sq ft	Low — prune occasionally	Higher — denser canopy
No pruning (let it sprawl, cage-only)	Determinates; cherries in big spaces	Same as multi-leader for determinates; lower for indeterminates	Lowest	Highest — full canopy, monsoon mildew risk

The single rule that matters most: *strip all leaves below the first fruit truss* once the truss sets, on every variety. That single act improves airflow at the base, cuts soil-splash disease, and pushes energy into fruit. For peppers and tomatoes both, this is the highest-return single pruning event.

Staking systems

System	Setup	Best for	Notes
Tomato cage	4-ft × 18-in galvanized cage stakes in soil	Determinates, cherries in small plots	Buy quality once. Cheap cages flatten under fruit weight by August.
Single stake (5 ft, 1-in)	T-post or rebar 12 in into ground	Determinates and short indeterminates	Tie with soft cloth or silicone clips every 8 in.

System	Setup	Best for	Notes
Florida weave	8-ft T-posts every 6 ft; double-string weave between every other row of plants	Indeterminate rows in raised beds	The commercial method. 1 hour of weaving per 20 ft of row per month.
String trellis (overhead)	Cattle panel or 6-ft horizontal wire stretched between two end posts; drop string per plant	Hydroponic and high-yield indeterminate soil rows	The hydroponic standard; transfers cleanly to soil. See Guide 2 §7 for the universal trellis pattern.
Cattle-panel A-frame	Two 16-ft cattle panels leaned together	Cherries, paste tomatoes	Excellent monsoon-wind resistance. Reuses for cucumbers next year.

LOCAL TIP

A 16-ft cattle panel costs \$25 at Tractor Supply in Sierra Vista and outlasts every other support in this guide. Two leaned together against the prevailing wind direction make an A-frame that holds 6 indeterminate tomato plants per panel and resists monsoon gusts in a way that no T-post trellis matches. Same panel pulls double duty for cucumbers and pole beans in years 2–3 of bed rotation.

Pruning calendar — indeterminate, single-leader

Week (from transplant)	Action
0	Plant deep. Strip leaves from bottom 6–8 in of buried stem.
2	Tie loosely to stake or string. Remove any suckers below the cotyledons.
4	First serious sucker pinch — every leaf axil produces a sucker. Pinch all of them below the first flower truss when the suckers are 1–2 in long. Keep going every week.
6	First flower truss should be visible. Strip remaining leaves below the first truss.

Week (from transplant)	Action
8	First fruit set. Continue sucker pinch. Tie up the leader as it grows.
10+	Weekly sucker pinch. Tie up weekly. Pull off any leaf that yellows from the bottom; the plant is mobilising N upward and is done with that leaf.
Late September	Top the plant — cut the growing tip 18 inches above the highest fruit cluster. Push energy into ripening, not new growth.

Pruning calendar — determinate

Almost no pruning. Strip leaves below the first fruit truss; otherwise, let the cage hold the plant up. Determinates are bred to set their fruit cluster on a fixed stem count — removing suckers reduces yield.

3.8 Hydroponic track — system selection

Bato buckets are the right system for tomatoes in the Dragoons. The reasoning mirrors Guide 2 §6.1: 5-gal media volume supports the root mass, drip-and-drain cycles oxygenate the root zone, the bucket spacing matches the 18–24-in plant spacing tomatoes want. Alternatives exist for cherries (DWC works well) and are listed below — but Bato is the default.

Variety type	Best hydro system	Why
Indeterminate slicer / heirloom	Bato bucket ●●●	Root mass requires the volume. 5-gal media per plant.
Indeterminate cherry (<i>Sun Gold</i> , <i>Sweet Million</i>)	Bato bucket or DWC	Either works; Bato is more forgiving of reservoir heat.
Determinate slicer (<i>Phoenix</i>)	Bato bucket	Same as indeterminate; the determinate just stops earlier.
Paste (<i>Roma</i> , <i>Amish Paste</i>)	Bato bucket	Heavy fruit load; needs the root volume.
Cherry (<i>Juliet</i>)	DWC or Bato bucket	Either; DWC produces faster, Bato produces longer.
Tomatillo	Bato bucket	Two plants minimum; cross-pollinated.
Drying cherry (<i>Principe Borghese</i>)	DWC	Compact, short-season; cheap setup.

RELATED GUIDES

The canonical Bato bucket build, water treatment protocol, plumbing, pump and timer specs, and daily operations live in **Guide 3 — Bato Bucket Hydroponic Systems**. Read that guide before committing to the hydroponic track here. This section assumes the system is already built per Guide 3 spec and covers only what differs for tomatoes vs peppers.

Media

Same recommendation as for peppers (Guide 2 §6.1): 70 % perlite + 30 % hydroton, washed, in 5-gal Bato buckets. Coco coir works for tomatoes too — slightly higher water retention than pure perlite, which can help in mid-summer reservoir cooling but increases EC drift. Pick one and run it consistently.



Figure 1: Young indeterminate tomatoes in bato buckets at the stage just before stringing up — 18-in spacing, drip lines run, the overhead twine trellis described in §3.12 going in next.

3.9 Hydroponic track — reservoir temperature management

The #1 hydroponic challenge in the Dragoons is reservoir temperature, and tomatoes are slightly *more* sensitive than peppers. Above 72 °F at the roots, dissolved oxygen drops, *Pythium* root rot becomes likely, and nutrient uptake stalls. The Dragoon summer makes this work — daytime air temperatures push reservoir temperatures up faster than any other regional factor.

- **Bury reservoirs partially.** A reservoir half-buried in Dragoon soil runs 8–12 °F cooler than the same tank sitting in the sun.
- **Insulate with rigid foam.** 1-inch foam wrap on an exposed reservoir cuts daily peak temperature by 5–8 °F.
- **Shade with row cover or 30 % shade cloth.** A reservoir sitting in afternoon shade (east side of a structure, or north of a tall plant row) runs 5 °F cooler.
- **In-line chiller for indoor / sunroom setups.** A \$200 1/10 HP chiller holds a 30-gallon reservoir at 65 °F through summer — the gold standard.
- **Monsoon advantage.** From mid-July through mid-September, air temperature drops 10 °F; the hardest reservoir-cooling weeks (June and early July) end just as fruit set restarts.

Reservoir temperature is the single biggest hydroponic intervention for Dragoon tomatoes. Above 75 °F at the roots, the best Masterblend recipe in the world cannot save the crop. *Pythium* takes over within days. The cheapest fix is to bury the reservoir 12 inches in the ground. The next-cheapest is foam insulation. Spend money here before spending it anywhere else in the system.

3.10 Hydroponic track — starting seeds

Same indoor-start protocol as peppers (Guide 2 §6.3) with two differences: tomatoes germinate faster (5–10 days vs 14–28 for peppers), and tomato seedlings are larger by transplant — pot up at 6–8 weeks rather than 8–10.

Factor	Target	Notes
Media	1.5-in rockwool cubes	Soak in pH 5.5 water before use. Rockwool transitions cleanly into Bato.
Substrate temperature	75–80 °F	Heat mat under seed trays.
Germination time	5–10 days	Faster than peppers — start tomato seeds 6 weeks before transplant, not 10.
Initial nutrient solution	EC 0.4–0.6	Very dilute. Seedlings need almost nothing.

Factor	Target	Notes
pH of water/solution	5.8-6.0	Pre-treat rockwool with pH 5.5 water. Soak 1 hour.
Light after sprouting	16 hrs LED, 200-300 PPFD (photosynthetic photon flux density, in $\mu\text{mol}/\text{m}^2/\text{s}$ — the rate of usable light hitting the plant)	Quantum board or T5 4 in above seedlings.

Transitioning seedlings into the system

1. **Wait for visible roots** through the base of the rockwool cube — typically when the seedling is 4-6 in tall.
2. **Place cube in net pot** of the Bato bucket. Surround with perlite/hydroton. No bare-rooting needed.
3. **Drop reservoir level** so net pot bottom sits 1 in above solution. Roots reach down.
4. **Start at low EC** — first week in system at EC 0.8-1.0. Increase to vegetative level (1.4-1.8) within 7-10 days as new growth shows.
5. **Protect from UV.** Dragoon UV at elevation is intense. 30 % shade cloth for the first 2 weeks of outdoor exposure.

3.11 Hydroponic track — nutrient solution and EC/pH by stage

Tomatoes are heavy feeders with a different curve than peppers. They want more N and K at fruit sizing than peppers, less Mg, and higher EC peaks during peak fruiting. The full per-gallon Masterblend recipe is canonical in **Guide 4 Part 1 §1.4.1** — the table below pulls the targets relevant to this track.

RELATED GUIDES

The full per-gallon Masterblend recipe for tomatoes, the strict mixing order (Masterblend → Epsom → Cal-Nitrate **last**), and the 5-gallon batch references live in **Guide 4 — Hydroponic Nutrients §1.4.1 and §1.4.4**. This table is for reference only — Guide 4 is canonical.

Tomato EC and pH by stage

Stage	Approx week from transplant	Target EC (mS/cm)	Target pH	Notes
Seedling (cube to 4 true leaves)	0-2	0.8-1.0	5.8-6.0	Hold dilute.

Stage	Approx week from transplant	Target EC (mS/cm)	Target pH	Notes
Early vegetative	2-4	1.4-1.8	5.8-6.0	Push leaf and root growth.
Late vegetative / pre-flower	4-7	1.8-2.2	5.8-6.2	Slight upward trend in EC.
First truss flowering	7-10	2.0-2.4	5.8-6.2	Watch for blossom drop above 75 °F nights or below EC 1.5.
First fruit set	10-14	2.2-2.6	6.0-6.2	Add the Mg bump — Epsom to 1.5-1.8 g/gal.
Heavy fruiting	14-20+	2.4-3.0	6.0-6.2	Peak production. Reservoir change every 7 days.
Final flush (last 1-2 weeks before kill)	Late October	0.5-0.8	6.0	Flush — improves last-fruit flavor and primes system for cleanup.

The Mg bump for tomatoes (smaller than peppers)

Crop	Peak fruiting Epsom (g/gal)	Note
Pepper (canonical, Guide 4 §1.4.2)	2.4 g/gal	The Mg bump is the load-bearing pepper rule.
Tomato (canonical, Guide 4 §1.4.1)	1.5-1.8 g/gal	Smaller bump. Tomatoes use less Mg than peppers.

Don't apply pepper's Mg bump to tomatoes. A common Dragoon mistake is running peppers and tomatoes on the same reservoir and dialing Epsom to 2.4 g/gal for both. Tomatoes don't need that much Mg and the excess at high EC can show up as leaf-edge necrosis. Keep separate reservoirs for peppers and tomatoes if you want to optimize both; if running one shared reservoir, hold

Epsom at the tomato rate (1.5–1.8) and accept that peppers will run slightly Mg-limited. The Guide 4 §1.4 split exists precisely to clarify this point.

3.12 Hydroponic track — pruning, training, and Florida weave for hydro

Hydroponic tomatoes are single-leader, period. The system rewards a single tall stem trained vertically up a string with all suckers pinched off — every week, religiously. Two factors drive this:

- **Reservoir volume per plant is fixed at 5 gallons** (Bato bucket). A multi-leader plant has 2–4× the canopy of a single-leader and exhausts the bucket’s water within hours.
- **The drip-and-drain cycle works best with a vertical, narrow plant.** Spreading laterals shade adjacent buckets, drip lines, and reservoirs and unbalance the system.

The hydroponic tomato pruning rhythm

Week from transplant	Action
0	Set string drop from overhead line before transplanting. Tie loose loop at base of stem.
2	Begin daily sucker pinch on lower 4 leaf axils.
4	Wrap stem around string clockwise; clip with tomato clip every 8 in.
6	First flower truss visible. Strip leaves below it.
8	First fruit set. Continue wrapping; continue pinching every sucker, every week.
12	Begin “lower-and-lean” if your overhead line is fixed. The stem gets longer than the vertical run — lower the plant by sliding the string clip down and angling the lower stem horizontally along the bench surface.
Final 2 weeks	Top the plant 18 in above the last flowering truss. Drop EC to flush level.

Florida weave in hydroponic mode

For wider beds and multiple plants per row, Florida weave converts cleanly to hydro. Set 8-ft T-posts every 6 ft along the row. Weave 18-inch-spaced twine between every other plant pair, top and bottom. Each plant lives between two parallel twine layers. This works particularly well for cherry varieties that produce so many side trusses that single-leader pinching becomes a daily job.

Single-leader vs Florida weave decision

Variety	Recommended training	Why
<i>Sun Gold</i>	Florida weave or single-leader	Either works. Single-leader gives slightly more total yield; Florida weave needs less daily attention.
<i>Juliet</i>	Single-leader	Trusses are heavy; weave gets messy.
<i>Phoenix, Heatmaster</i> (determinate)	Cage or Florida weave	Don't try to single-leader a determinate — it's not how it grows.
<i>Cherokee Purple, Black Krim</i> (indet. heirloom)	Single-leader	Single 6-ft stem produces the highest-quality fruit.
<i>Roma, Amish Paste</i>	Florida weave	Multi-leader paste varieties pump out more fruit on a weave.

3.13 Pests, diseases, and physiological problems

The Dragoons have lower tomato disease pressure than most American regions, but a handful of pests matter, and several physiological problems (BER, splitting, sunscald) are the bigger threats than infectious disease in this climate.

Tomato hornworm (*Manduca quinquemaculata*)

Five-spotted hawkmoth larvae — large green caterpillars with white striping and a single horn. Defoliate quickly; in a bad year, a single plant can be stripped to bare stems in 48 hours. Active mid-July through September on the same monsoon-trigger pattern as squash vine borers.

Stage	Sign	Action
Egg	Single round green eggs on leaf undersides	Hand pick if you spot them; usually missed

Stage	Sign	Action
Small larva (1–2 in)	Black frass pellets on leaves below; occasional notched leaf	Hand pick at dusk; the caterpillars feed from the top of the plant
Large larva (3–4 in)	Massive defoliation; leaves stripped from upper canopy outward	Hand pick urgently; <i>Bt</i> spray
Parasitized larva	White rice-like pupae on caterpillar back	Leave alone — these are braconid wasp parasites; the caterpillar will die and the wasps will hatch and kill more hornworms

Bt (*Bacillus thuringiensis* var. *kurstaki*) applied at dusk through monsoon is the most effective preventative. Hand picking works for small plantings (10 plants or fewer) — a daily dusk walk-through of the bed with a flashlight catches them. The horn is harmless; pick with bare hands.

Tomato/Potato psyllid (*Bactericera cockerelli*) and tomato-mosaic virus

The psyllid is small (1/16 in), winged, and lives on the undersides of upper leaves. Direct damage is mild (yellowing, leaf curl). The serious issue is that the psyllid vectors **tomato-mosaic virus** and the *Candidatus Liberibacter solanacearum* bacterium that causes psyllid yellows. A virus-infected plant produces mottled, distorted leaves and small, malformed fruit.

Stage	Sign	Action
Light infestation	Slight leaf yellowing; tiny wedge-shaped psyllids on undersides	Insecticidal soap; encourage lacewings and ladybugs
Heavy infestation	Severe yellowing, leaf curl, stunted plants	Pyrethrin at dusk; reflective silver mulch around plants disorients them
Virus symptoms (mottled leaves, distorted fruit)	Pull and destroy plant	No cure — sanitize tools, rotate beds

WARNING

Psyllid pressure rises in dry, hot springs. A dry April–May with no rain and 90 °F+ days pushes psyllids from native solanaceous hosts (silverleaf night-

shade, ground cherry) onto tomatoes. Reflective mulch around plants disorients incoming psyllids and is the most effective single intervention if you've seen damage previously. Pull and destroy virus-symptomatic plants immediately — leaving them in the bed is a vector reservoir for the rest of the season.

Splitting (concentric and radial)

Splitting is a *watering* problem, not a disease. The classic Dragoon pattern: a 10-day dry spell during which fruit ripens with low water uptake; then a 1-inch monsoon downpour delivers a rush of water; the fruit interior expands faster than the skin and cracks. Concentric (ring-shaped) splits at the stem end and radial (spoke-shaped) splits down the sides are both expressions of the same uneven-water issue.

- **Mulch heavily** to buffer soil moisture against rain spikes.
- **Pick at breaker stage** (when first color shows but full ripening is incomplete) during heavy monsoon. Tomatoes ripen perfectly off the vine in 3–5 days at room temperature.
- **Choose crack-resistant varieties** if splitting is a chronic issue. *Juliet*, *Sun Gold*, and *Phoenix* are notably crack-resistant. *Black Krim* and *Cherokee Purple* are notably crack-prone.

Blossom end rot (BER)

Dark, sunken, water-soaked spot on the blossom (bottom) end of fruit. Almost universally a *calcium delivery* problem, not a Ca shortage. Dragoon soil has abundant calcium from caliche; hydroponic Masterblend delivers ample Ca. The plant fails to *move* calcium to the developing fruit because of:

- **Uneven watering** (most common in soil)
- **High EC** (most common in hydro; reduces water uptake)
- **pH out of range** — Ca locks out below pH 5.5 or above 7.0 in hydro
- **Cal-Nitrate mixed first or skipped** in hydro (must be last — see Guide 4 §1.3)

The fix is upstream of calcium: stabilize watering (soil), reduce EC and check pH (hydro), confirm Cal-Nitrate is the last component added (hydro).

Sunscald

Whitish papery patches on fruit shoulders exposed to direct afternoon sun. The Dragons' UV intensity makes this more common than in lower-elevation climates. Prevention: leave enough upper foliage to shade the fruit; consider 30 % shade cloth in July; orient rows north-south.

Powdery mildew

Rare in Dragoons tomatoes — too dry most of the season. Shows up only during heaviest monsoon weeks if the canopy is dense and airflow is poor. The standard milk dilution (1:9 milk:water) sprayed weekly during monsoon stops it cleanly. Better preventative: prune for airflow (the bottom-leaf strip rule).

Curly top virus

Beet curly top virus (BCTV), vectored by the beet leafhopper, is the one virus that causes notable Dragoons losses in some years. Symptoms: stunted plant, severely upward-curved leaves, purple-green leaf veins, dwarfed fruit. No cure. Some years see almost no curly top; other years (typically following warm wet winters when leafhopper populations build) can be brutal. Pull and destroy symptomatic plants immediately. Resistant varieties exist (none in this guide's recommended list, but Roadside Red and ANR Yellow are bred for curly top tolerance).

3.14 Harvest, ripening, and end-of-season

Ripeness indicators

Stage	Sign	Use
Mature green	Full size, skin glossy, slight yellow at blossom end	Fried green tomato; chow-chow; ripens fully off the vine
Breaker	First color (yellow, pink, or red) at blossom end	Picks for storage; ripens in 3-5 days at room temperature
Pink / blush	30-60 % color	Eating ripeness within 1-2 days
Full color	80-100 % color	Eat immediately or process
Soft / overripe	Color uniform, skin slightly wrinkled	Sauce, juice; not for fresh eating

LOCAL TIP

Pick at the breaker stage during heavy monsoon and during the final 2 weeks before frost. Tomatoes ripen fully off the vine without loss of flavor at this stage, and the breaker-stage fruit is less prone to splitting (less ripe = thicker skin) and less attractive to birds. The Dragoons fall sun on a windowsill ripens breaker-stage tomatoes in 3-4 days. The flavor difference between vine-ripened and breaker-ripened is much smaller than commonly believed.

Off-the-vine ripening

Tomatoes synthesize ethylene to ripen themselves — picking at breaker doesn't stop the process. A bowl of breaker-stage tomatoes on the kitchen counter ripens in 3–5 days. Faster in a brown paper bag (concentrates the ethylene). Slower in the refrigerator (and the cold damages flavor — don't refrigerate ripening tomatoes; only refrigerate fully ripe tomatoes you can't eat within 2 days).

End-of-season green tomato use

By late October, every plant has unripe fruit that won't ripen on the vine before frost. Options:

- **Pull plant whole, hang upside down in a cool shed.** Fruit ripens slowly over 2–4 weeks. Works well in dry Dragoon winters.
- **Pick all green fruit; ripen indoors.** Lay single-layer in a flat, check daily. Light is not required (ripening is ethylene-driven, not sun-driven). Wrap individual fruit in newspaper to slow the process — works through Christmas.
- **Process green:** fried green tomatoes; green tomato relish; green tomato salsa verde substitute; green tomato chutney.
- **Compost the unsalvageable.** Anything frost-damaged before harvest goes to compost.

LOCAL TIP

A grocery-store paper bag with three apples and a dozen breaker-stage tomatoes from the last harvest produces ripe tomatoes for Thanksgiving every year. Apples emit ethylene strongly; the bag concentrates it. Check daily and pull ripe ones out before they soften.

4 · Eggplant

Solanaceous companion · transfers from peppers · short chapter

Eggplant (*Solanum melongena* — another *Solanaceae* member alongside tomato, pepper, and potato) is biologically much closer to peppers than to tomatoes — same family, similar heat tolerance, similar root and pruning patterns, similar staking needs. Where this chapter says “see Guide 2,” the pepper protocol is genuinely the same and not repeated. Eggplant deserves its own chapter for two reasons: (1) the variety selection differs sharply by world cuisine, with Asian and African types outperforming the standard Italian *Black Beauty* in Dragoons heat; (2) the flea beetle problem at seedling stage is more severe than for peppers.

4.1 Variety reference

Three traditional families: Italian (large, oval, dark purple), Asian (long, slender, lavender or purple), African/Caucasian (round, striped, multiple colors). The Asian types dominate in Cochise County heat — thinner skins, faster fruit set, less reliant on the cool-night recovery that big Italian eggplants need.

Variety · profile	Type	Days · Habit	Dragoon-fit	Dragoon notes
<i>Ping Tung</i> Long OP	Asian · long, lavender	65 d · 3 ft	●●●●●	The best eggplant for the Dragoons. Sets through 95 °F days, productive June through frost. Thin skin doesn't bitter.
<i>Orient Express</i> F1	Asian · long, deep purple	60 d · 3 ft	●●●●●	Very early. Sets fruit before pre-monsoon heat. Heavy producer through fall.
<i>Ichiban</i> F1	Asian · long, dark purple	60 d · 3 ft	●●●●○	Excellent Asian standard. Heat-tolerant, mild flavor.

Variety · profile	Type	Days · Habit	Dragoon-fit	Dragoon notes
<i>Rosa Bianca</i> OP	Italian · round, lavender-and-white	80 d · 3 ft	●●●●	Beautiful and flavorful but a slow setter. June heat shuts it down; fall production is excellent.
<i>Black Beauty</i> OP	Italian · large, oval, dark purple	80 d · 3 ft	●●●○	The standard Italian variety. Heat-sensitive; sets sparsely until monsoon. Plant alongside Asian types, not as a sole eggplant.
<i>Striped Toga / Listada de Gandia</i> OP	Italian · oval, purple-and-white striped	80 d · 3 ft	●●●●	Heirloom striped type from Spain. Tolerates Dragoon heat better than Black Beauty.
<i>Turkish Orange</i> OP	African · small round, orange	75 d · 4 ft	●●●●○	Unusual — fruits are small (golf-ball) and orange. Bitter when full ripe; eat green. Heat-tolerant.
<i>Casper</i> OP	Italian · oval, white	70 d · 3 ft	●●●●	White Italian — striking and mild. Heat-tolerant.
<i>Fairy Tale</i> F1	Italian-Asian cross · small, striped	50 d · 2 ft	●●●●○	Container-friendly. Very early. Heavy producer. Excellent for small plots.

The Dragoon eggplant pair. Plant *Ping Tung Long* (Asian) and *Rosa Bianca* (Italian) together. The Asian sets through June heat and produces all summer; the Italian catches up in August and produces through October. The pair covers the entire season. Add *Fairy Tale* for an early June harvest if you want a third variety.

4.2 Soil and bed prep

Same as peppers — see **Guide 2 §5.1**. The relevant differences:

- Eggplant is *slightly* heavier feeder than pepper — add an extra cup of composted manure to the planting hole.
- Eggplant likes warmer soil at transplant: wait until soil at 4-inch depth holds **70 °F** for 5 mornings, not 60 °F as with tomato/pepper. Transplant date in the Dragoons is typically May 15–June 1.
- Same drip irrigation, same mulch, same wind tolerance issues.

4.3 Spacing and staking

Variety type	In-row spacing	Between rows	Staking
Asian (<i>Ping Tung</i> , <i>Orient Express</i>)	18 in	30 in	Single 4-ft stake; tie at 12 and 24 in
Italian (<i>Rosa Bianca</i> , <i>Black Beauty</i>)	24 in	36 in	Single 4-ft stake; tie at 12 and 24 in
Container varieties (<i>Fairy Tale</i>)	12 in	18 in	Stake optional; cage works

Don't overcage eggplant. The plants are upright and self-supporting until fruit weight pulls them sideways in late season. A single stake tied with soft cloth at two heights is sufficient for almost every variety.

4.4 Flea beetles — the seedling-stage problem

Flea beetles (*Epitrix* and *Phyllotreta* species) are tiny black jumping beetles that pepper eggplant seedling leaves with pinholes in May. Cosmetic damage on mature plants; potentially fatal on transplants under 6 inches. The Dragoons have light flea beetle pressure in most years and heavy pressure in dry warm springs.

Stage	Action
Pre-transplant (in pots)	Move to a screened or row-covered location; the worst losses happen during the indoor-to-outdoor transition
Transplant + 0–4 weeks	Row cover (0.5 oz/sq yd floating cover) directly on plants for the first 4 weeks. Mature plants outgrow the damage.
Heavy pressure	Diatomaceous earth dusted on leaves; pyrethrin at dusk only
After 4 weeks	Remove cover. Eggplant produces flowers from the leaf axils and self-pollinates; cover slightly reduces fruit set if left too long.

LOCAL TIP

The Dragoon flea beetle peak is the first two weeks of May, coinciding with eggplant transplant time. If you’ve seen flea beetle damage in a previous year, plan to row-cover the eggplant bed at transplant *before* the beetles show up. By the time you see the pinhole pattern, you’ve already lost a week of growth.

4.5 Hydroponic eggplant

Eggplant runs in Bato buckets exactly like peppers — same media, same reservoir routine, same pruning, same EC/pH curve. See **Guide 2 §6** for the complete hydroponic recipe.

The only differences worth noting:

- Eggplant slightly prefers a warmer reservoir than peppers — 68–72 °F is fine; below 60 °F the plant stalls.
- Eggplant in Bato buckets responds to the same Mg bump as peppers (Epsom 2.4 g/gal at fruit set) — see **Guide 4 §1.4.2**.
- Single-leader pruning is optional; eggplant naturally produces a bushy plant with 3–4 main stems. The Florida weave (§3.12 above) works well in hydro for the smaller Asian varieties.

4.6 Harvest

Pick early and often. Eggplant is harvested *immature* — full-size but still glossy. Once the skin loses its sheen and the seeds darken inside, the fruit is bitter. Cut (don’t pull) with a knife or pruning shears, leaving 1 inch of stem attached.

Variety	Harvest size	Sign
Asian (<i>Ping Tung, Orient Express</i>)	8-12 in long, 1.5 in diameter	Skin glossy, fruit firm
Italian (<i>Black Beauty, Rosa Bianca</i>)	4-6 in diameter, 6-8 in long	Skin glossy, fruit firm; thumb press should leave faint mark that disappears
Container (<i>Fairy Tale</i>)	3-4 in long	Skin glossy, picked young

Eggplant doesn't ripen off the vine. Pick what's ready; refrigerate up to a week.

5 · Cucumbers

The trellis crop · monsoon airflow · cucumber beetle defense

Cucumbers (*Cucumis sativus* — the leading edge of the *Cucurbitaceae*, the family of cucumbers, squash, zucchini, melons, and gourds) are the highest-return crop per square foot in the Dragoons warm-season garden. A single 8-ft cattle-panel trellis holds 4–6 plants and produces 60–100 lb of cucumbers from June through October. The Dragoons climate is unusually suited to cucumber: dry pre-monsoon air discourages disease, monsoon humidity boosts fruit set, and the long fall keeps production going until frost. The catch is the cucumber beetle — bacterial wilt vector — which gets its own treatment in §5.5.

5.1 Why trellis cucumbers

Almost every cucumber problem in the Dragoons traces to *not* trellising:

- **Straighter fruit.** Hanging cucumbers grow straight; ground-grown cucumbers curl into J-shapes and split where they touch soil.
- **Better airflow against powdery mildew.** Monsoon humidity favors powdery mildew on dense canopies. A trellised plant has 360° airflow.
- **Reduced cucumber beetle pressure.** Beetles emerge from soil; trellised plants are harder to find and harder to feed on.
- **Yield density.** A 6-ft trellis produces twice the yield per square foot of ground cucumbers.
- **Harvest visibility.** You see every cucumber; nothing oversizes into a yellow club hidden in the leaves.

The right trellis is a 16-ft cattle panel arched over a bed, or two leaned together in an A-frame, or a 6-ft vertical run between two T-posts with horizontal stringing every 12 inches. Any of these works; the cattle panel is the most durable and reusable across years.

If it's your first season with cucurbits. Start with *Suyo Long* or *Tasty Jade* on a cattle-panel trellis. Both are heat-tolerant Asian types, both forgive uneven watering better than American slicers, and both produce so heavily on a single panel that two plants feed a household. Save *Marketmore* and pickling cucumbers for year two.

5.2 Variety reference

Three categories: slicing (long thin-skinned), pickling (short thick-skinned), and Asian/burpless (very long, ribbed, mild). Each does well in the Dragoons; the Asian types are the most heat-tolerant.

Variety · profile	Type	Days · Habit	Dragoon-fit	Dragoon notes
<i>Suyo Long</i> OP	Asian / burpless · 12-18 in long, ribbed	60 d · vining · 8 ft	●●●●●	The best cucumber for the Dragoons. Heat-tolerant, monoecious, sets through 100 °F days. Sweet, no bitterness.
<i>Tasty Jade</i> F1	Asian / burpless · 11 in, smooth	55 d · vining · 8 ft	●●●●●	Parthenocarpic (sets without pollination). Indoor / hydroponic favorite. Heavy producer.
<i>Marketmore 76</i> OP	American slicer · 8 in	68 d · vining · 6 ft	●●●●○	Reliable American slicer. Disease-resistant. Slightly more bitter than Asian types in heat.
<i>Straight Eight</i> OP	American slicer · 8 in	60 d · vining · 6 ft	●●●●●	Classic heritage. Less heat-tolerant than Marketmore.
<i>Boston Pickling</i> OP	American pickler · 4-5 in	55 d · vining · 5 ft	●●●●●	The classic pickling cucumber. Productive, dependable.
<i>Calypso</i> F1	Hybrid pickler · 4 in	50 d · vining · 5 ft	●●●●○	Heavy producer for canning. Disease-resistant.

Variety · profile	Type	Days · Habit	Dragoon-fit	Dragoon notes
<i>Lemon OP</i>	Heirloom · round yellow	65 d · vining · 6 ft	●●●●○	Yellow-round novelty; mild flavor, low bitterness. Very productive. Heirloom curiosity worth growing.
<i>Beit Alpha OP</i>	Middle Eastern · 6 in, thin-skinned	55 d · vining · 6 ft	●●●●●	Thin-skinned eating cucumber. No bitterness even in heat.
<i>Marketmore 86 OP</i>	American slicer · 8 in	67 d · vining · 6 ft	●●●●○	Curly-top resistant — useful if BCTV has been an issue.

5.3 Bed prep and direct-sow

Cucumber roots resent transplanting. Direct-sow whenever possible. The exception is the spring-push window: an indoor-started transplant in a peat pot (so the root ball never disturbs) can buy you 2 weeks on first harvest.

Soil targets

Parameter	Target	Notes
pH	6.0 – 7.0	Tolerant; sulfur amendment if alkaline
Organic matter	3 – 5 %	3 inches finished compost at bed prep
Drainage	Excellent	Hates wet feet
Nitrogen	Moderate	Composted manure at planting; light side-dress at first flower
Calcium	Adequate	Naturally high in Dragoons soil

Sowing

Method	Timing	Depth	Spacing
Direct-sow (main crop)	May 10-25 (after soil hits 65 °F)	1 in deep	12 in apart along trellis; thin to 18 in
Direct-sow (fall succession)	July 20 – August 5	1 in deep	12 in along trellis
Indoor transplant (early)	Sow in peat pots April 15; transplant May 10	1 in deep	18 in along trellis

5.4 Watering, mulching, and feeding

Cucumbers are 95 % water by weight. Even modest water stress produces bitter, curled, club-shaped fruit. Drip irrigation is non-negotiable; overhead watering also spreads powdery mildew.

- **Drip rate:** 1 gal/plant/day in May-June; 2 gal/plant/day in July-August (peak monsoon production); 1.5 gal/plant/day September.
- **Mulch heavily.** 3-4 inches straw or wood chips after soil hits 70 °F. Same logic as tomatoes — buffers water, reduces splash, suppresses weeds.
- **Side-dress at first flower** with 1 cup composted manure per plant; repeat every 3 weeks during peak production.

5.5 The cucumber beetle problem — Dragoon’s signature cucurbit pest

This is the single biggest threat to cucumber production in the Dragoons, and the same beetle threatens squash, zucchini, and melons. Two species: spotted cucumber beetle (*Diabrotica undecimpunctata*) and striped cucumber beetle (*Acalymma vittatum*). Both are yellow-green, about 1/4 in long; spotted has 12 black dots, striped has 3 black stripes down its back.

The direct damage (chewed leaves, ragged flowers) is manageable. The serious problem is that cucumber beetles vector **bacterial wilt** (*Erwinia tracheiphila*) — a pathogen that lives in beetle guts, transfers during feeding, and clogs the plant’s xylem. Symptoms appear 1-3 weeks after infection: a vine wilts and dies in 48 hours despite full soil moisture. There is no cure; the plant must be pulled.

The protocol

1. **Row cover from transplant or sowing until flowering.** Floating row cover (0.5 oz/sq yd) over the bed for the first 4-5 weeks excludes beetles entirely. Most damage happens to young plants.
2. **Remove cover at flowering.** Cucumbers (with the exception of parthenocarpic varieties like *Tasty Jade*) need bee pollination. Cover off at first male flower.
3. **Pyrethrin at dusk during peak beetle pressure.** July, after the first big monsoon

rain, is when beetle populations explode. Spray pyrethrin at dusk — never during pollinator activity — for 2-3 consecutive evenings.

4. **Trap crops.** A row of *Blue Hubbard* squash planted at the bed edge draws beetles away from cucumbers. Sacrifice the Hubbard; it's a beetle magnet.
5. **Yellow sticky traps.** Hang at canopy level. Catch 80 % of incoming beetles before they find plants.

WARNING

The 48-hour bacterial wilt rule. Once a cucumber vine shows bacterial wilt (sudden mid-day wilting that doesn't recover overnight, with white string emerging from a cut stem held to your finger), the plant is dead and a reservoir for further infection. Pull it within 48 hours. Don't compost — trash it. Wash hands before handling other cucurbits. A confirmed bacterial wilt vine left on the bed will infect adjacent plants within a week.

LOCAL TIP

The cucumber beetle surge in the Dragoons follows the first big monsoon rain by 48-72 hours. Mark the calendar: watch the week of July 5-15 for the first significant storm, then check cucumber leaves every morning for the next 5 days. Pyrethrin at dusk on the second evening you see beetles is the highest-leverage intervention. By the time damage is visible, you're already a week behind.

5.6 Heat threshold and the fall succession crop

Cucumber flowers wither and drop above 100 °F daytime with low humidity. The pre-monsoon heat wave (mid-June to mid-July) typically shuts down fruit set for 2-4 weeks. The first wave of fruit comes June 25-July 5; the second wave starts mid-August and runs through October.

The fall succession sowing is one of the most useful single events in the warm-season calendar. Direct-sow a new row of cucumbers between July 20 and August 5. Young plants establish through monsoon, set fruit in September, and produce a fall crop that often outshines the spring planting — same plant, cooler temperatures, less beetle pressure (most beetles already laid their eggs).

5.7 Pollination

Cucumbers (with the exception of parthenocarpic Asian varieties) are monoecious — separate male and female flowers on the same plant — and need bees for fruit set. Three implications:

- **Don't keep row cover on at flowering.** It excludes pollinators.
- **Spray pyrethrin only at dusk**, after bees have stopped foraging.
- **Plant for bees.** Adjacent rows of basil, borage, or *Tagetes patula* flower through monsoon and bring native bees and honey bees to the cucumber row.

Parthenocarpic varieties (*Tasty Jade*, some F1 hybrids) set fruit without pollination — useful for greenhouse, hydroponic, and row-covered production.

5.8 Hydroponic cucumbers — brief pointer

Cucumbers run in Bato buckets just like tomatoes. Same media, same reservoir routine, same EC range (1.8–2.4 mS/cm peak; 5.8–6.2 pH). Plants are vining and trained up overhead string the same way — single-leader, weekly sucker pinch, leaves stripped below first fruit.

RELATED GUIDES

Bato bucket build and operations: **Guide 3**. Daily reservoir routine, EC/pH chart: **Guide 4 Part 1** (use the tomato chart in §1.4.1 — cucumber needs almost identical numbers). Mg bump: tomato level (1.5 g/gal), not pepper level.

Use *Tasty Jade* or any greenhouse parthenocarpic variety. Pollination is unnecessary; fruit set is steady; production runs 15–20 lb per plant indoors over a 4-month cycle. Hydroponic cucumbers also extend cleanly into October when outdoor cucumbers slow down.

5.9 Harvest

Pick early and pick often. Cucumber plants slow new fruit set when fruit is left to over-size on the vine; daily harvest during peak season produces a steady 4–6 cucumbers per plant per week.

Variety type	Pick at	Sign
Slicer (<i>Marketmore</i> , <i>Straight Eight</i>)	6–8 in long	Skin firm, dark green, not yellowing
Asian / burpless (<i>Suyo</i> , <i>Tasty Jade</i>)	10–14 in long	Skin glossy, slightly ribbed
Pickler (<i>Boston</i> , <i>Calypso</i>)	3–4 in long	Cut earlier than slicers; pick at full size for table eating, smaller for pickling
<i>Lemon</i>	Tennis-ball size	Skin yellowing slightly

Cut with shears; pulling damages the vine. Refrigerate up to a week.

6 · Summer squash & zucchini

The high-volume crop · vine borer protocol · second sowing

Summer squash (*Cucurbita pepo*) and zucchini are the most productive single crop in the Dragoons garden by weight. Two plants of zucchini produce more food than most families eat. The pleasure of growing zucchini is the daily harvest; the agony is the squash vine borer, which can take a healthy plant down in a week and gets serious treatment in §6.4.

If it's your first season. Plant two zucchini — *Costata Romanesco* or *Black Beauty* — and stop there. Two is plenty. The aluminum-foil-at-the-stem-base protocol in §6.4 is the single highest-return new-grower move in the Dragoons; do it at transplant, before the borer ever shows up.

6.1 Variety reference

Variety · profile	Type	Days · Habit	Dragoon-fit	Dragoon notes
<i>Costata Romanesco</i> OP	Italian zucchini · ribbed, gray-green	60 d · bush · 4 ft sprawl	●●●●●	The best zucchini for the Dragoons. Italian ribbed type holds quality even oversized. Nutty flavor, dense flesh. Less prolific than F1 hybrids but more flavorful.
<i>Black Beauty</i> OP	American zucchini · classic dark green	50 d · bush · 4 ft sprawl	●●●●●	The standard open-pollinated zucchini. Very productive, dependable, dark green.
<i>Dunja</i> F1	Zucchini · dark green, spineless	48 d · bush · 3 ft	●●●●○	Open habit lets you reach in without scratched arms; vigorous and very productive.

Variety · profile	Type	Days · Habit	Dragoon-fit	Dragoon notes
<i>Yellow Crookneck</i> OP	Yellow summer squash · curved neck	50 d · bush · 3 ft	●●●●○	The classic Southern yellow squash. Tender skin, mild flavor. Less productive than zucchini.
<i>Yellow Straightneck</i> OP	Yellow summer squash · straight	50 d · bush · 3 ft	●●●●●	Similar to crookneck, straighter shape, slightly less flavor.
<i>Eight Ball</i> F1	Round green zucchini	50 d · bush · 3 ft	●●●●●	Novel round shape, good for stuffing. Tender.
<i>Pattypan / Sunburst</i> F1	Yellow scallop / patty pan	50 d · bush · 3 ft	●●●●●	Tender flying-saucer shape. Pick small (3 in).
<i>Tromboncino</i> OP	Italian climbing zucchini · long, curved	75 d · vining · 12+ ft	●●●●○	A vining squash you actually trellis. Less vine-borer susceptible than bush zucchini because of distributed nodes. Pick young (12 in) for zucchini flavor; let mature for winter-squash use.

Two plants is plenty. A single Costata Romanesco or Black Beauty in good Dragoon soil produces 30–50 lb of zucchini between June and August. Two plants overwhelm a family of four. Three plants generates a community-

distribution problem. Resist the seed-packet temptation to plant a row of six.

6.2 Bed prep and direct-sow

Same approach as cucumbers — heavy compost, well-drained bed, pH 6.0–7.0.

Method	Timing	Depth	Spacing
Direct-sow (main crop)	May 10–25	1 in deep, 3 seeds per hill	36 in apart (bush types), 60 in apart (vining <i>Tromboncino</i>)
Indoor transplant (peat pot)	Sow April 20; transplant May 10	1 in deep	36 in apart
Direct-sow (fall succession)	July 25 – August 5	1 in deep	36 in apart

After germination, thin to one plant per hill.

6.3 Watering and feeding

Same as cucumbers: 1–2 gal/plant/day depending on stage and heat. Mulch heavily after soil hits 70 °F. Side-dress with composted manure at first flower; repeat every 3 weeks.

6.4 Squash vine borer — the Dragoons crop killer

Squash vine borer (*Melittia cucurbitae*) is the single most destructive pest of summer squash and zucchini in the Dragoons. Adult moth (orange-and-black, wasp-like, day-flying) lays eggs at the base of stems in early July, coinciding with the first monsoon storms. Eggs hatch into white larvae that tunnel inside the stem near the soil line, eating the vascular core. A vine that was healthy yesterday wilts and collapses today.

The protocol — aluminum foil at the base

This is one of the highest-return interventions in the Dragoons garden. At transplant or thinning, wrap a 4-inch-tall strip of aluminum foil around the lower 4 inches of each main stem. The foil makes the base reflective and confuses the moth, which won't lay eggs on a shiny surface. The plant grows above the foil; the foil stays in place all season.

Step	Action	Notes
1	Cut 6 × 4 in strips of heavy aluminum foil	Cheap to buy; lasts the season

Step	Action	Notes
2	Wrap around stem base loosely	Don't bind tight — the stem thickens during the season
3	Bury bottom edge 1 in into soil	Anchors against monsoon wind
4	Refresh in mid-July	First monsoon storm may displace foil; check after each storm
5	At first sign of wilt	Inspect base of plant; if you find a small entry hole (sawdust-like frass), the plant is infested

Recovery from a borer hit

If you find an entry hole on a plant that's still partially upright:

1. **Slit the stem lengthwise above the entry hole** with a sharp knife.
2. **Remove the larva.** A small white grub; squish and dispose.
3. **Bury the slit section** with soil. The plant often re-roots from the slit and recovers.

If the whole plant has collapsed, pull and destroy. Don't compost — eggs may remain on stem fragments.

Other prevention

- **Plant a second sowing late July.** Even if the spring plants get hit in early August, the second sowing comes in unaffected (the moth is one-generation; eggs from July hatch within a month, larvae overwinter as pupae, and adults emerge next June). Two sowings split the risk.
- **Pheromone traps.** Squash vine borer pheromone traps catch the male moths. Reduce population by 40–60 % over time. Worth it for a serious problem.
- **Plant *Tromboncino* or other *Cucurbita moschata* varieties.** Vine borer prefers *C. pepo* (zucchini, summer squash). *C. moschata* (butternut, *Tromboncino*) is less susceptible.

LOCAL TIP

The Dragoons squash vine borer flight typically peaks the second week of July, in step with the first significant monsoon storm. Aluminum foil wraps go on in May at transplant; the second-line defense is the second sowing in late July, which sits the rest of the season after the moth flight is over. Combining both — foil on spring plants, fresh seed late July — gets you a complete season of

squash production through October.

6.5 Powdery mildew

Monsoon humidity brings powdery mildew on summer squash leaves in July and August. White powder on upper leaf surfaces; reduces photosynthesis and shortens production by 2–3 weeks if untreated.

Stage	Sign	Action
Early	Small white spots on lower leaves	Milk dilution (1:9 milk:water) sprayed weekly. Potassium bicarbonate (1 tbsp/gal) also effective.
Moderate	Powder on 30 % of leaves	Continue weekly milk spray; pull worst-affected lower leaves for airflow
Heavy	Powder on 70%+ of leaves; plant declining	Pull plant if late-season; replace with fall sowing

The strongest preventative is plant spacing. Squash crammed in at 24 inches dies from mildew weeks before squash at 48 inches. Give them room.

6.6 Harvest

Pick young and pick daily. A zucchini at 6–8 inches is tender, mild, dense; at 12 inches it's seedy; at 18 inches it's a club fit for bread. Daily harvest also stimulates further production — plants that hold ripe fruit slow new fruit set.

Variety	Pick at	Notes
Zucchini (any)	6–8 in long, 1.5 in diameter	Cut with knife; leave 1 in stem
Yellow crookneck/straightneck	4–6 in long	Smaller than zucchini for best texture
Patty pan	3 in across	Tender when small; tough when large
<i>Tromboncino</i> (summer use)	12 in long, before seed cavity forms	Cut at the curve; vine continues producing
<i>Tromboncino</i> (winter use)	Let mature on vine to 24 in, tan skin	Cure 2 weeks in dry sun; stores 4 months

7 · Melons

Cantaloupe · watermelon · honeydew · French Charentais · the heat-loving crop

Melons (*Cucumis melo* — cantaloupe, honeydew, *Charentais* — and *Citrullus lanatus* — watermelon, both *Cucurbitaceae* members) are uniquely suited to Dragoons heat. They want hot days, warm nights, dry air, and a long growing season — and they reward the diurnal swing with concentrated sugar. A cantaloupe grown in the Dragoons is among the sweetest in the country. There is no second sowing; melons take the entire summer to produce a single crop.

If it's your first season. Plant *Hale's Best Jumbo* cantaloupe and *Sugar Baby* watermelon. Both are classic, dependable, and forgiving of beginner errors. Both fit a backyard trellis or sprawl. Skip *Charentais* and the heirlooms until you've watched the harvest-window timing once.

7.1 Variety reference

Variety · profile	Type	Days · Habit	Dragoon-fit	Dragoon notes
<i>Hale's Best Jumbo</i> OP	Cantaloupe · orange flesh, netted	85 d · vining · 8 ft	●●●●●	The standard Western cantaloupe. Heat-loving, drought-tolerant, sweet at maturity. 3–4 lb fruit.
<i>Charentais</i> OP	French heirloom · cantaloupe-type, gray-green skin, orange flesh	80 d · vining · 6 ft	●●●●●	Exceptional in dry Dragoon heat. Small (2 lb) intensely sweet, perfumed. Trellis for quality.
<i>Crimson Sweet</i> OP	Watermelon · red flesh, striped rind	85 d · vining · 12 ft	●●●●●	The classic Western watermelon. 20–25 lb fruit. Heat-tolerant, drought-tolerant.

Variety · profile	Type	Days · Habit	Dragoon-fit	Dragoon notes
<i>Sugar Baby</i> OP	Watermelon · red flesh, dark green rind	75 d · vining · 8 ft	●●●●●	Small (8-10 lb) icebox watermelon. Trellis-friendly. Early — sets first fruit before pre-monsoon heat.
<i>Yellow Doll</i> F1	Watermelon · yellow flesh, striped rind	70 d · vining · 8 ft	●●●●○	Small (6-8 lb) yellow-fleshed; very sweet.
<i>Moon and Stars</i> OP	Watermelon · red flesh, dark rind with yellow spots	95 d · vining · 12 ft	●●●●○	Heritage variety. Slow but unique.
<i>Honey Dew Green Flesh</i> OP	Honeydew · green flesh, smooth white rind	100 d · vining · 8 ft	●●●●○	Long season; needs the full warm window. Excellent if you have the bed time.
<i>Tigger</i> OP	Persian melon · striped, tiny	85 d · vining · 6 ft	●●●●●	Curiosity heirloom; very fragrant, modest flavor.
<i>Banana</i> OP	Long melon · cantaloupe family · banana-shaped	90 d · vining · 8 ft	●●●●○	Spicy-sweet flavor, banana shape. Heirloom curiosity.

Trellis the small types. *Charentais*, *Sugar Baby*, *Yellow Doll*, and any melon under 5 lb at maturity can be trellised on a cattle panel. Trellising saves bed space, improves airflow, prevents soil rot on the fruit bottoms, and produces noticeably better fruit (no flat side). Support each fruit with a cloth sling tied to the panel as it sizes up. Large watermelons (*Crimson Sweet*, *Moon and Stars*) sprawl on the ground — give them space.

7.2 Bed prep and direct-sow

Melons want a hot, fertile, well-drained bed and *long* growing season. The pre-monsoon heat that hurts other crops *helps* melons establish — they're at peak vigor at 95 °F daytime.

- **Soil pH:** 6.0–7.0; sulfur amend if alkaline.
- **Organic matter:** 4–5 %. Heavy compost at planting.
- **Drainage:** Excellent. Mound or raise the planting hill 6 inches above grade.
- **Nitrogen:** Heavy at planting; taper to potassium at fruit sizing.

Sowing

Method	Timing	Depth	Spacing
Direct-sow	May 20 – June 1 (after soil hits 70 °F)	1 in deep, 3 seeds per hill	48 in apart (vining); 36 in (trellised small types)
Indoor transplant (peat pot)	Sow April 25; transplant May 20	1 in deep	Same as direct-sow

Black plastic mulch on melon beds warms the soil 6–8 °F. Worth using in cool springs; less critical in warm years. Pull mulch back after monsoon arrives — black plastic in a 100 °F dry afternoon will cook the bed.

7.3 Watering — taper at ripening

Melons want deep, even watering during establishment and fruit sizing, then **tapered watering during ripening** to concentrate sugars.

Stage	Water rate	Notes
Establishment (May–June)	1.5 gal/plant/day	Drip lines, 2 emitters per plant
Vine run / pre-flower (June)	1.5 gal/plant/day	Pre-monsoon heat — keep up with evaporation
Flowering / fruit set (July)	1.5 gal/plant/day	Monsoon takes some load off
Fruit sizing (July–August)	2 gal/plant/day	Peak demand
Ripening (last 10 days before harvest)	Reduce to 1 gal/plant/day	Concentrates sugar; over-watered melons are watery and bland

The taper is the load-bearing rule. A cantaloupe ripened with full watering tastes like cucumber. Same fruit, same variety, with a 10-day reduction tastes like candy.

7.4 Pollination

Melons are monoecious; bees do the pollination. Same considerations as cucumbers (§5.7) — keep row cover off after flowering, spray only at dusk, plant adjacent bee-attracting flowers.

The first 1–2 weeks of flowering are male-only; female flowers (with a tiny melon at the base) appear after the male flowers establish. Don't worry that the first flowers don't set fruit. Within 2 weeks the females catch up.

7.5 Pests

- **Cucumber beetles** — same protocol as cucumbers (§5.5). Row cover until flowering; pyrethrin at dusk during the monsoon surge.
- **Squash bug** (*Anasa tristis*) — gray-brown shield bug; sucks sap from melon (and squash) vines. Hand-pick adults; squash eggs (bronze clusters on leaf undersides) with a thumbnail.
- **Aphids** — mild pressure; hose blast or insecticidal soap.

7.6 Harvest indicators

Knowing when a melon is ripe is the single hardest part of melon growing. Each species has a different signal.

Type	Ripeness signal	Best test
Cantaloupe (<i>Hale's Best</i> , <i>Charentais</i>)	"Full slip" — the stem detaches cleanly from the fruit with light pressure	Apply gentle pressure with thumb at stem; if stem releases without tugging, ripe. Strong cantaloupe perfume from blossom end.
Watermelon (<i>Crimson Sweet</i> , <i>Sugar Baby</i>)	Tendrils nearest the fruit stem are brown and dry; ground spot (bottom) yellow; thump test gives low hollow note	Tendrils are most reliable. If the curly tendril 6 inches from the fruit stem is brown and crispy, ripe.
Honeydew (<i>Honey Dew</i>)	Skin turns from green to creamy-white; blossom end softens slightly	Honeydew doesn't slip from the stem — cut with shears.
Charentais	Skin yellows from gray-green; full slip; intense perfume	Same as cantaloupe; pick at first slip — it's a small melon that overripens fast.

LOCAL TIP

A ripe *Charentais* hangs on the vine for 24 hours. Once it slips, it must be eaten within 2 days or it becomes soft and yeasty. Check the vine daily during the last week of August. The reward for catching one at peak is the single most aromatic melon you'll grow.

8 · Beans

Snap · dry · fresh shellies · teparies · the nitrogen-fixing legume

Beans (*Phaseolus* spp.) are one of the most useful crops in a Dragoons garden — easy to grow, produce heavily, fix atmospheric nitrogen into the soil, and span every culinary use from fresh snap to long-keeping dry beans. This chapter covers four bean types: snap (eaten pod), dry (mature seed), fresh shellies (matured beans eaten fresh from the pod, between snap and dry stage), and *teparies*, an indigenous Sonoran Desert species that deserves its own treatment.

If it's your first season. Plant *Provider* (bush) or *Blue Lake* (pole) — both forgiving, both heavy producers, both easy from a packet of seed direct-sown in mid-May. Add *teparies* in year two when you've watched a Dragoons monsoon and can time the sow with the first big July storm.

8.1 Why beans matter for the rotation

Legumes (beans, peas, cowpeas) host symbiotic *Rhizobium* bacteria on their roots that fix atmospheric nitrogen into soil-available nitrogen compounds. A well-grown bean crop can add 30–80 lb/acre of nitrogen to the soil. This makes beans the **rotational hinge** of the Dragoons garden — they're a soil-builder between heavy-feeding crops. The standard Dragoons rotation slot for beans:

Year in rotation	Slot	Crop
Year 1	Spring/summer	Peppers + tomatoes (heavy feeders)
Year 1	Fall/winter	Brassicas (heavy feeders)
Year 2	Spring/summer	Squash + cucumbers (heavy feeders)
Year 2	Fall/winter	Alliums (light feeders)
Year 3	Spring/summer	Cover crop / greens / fall brassicas
Year 4	Spring/summer	Beans + corn (legume + grass — soil-building)
Year 4	Fall/winter	Cover crop only

This is also why the bean and corn chapters in this guide are paired — the “three sisters” rotation (corn + beans + squash) is the indigenous Sonoran Desert pattern and is exceptionally well-suited to Dragoons gardens.

8.2 Variety reference

Beans split into four categories: snap (green / yellow / Romano-shaped), dry (mature shelled seed), fresh shellies (matured beans eaten fresh from the pod, between snap

and dry), and teparies (the desert-adapted species). Within each, plants are either bush (compact, single flush of pods) or pole (vining, multiple flushes).

Snap beans (pods eaten green)

Variety · profile	Type · habit	Days	Dragoon-fit	Dragoon notes
<i>Provider</i> OP	Round green · bush	50 d	●●●●●	The reliable early bush bean. Sets in cooler soil than most. Heavy producer.
<i>Blue Lake 274</i> OP	Round green · bush	55 d	●●●●○	Classic American snap bean. Excellent flavor; canning standard.
<i>Blue Lake</i> (pole) OP	Round green · pole	65 d	●●●●●	The same variety in pole form — outyields the bush 3:1 over the season.
<i>Kentucky Wonder</i> OP	Round green · pole	70 d	●●●●●	The classic Southern pole bean. Drought-tolerant, heat-tolerant, very productive.
<i>Rattlesnake</i> OP	Streaked purple/green · pole	75 d	●●●●●	Beautiful streaked pods; turn green when cooked. Heat-tolerant, heavy producer.
<i>Romano</i> (pole) OP	Flat Italian-style · pole	65 d	●●●●○	Wide flat pod; meaty flavor. Less crunch, more savory.
<i>Dragon's Tongue</i> OP	Yellow with purple streaks · bush	60 d	●●●●●	Beautiful; pods are tender; flavor is good.

Variety · profile	Type · habit	Days	Dragoon-fit	Dragoon notes
<i>Golden Wax</i> OP	Yellow · bush	55 d	●●●●	Yellow snap bean; mild flavor.
<i>Royal Burgundy</i> OP	Purple · bush	55 d	●●●●	Purple pods turn green when cooked; useful as a thinning indicator.

Dry beans (mature seed)

Variety · profile	Type · habit	Days	Dragoon-fit	Dragoon notes
<i>Pinto</i> OP	Spotted brown-tan · bush or half-runner	90 d	●●●●●	The Southwest staple. Drought-tolerant once established. Productive.
<i>Anasazi</i> (Cave bean) OP	Spotted maroon-white · bush	90 d	●●●●●	Heritage variety from the Four Corners; sweet flavor, holds shape when cooked. Cultural depth — pre-Columbian Pueblo crop.
<i>Hopi Yellow Lima</i> OP	Yellow-tan · pole	100 d	●●●●○	A Hopi heritage variety; sweet flavor; needs long warm season.
<i>Hopi Black Turtle</i> OP	Small black · bush	90 d	●●●●	Hopi heritage variety; small black beans, dense flavor.

Variety · profile	Type · habit	Days	Dragoon-fit	Dragoon notes
<i>Cranberry</i> OP	Speckled red-white · pole	90 d	●●●●●	Italian-Heritage shelly type; eats young as fresh shelly or matures for dry storage.
<i>Black Turtle</i> OP	Small black · bush	95 d	●●●●○	Standard Latin American black bean.
<i>Great Northern</i> OP	White · bush	85 d	●●●●●	Classic white bean; mild, soft cook.
<i>Tiger's Eye</i> OP	Orange with maroon swirl · bush	85 d	●●●●●	Striking; melts smoothly in pot beans.

Teparies (*Phaseolus acutifolius*) — the desert-native species

Variety · profile	Type · habit	Days	Dragoon-fit	Dragoon notes
<i>Brown Tepary</i> (Tohono O'odham) OP	Small tan-brown · bush, drought-tolerant	80 d	●●●●●	Native Sonoran Desert variety. Extremely drought-tolerant. Plant with monsoon, harvest in October.
<i>White Tepary</i> (Tohono O'odham) OP	Small white · bush, drought-tolerant	80 d	●●●●●	Lighter cook than brown; same growing pattern. Both teparies are pre-Columbian Sonoran crops with thousands of years of regional history.

Variety · profile	Type · habit	Days	Dragoon-fit	Dragoon notes
<i>Mitla Black</i> <i>Tepary</i> OP	Small black · bush	85 d	●●●●○	From Oaxaca; same species, slightly less drought-tolerant than the Sonoran types.

Teparies belong in every Dragoons bean garden. *Phaseolus acutifolius* is a separate species from common bean (*P. vulgaris*) — domesticated independently in the Sonoran Desert thousands of years ago by ancestors of the Tohono O’odham. Teparies set pods at 100 °F and beyond, set with monsoon humidity, and produce mature dry beans with one watering after the monsoon ends. They are the most regionally-appropriate bean crop in this guide and the only one specifically bred for Sonoran Desert summers. Native Seeds/SEARCH in Tucson is the canonical Dragoon-region seed source for teparies and other Sonoran heritage crops.

8.3 Bed prep and direct-sow

Beans are direct-sown, not transplanted. They germinate fast and resent disturbance.

Soil

Parameter	Target	Notes
pH	6.0–7.0	Tolerant; sulfur amend if alkaline
Organic matter	3 %	Beans want less compost than tomatoes — too much N triggers leaf growth at expense of pods
Drainage	Excellent	Bean seeds rot in cold wet soil
Nitrogen	LOW at planting	Beans fix their own. Excess N delays pod set.
Phosphorus	Moderate	Bone meal in row before sowing

Sowing

Bean type	Sow date	Depth	In-row	Between rows
Snap, bush	May 1 – May 25; succession every 3 weeks through July 1	1 in	4 in	18 in
Snap, pole	May 5 – June 15 (single planting; pole types produce all season)	1.5 in	6 in (or 4 plants per pole)	36 in (cattle panel or pole trellis)
Dry, bush (pinto, Anasazi)	May 15 – June 5 (single planting; matures together)	1.5 in	4 in	24 in
Dry, pole (Hopi Yellow, cranberry)	May 15 – June 5	1.5 in	6 in	36 in
Tepary	Jun 20 – Jul 15 (time with first monsoon rains)	1 in	4 in	24 in

WARNING

Don't sow beans into cold soil. Bean seeds rot below 60 °F. Direct-sow only when soil at 4-inch depth holds 60 °F for 5 mornings — typically May 1 in raised beds, May 10 in unraised ground. A May 1 sowing in 55 °F soil produces a 30 % germination rate; the May 15 sowing in 65 °F soil produces 90 % germination on the same packet of seed.

8.4 Inoculant

Beans form nitrogen-fixing nodules with *Rhizobium* bacteria — but only if the right bacteria are present in the soil. In native Dragoons ground that has never grown beans before, the bacteria may be absent, and the plants grow normally but don't fix nitrogen. Solution: inoculate seed before sowing.

1. **Buy bean/pea inoculant.** Granular *Rhizobium* powder from any seed supplier (\$5 for enough to inoculate 5 lb of seed).
2. **Moisten seed.** Sprinkle 1 tablespoon water over 1 cup of seed; mix.
3. **Dust with inoculant.** Sprinkle inoculant onto wet seed and stir.
4. **Sow immediately.** Bacteria live on the seed and colonize roots as the plant ger-

minates.

After the first bean crop, the bacteria persist in the soil for 3–5 years. Repeat inoculation in newly-broken ground or after long bean-free intervals.

8.5 Watering

Beans are drought-tolerant compared to tomato or cucumber. They want even watering, not heavy watering. Teparies are the drought champion — see below.

Bean type	Watering target
Snap (bush, pole)	1 gal/plant/day; drip preferred
Dry (pinto, Anasazi)	0.5 gal/plant/day during pod fill; reduce to nothing 2 weeks before harvest
Tepary	Sow on monsoon moisture; one supplemental watering if monsoon fails. The entire crop can ripen on 4 inches of seasonal rainfall.

8.6 Pole beans and trellising

Pole beans need vertical support. Three common approaches in Dragoons gardens:

System	Setup	Notes
Single bamboo poles (teepee)	4 bamboo poles 7 ft long tied at top; plant 4–6 seeds around each pole	Traditional; works for <i>Kentucky Wonder</i> , <i>Rattlesnake</i> .
Cattle panel arch	16-ft cattle panel arched over 4-ft-wide bed	Reuses from cucumber years; excellent for <i>Blue Lake</i> pole and <i>Romano</i> .
Vertical T-post + twine grid	7-ft T-posts every 4 ft; horizontal twine every 8 in	Commercial method; high-density.

8.7 Teparies — the desert-native pattern

Teparies are grown differently from every other bean in this guide. They are not just drought-tolerant — they are *heat-adapted* and *monsoon-keyed*. The traditional Tohono O’odham method:

1. **Sow with the first significant monsoon rain.** Wait for the storm — typically July 5–15. Don’t pre-irrigate the bed.
2. **Direct-sow into the wet ground.** No bed prep beyond loosening top 4 in. No inoculant needed in Sonoran Desert soil — native *Rhizobium* are abundant.

3. **No supplemental watering after sow.** The crop lives on monsoon rain. In dry monsoon years (5 inches or less), one supplemental drip irrigation around flowering helps.
4. **Plants stay short and bushy.** 18 inches tall; flowers small and white or purple.
5. **Pods set August through early October.** Pods dry on the plant.
6. **Harvest in October.** Whole-plant pull when 90 % of pods are tan and dry. Thresh by stomping in a sheet or hand-shelling.

Teparies are not eaten as snap beans — pods are fibrous from young. They are exclusively a dry bean. Cook with longer simmer than common beans; flavor is denser and slightly sweet.

LOCAL TIP

The Sonoran Desert Living Network and Native Seeds/SEARCH (Tucson) are the regional sources for tepary seed, along with knowledgeable distribution of growing practice. A pound of tepary seed plants a 25-foot row that will produce 5-10 lb of dry beans in a normal monsoon year — with almost no irrigation. They are the highest-return crop per gallon of water in this guide.

8.8 Pests

Beans have light pest pressure in the Dragoons.

Pest	Sign	Action
Bean leaf beetle	Round holes in leaves; small striped beetle	Hand-pick; mild damage usually tolerable
Mexican bean beetle	Lacy skeletonized leaves; yellow lady-bug-like beetle and yellow grub	Hand-pick adults and larvae; spray neem if heavy
Aphids	Clusters on growing tips and pods	Hose blast; insecticidal soap if needed
Spider mites	Stippled bronzed leaves in hot dry weather	Mist plants in morning to raise humidity; insecticidal soap

8.9 Harvest

Snap beans

Pick when pods are firm, slim, and seeds inside are barely visible as bumps. Past that, pods get tough and beans get fibrous. Pole varieties produce continuously through frost; pick every 2 days during peak production to keep plants setting new pods.

Fresh shellies

Let pods plump up but still be soft and green (3–4 weeks past snap stage). Shell out fresh beans for cooking same day. *Cranberry* and *Hopi Yellow* are excellent shelly varieties.

Dry beans

Wait until 90 % of pods on the plant are tan, dry, and rattle when shaken. Pull whole plant; hang upside down in dry shed for 2 weeks. Then thresh by stomping in a sheet or running through a small grain thresher. Winnow chaff in a breeze. Store in tight-lid jars; 1+ year shelf life.

9 · Sweet corn

Pollination block · isolation distance · heritage varieties · the water crop

Sweet corn (*Zea mays*) in the Dragoons is a different proposition than in the Corn Belt. Yield per plant is lower (1-2 ears vs 1.5-3 in Iowa); water demands are high (corn is the most water-hungry crop in this guide); pollination requires planning. But the Dragoons offer real advantages — long warm-night season, monsoon timing, and a deep cultural history of Indigenous corn varieties bred for exactly this elevation and climate. This is also the place to bring in heritage flour and dent corns — *Hopi blue*, *Painted Mountain*, *O’odham 60-day* — which deserve their own treatment.

WARNING

Sweet corn is the hardest beginner crop in this guide. It demands the most water (50-90 gallons per day in July for a small block), the most space (a 4×4 block minimum for decent pollination), the most pest planning (corn earworm peaks in August), and a strict isolation rule between sweet corn types. New growers should plant tomatoes, beans, and zucchini before they plant corn. If you do plant corn the first season, pick a single sugary (su) variety like *Golden Bantam* and accept that this is a learning year.

9.1 Sweet corn types — the isolation problem

Modern sweet corn comes in four genetic types, and **mixing them in the same garden ruins them all** unless they are isolated by distance or time.

Type	Genetic shorthand	Sweetness	Storage	Notes
Sugary	su	Standard	Poor (eat fresh or freeze same day)	Old-school sweet corn. Classic flavor. <i>Golden Bantam</i> , <i>Country Gentleman</i> .
Sugary enhanced	se	Sweeter, more tender	Moderate	Improved hybrids; tender husk. <i>Bodacious</i> , <i>Kandy Korn</i> .
Supersweet	sh2	Very sweet, holds sweetness	Excellent	High-sugar isolating recessive. <i>Honey ‘n Pearl</i> , <i>Mirai</i> .

Type	Genetic shorthand	Sweetness	Storage	Notes
Synergistic	sy / triplesweet	Balanced; combines types	Excellent	Newer hybrid type. <i>Honey Select</i> .

If sh2 corn cross-pollinates with su or se corn (or with field/flour corn), the resulting kernels on the su/se plant become **starchy and unpalatable**. Conversely, sh2 corn cross-pollinated by su/se becomes only modestly sweet. Both crops are ruined.

The solutions:

- **Plant only one type per garden.** Simplest. Pick sh2 if you want the sweetest corn; pick su if you want the classic flavor.
- **Isolate by distance.** 250+ feet between different types. Rarely practical in home gardens.
- **Isolate by time.** Plant types so their tasseling (pollen release) is 2–3 weeks apart. *O’odham 60-day* tassels mid-July; *Hopi Blue* tassels late August. They overlap in flowering only if planted simultaneously.

WARNING

The isolation distance rule. Sh2 sweet corn and any other corn type (including a neighbor’s field corn) must be separated by 250 feet of direct line, or by 2-week tasseling time, or by a tall windbreak that disrupts pollen flow. A 50-foot separation is not enough. If you can see your neighbor’s flowering corn from your bed, your sh2 corn is at risk. The safest move in a populated valley is to grow only one type, or to grow a non-sweet heritage corn (*Hopi Blue*) that doesn’t have a sweetness-vs-starch conflict.

9.2 Variety reference

Variety · profile	Type	Days · Habit	Dragoon-fit	Dragoon notes
<i>Golden Bantam</i> OP	Sugary (su), yellow	80 d · 6 ft · 1–2 ears	●●●●○	The heritage standard. Open-pollinated; save seed. Classic sweet corn flavor.

Variety · profile	Type	Days · Habit	Dragoon-fit	Dragoon notes
<i>Country Gentleman</i> OP	Sugary (su), white shoepeg	90 d · 7 ft · 1-2 ears	●●●●●	Heirloom; small irregular white kernels. Excellent flavor for fresh eating or canning.
<i>Bodacious</i> F1	Sugary enhanced (se), yellow	75 d · 7 ft · 1-2 ears	●●●●○	Reliable workhorse hybrid. Tender husk.
<i>Kandy Korn</i> F1	Sugary enhanced (se), bi-color	85 d · 7 ft · 1-2 ears	●●●●●	Old-school se hybrid. Reliable in the Dragoons.
<i>Honey 'n Pearl</i> F1	Supersweet (sh2), bi-color	80 d · 7 ft · 1-2 ears	●●●●○	Long-storing supersweet; freezer-friendly.
<i>Mirai</i> F1	Supersweet (sh2), bi-color	80 d · 7 ft · 1-2 ears	●●●●○	Premium supersweet. Excellent fresh eating.
<i>Honey Select</i> F1	Synergistic, yellow	80 d · 7 ft · 1-2 ears	●●●●○	Combines su, se, and sh2 traits. Easy to grow.

Variety · profile	Type	Days · Habit	Dragoon-fit	Dragoon notes
<i>Hopi Blue</i> OP	Flour corn, deep blue	100 d · 8 ft · 1-2 ears	●●●●●	Hopi heritage variety from the Four Corners. Drought-tolerant. Ground into blue cornmeal for traditional foods. Plant May 10; harvest October. Cultural depth — this is a sacred crop with thousands of years of Pueblo agricultural history.
<i>Painted Mountain</i> OP	Flour corn, mixed kernel colors	85 d · 6 ft · 1-2 ears	●●●●●	Cool-season-tolerant heirloom from Montana, well-suited to Dragoon elevation and short cool springs. Drought-tolerant. Kernels in every color of the spectrum.

Variety · profile	Type	Days · Habit	Dragoon-fit	Dragoon notes
<i>O'odham 60-day</i> OP	Flour corn, white	60 d · 5 ft · 1 ear	●●●●●	Tohono O'odham heritage variety. Sow with monsoon (July 1–15). Sets ears in 60 days on monsoon moisture alone. Sonoran Desert pre-Columbian crop.
<i>Bloody Butcher</i> OP	Flour/dent corn, deep red	110 d · 10 ft · 1–2 ears	●●●●○	Appalachian heritage; deep red kernels. Excellent for cornmeal. Long-season — full warm window needed.
<i>Glass Gem</i> OP	Flint corn, multi-color glass-like kernels	110 d · 8 ft · 2 ears	●●●●	Carl Barnes' Cherokee heritage. Beautiful glassy kernels; ornamental and edible (popcorn, cornmeal).
<i>Strawberry Popcorn</i> OP	Popcorn, small red ears	105 d · 5 ft · 2–3 ears	●●●●○	Small ears, distinctive strawberry shape. Children love this one.

The Dragoon heritage corn case. *Hopi Blue, Painted Mountain, and O'odham 60-day* are all specifically bred for Dragoon-like conditions — high elevation, dry climate, monsoon-keyed water, short growing seasons. They

outperform commodity hybrids on resilience. They lack the supersweet kernel of modern hybrids, but they aren't trying to be sweet corn — they're flour corns, ground into traditional foods (blue cornmeal, posole, atole). Growing them is partly cultural participation in the longest continuous farming tradition in the region; partly just smart agronomy for the climate.

9.3 The pollination block — 4×4 minimum

Sweet corn is wind-pollinated. Pollen falls from the tassel at the top of the plant; the silks on the ear catch pollen as it drifts. Pollination is inefficient unless many plants pollinate each other simultaneously — which means **planting in a block, not a single long row**.

The minimum useful pollination block is **4 plants wide × 4 plants long** (16 plants). Below that, kernels on the ears fill spottily — every third kernel missing — because pollen didn't reach those silks. The maximum useful block is whatever you have space for; bigger blocks produce more complete ears.

Block size	Pollination quality	Notes
1×16 (single row, 16 plants)	Poor — spotty kernels	Avoid; the most common beginner mistake
4×4 (16 plants square)	Acceptable	Minimum useful planting
6×6 (36 plants)	Good	Recommended for most home gardens
8×8 (64 plants)	Excellent	Commercial-quality kernel fill

Spacing within the block

Variety type	In-row	Between rows
Sweet corn (su, se, sh2)	12 in	30 in
Heritage / flour corn	12 in	36 in
Popcorn	12 in	30 in

9.4 Direct-sow timing and the corn earworm dodge

Corn is direct-sown, never transplanted. Seed depth 1 in; sow when soil hits 60 °F (su types) or 65 °F (sh2 types).

The Dragoons' biggest sweet corn pest is the **corn earworm** (*Helicoverpa zea*), a caterpillar that bores into the tip of the ear during silk formation and damages kernels.

Earworm pressure rises sharply in August. The single most effective non-chemical control is **planting early enough that ears mature before peak earworm flight**.

Sowing date	Tassel date	Earworm risk
April 15	June 25	Low — early tassel, mature ears by July 25 (before peak earworm flight)
May 1	July 10	Moderate — coincides with monsoon and earworm uptick
May 15	July 25	High — peak earworm pressure during silking
June 1	August 15	Very high — peak earworm season

Plant April 15 (or as soon as soil hits 60 °F) for the lowest earworm pressure. The trade-off is colder soil at germination — accept a slightly lower stand rate and replant gaps.

Other earworm controls if pressure is high:

- **Mineral oil drop.** A few drops of mineral oil applied to the silk where it emerges from the ear (with a kitchen baster) blocks the moth from laying eggs. Apply 4 days after silks appear.
- **Bt at silk emergence.** *Bt kurstaki* sprayed on silks every 5 days through silking.
- **Tolerate the loss.** Cut off the damaged ear tip with a knife at harvest. The bottom 80 % is fine.

9.5 Watering — the high-demand crop

Corn is the most water-hungry crop in this guide. Each plant transpires 1.5–2.5 gal of water per day at peak (tasseling through ear fill). A 6×6 block of 36 plants needs 60–90 gallons per day in July. This makes corn poorly suited to water-limited Dragoon systems.

Stage	Water rate per plant
Seedling (4–6 in)	0.3 gal/day
Vegetative (knee high to chest)	1 gal/day
Tasseling	2 gal/day
Silking and ear fill	2.5 gal/day — the peak demand

Stage	Water rate per plant
Drying down (heritage flour types)	Stop watering 3 weeks before harvest

Drip lines or soaker hoses with 2-3 emitters per row are correct. Overhead sprinkler corn wastes 30-50 % to evaporation in dry Dragoon afternoons.

The monsoon helps — 6-12 inches of monsoon rain in July-August covers a significant portion of corn water need in those months. April-planted corn does most of its hard drinking in June (pre-monsoon), which is the costly month.

9.6 Three Sisters — corn + beans + squash

The traditional Sonoran Desert / Pueblo planting is corn, beans, and squash interplanted:

- **Corn** provides vertical structure for pole beans to climb.
- **Beans** fix nitrogen for the heavy-feeding corn and squash.
- **Squash** (or melons) sprawl beneath as living mulch — shade soil, suppress weeds.

The pattern works in Dragoon gardens with adjustments. Plant corn first (mid-May), then sow beans at the base of each corn plant 2-3 weeks later, then sow squash between corn rows after another 2 weeks. The corn is ahead of the beans; the beans climb without smothering; the squash fills space.

The trade-off: more complex harvest, slightly lower per-crop yields than monoculture, but a beautifully integrated system that conserves water and builds soil. Best results with heritage corn (*Hopi Blue* or *Painted Mountain*), heritage beans (*Hopi Yellow* lima or any pole dry bean), and a short-vine squash.

9.7 Harvest

Sweet corn

The classic test: peel back a small strip of husk to expose 4-5 kernels at the top of the ear. Press a kernel with a thumbnail.

- **Watery clear liquid** — too early. Wait 2 days.
- **Milky white liquid** — perfect ripe. Pick now.
- **Doughy paste** — too late. Use for cornbread or freeze; not as good fresh.

Sweet corn is unmatched eaten within 2 hours of picking. Sugars convert to starch within 24 hours of harvest (slower in sh2 types, faster in su). Pick same-day for the table.

Heritage flour / dent corn

Leave ears on plants until husks are tan, kernels are hard, and the plant is dead. Pull ears in October; husk; air-dry on screens for 2 weeks; shell by hand or with a hand-cranked sheller; store kernels in tight-lid jars. Grind into cornmeal as needed.

10 · Sweet potatoes

Slip propagation · the late-May plant · the curing rule

Sweet potatoes (*Ipomoea batatas*) are unusual in this guide for three reasons: (1) they're not *Solanum* — they're a morning glory relative, vining and indifferent to most of the pest spectrum that hits other crops; (2) they're propagated from **slips** — green shoots that sprout from a stored tuber suspended in water or damp sand, twisted off and rooted before transplant — not seeds or starts; (3) they require a **curing step** after harvest that is the trickiest single step in Dragoon soil gardening.

::: keynote **If it's your first season with sweet potatoes.** Buy 10 *Beauregard* slips locally in mid-May rather than growing your own — Willcox Feed and most Cochise feed stores carry them. Plant after the soil hits 70 °F. The bigger commitment is the curing setup in §10.7; line up your tote, heat mat, and humidifier *before* you harvest, not after. ::: The reward is one of the best crops you can grow here — sweet potatoes love Dragoon heat, ignore monsoon rain, produce heavily, and store for months.

10.1 Variety reference

Variety · profile	Type	Days · Habit	Dragoon-fit	Dragoon notes
<i>Beauregard</i> OP	Orange flesh, copper skin	100 d · vining	●●●●●	The American commercial standard. Reliable, productive, stores well. The default Dragoon sweet potato.
<i>Georgia Jet</i> OP	Orange flesh, red-purple skin	90 d · vining	●●●●●	Faster than <i>Beauregard</i> ; useful for the slightly shorter Dragoon warm window. Heavy producer.
<i>Murasaki</i> OP	White flesh, purple skin	100 d · vining	●●●●○	Purple-skinned Japanese-Asian variety. Drier than orange types; cooks creamier.

Variety · profile	Type	Days · Habit	Dragoon-fit	Dragoon notes
<i>Hannah</i> OP	Yellow flesh, tan skin	105 d · vining	●●●●○	Less sweet than orange; nuttier. Good keeper.
<i>Stokes Purple</i> OP	Deep purple flesh, purple skin	110 d · vining	●●●●	Striking color; antioxidant-rich; long-season.
<i>O'Henry</i> OP	White flesh, tan skin	100 d · vining	●●●●○	White-fleshed Beauregard relative. Less sweet than orange types.

10.2 Slip propagation — grow your own

Sweet potatoes are propagated from **slips** — sprouts that grow from a stored tuber. Slips can be bought from regional suppliers (Sand Hill Preservation, Steele Plant Co.) for \$1–2 each, but growing your own from a stored tuber is cheap and produces more slips than most gardens need.

The slip-growing protocol

1. **Start February 1.** Buy or save 2–3 organic sweet potatoes from the previous fall (commercial supermarket sweet potatoes are sometimes sprayed with sprout inhibitors and won't slip — buy organic or from a previous harvest).
2. **Suspend in water.** Insert 4 toothpicks around the middle of each tuber; suspend in a glass of water with the bottom half submerged. Or lay the tuber on damp sand in a tray.
3. **Place in warm bright spot.** 75–80 °F is ideal. A sunny windowsill works; bottom heat is helpful.
4. **Wait 4–6 weeks.** Sprouts emerge from the top of the tuber (the end with eyes). Each sprout becomes a slip.
5. **When slips are 6 in tall, twist them off.** Hold the base of the slip; twist gently. The slip should come away clean with no tuber flesh attached.
6. **Root the slips.** Place each slip in a small jar of water; roots emerge within 5–7 days.
7. **Plant when soil hits 70 °F.** Typically May 20 in the Dragoons. Slips with 2-inch roots transplant cleanly.

One tuber produces 10–20 slips over 6 weeks. Two tubers cover most home gardens.

LOCAL TIP

Sweet potato slips are also available locally at most Cochise County feed stores (Willcox Feed, Wilcox Tractor Supply) starting mid-May. \$1–2 per slip; bundles of 25 for \$20. Worth buying if you want a specific variety you didn't store last year, or want to skip the February startup work. The slips arrive freshly cut without roots; plant the same day in well-watered soil.

10.3 Bed prep and planting

Sweet potatoes are the easiest soil-prep crop in this guide. They actively prefer poor soil:

Parameter	Target	Notes
pH	5.5–6.5	Lower than most crops — slight acidification helps
Organic matter	2–3 %	Light. Heavy compost (5%+) produces leaf growth at expense of tubers
Drainage	Excellent	Wet feet rot tubers
Nitrogen	LOW	High N produces vine, no tuber
Phosphorus and potassium	Moderate	Bone meal and wood ash at planting

Planting

1. **Mound or ridge planting.** Make 6-inch ridges 30 inches apart. Mounding ensures the tubers form in loose, well-drained soil and not in compacted ground.
2. **Plant slips 12 in apart along ridge.** Bury 2/3 of the slip below ground; only top leaves above soil.
3. **Water in deeply.** Drench newly planted slips for 3 days.
4. **Mulch lightly** with straw — 1 inch only. Heavy mulch keeps soil too cool.

10.4 Season-long care

Sweet potatoes need almost no attention from June through September.

- **Watering:** Deep watering once weekly (1 inch). Sweet potatoes tolerate drought; over-watering produces vine, no tuber.
- **Mid-season root pruning** (optional): A traditional Southern technique — once vines start running, lift them gently from the ground and turn over. This breaks the

secondary roots that form along the vine and concentrates energy into the tubers under the original slip. Worth doing once in mid-August.

- **Vines may sprawl 8 ft long** and root wherever they touch wet soil. Either let them root (light extra tuber set) or lift weekly.

10.5 Pests

- **Wireworms** — soil larvae that bore into developing tubers. Worst in newly-broken ground. Rotate sweet potato beds; don't plant where grass was recently growing.
- **Sweet potato weevil** — uncommon in the Dragoons. If detected, rotate at least 200 yards from previous beds.

10.6 Harvest

Sweet potatoes are harvested before first frost — or, more precisely, before the *foliage* is killed by frost. Vine kill from frost triggers rot in the tubers within 24 hours.

Trigger	Action
Forecast frost within 48 hrs	Harvest immediately, weather permitting
Vines yellowing in mid-October	Harvest
100 days since planting	Test-dig one plant; if tubers are 4 in+ in length, harvest

Digging technique

1. **Cut the vines back** to 6 in stubs around each plant with shears.
2. **Loosen soil with a fork** 18 in away from the stem in a circle.
3. **Lift gently.** Don't pull by the stem — tubers break.
4. **Brush off soil; do not wash.** Washing introduces moisture that interferes with curing.
5. **Sort by size.** Cull damaged tubers (use first; don't store). Set aside undamaged ones for curing.

10.7 Curing — the critical step

This is the hardest part of growing sweet potatoes in the Dragoons.

Sweet potatoes need to cure at 80 °F and 85 % humidity for 10 days after harvest. Curing heals minor skin damage, converts starches to sugars, and dramatically extends storage life. **Uncured sweet potatoes rot within 4-6 weeks.** Properly cured ones store 6-8 months.

The Dragoons climate at harvest time (early-to-mid October) is wrong on both counts: 60-75 °F daytime, 20-40 % humidity. You have to **build a curing environment.**

The Dragoon curing problem. Our October weather is the opposite of what sweet potatoes need to cure. Without an intentional curing setup, sweet potatoes from a Dragoon harvest store about 6 weeks at best. With a proper 80 °F / 85 % RH cure for 10 days, the same tubers store through April. The curing step is the single highest-return action in the entire sweet-potato process. Don't skip it.

Improvised curing setups

Setup	How	Notes
Insulated tote with water + heat mat ●●	Place tubers single-layer in a plastic tote on a wire rack. Below the rack, set a baking dish of water and a \$20 reptile heat mat. Cover loosely with plastic sheet. Check daily — aim for 80 °F and visible condensation.	The most reliable Dragoon method. Works in any heated room.
Sunroom or greenhouse with humidifier	Set tubers on screens in a sunroom. Place a humidifier in the room set to 85 %. Hang thermometer-hygrometer.	Works if you have the space and the room runs warm.
Bathroom with running humidifier	Run a humidifier in a closed bathroom for 10 days; heat with a small space heater set to 78 °F.	Works but inconveniences household.
Outside in monsoon (early harvest)	If you harvest in early September during late monsoon, lay tubers on screens in a covered shaded location — late monsoon humidity (50–70 %) and warm temps approximate the curing conditions.	Only works if your harvest is timed to monsoon weather.
Skip curing	Just put fresh tubers in a basket and eat within 6 weeks.	Acceptable for small harvests; not for storage crop.

After 10 days curing:

1. **Inspect.** Healthy cured tubers have skins that are slightly papery and resist scratching with a thumbnail. Skin is firm and intact.
2. **Wrap individually in newspaper** or place in shallow boxes with no contact between tubers.
3. **Store at 55-60 °F, 60 % RH.** A cool basement, a heated garage, or an interior closet works. Avoid temperatures below 50 °F — sweet potatoes get chilling injury (internal black spots) below 50 °F.
4. **Check monthly.** Cull any soft or moldy ones immediately.

WARNING

Never refrigerate sweet potatoes. Below 50 °F, sweet potatoes develop a flavor and texture defect from chilling injury — the flesh turns watery, sometimes darkly spotted. The damage is invisible until you cook them. Sweet potatoes belong in a cool room, not a fridge.

11 · Pest & disease summary for the warm season

One cross-cutting table for the whole guide

The Dragoons warm season has a richer pest community than the cool season — the heat and monsoon humidity favor more insect species. This chapter consolidates pest pressure for all eight crop families into a single IPM framework — what to watch for, when, on which crop, and how to respond. Where individual chapters have crop-specific protocols (e.g., cucumber beetle in §5.5, squash vine borer in §6.4), those are the canonical treatment.

11.1 Pest calendar — what to watch for, when

Pest	Active months	Primary targets	Severity in the Dragoons
Tomato/potato psyllid	Apr – Jun	Tomato, eggplant, potato	Moderate; severe in dry warm springs
Tomato hornworm	Jul – Sep	Tomato, eggplant	High during monsoon
Cucumber beetle (striped & spotted)	Jul – Sep	Cucumber, melon, squash	High — Dragoon signature pest
Squash vine borer	Jul (single flight)	Summer squash, zucchini	High — Dragoon signature pest
Squash bug	Jul – Sep	Squash, zucchini, melon	Moderate
Aphids	May – Sep	Tomato, bean, cucumber, squash, sweet potato	Moderate
Spider mites	Jun (pre-monsoon dry)	Tomato, bean, eggplant	Moderate-to-high in dry pre-monsoon
Flea beetle	May (transplant)	Eggplant primarily; tomato, sweet potato secondary	Moderate
Corn earworm	Aug	Sweet corn	High — plan around
Grasshoppers	Aug – Sep (drought years)	All crops; rapid defoliation	Low-to-high (year-dependent)
Javelina	Year-round	Melons, sweet potatoes, tomatoes	High where unfenced
Pack rat / wood rat	Year-round	Squash, melons (chewing fruit), tomato fruit	Moderate

Pest	Active months	Primary targets	Severity in the Dragoons
Bacterial wilt (cucumber beetle vector)	Jul – Sep	Cucumber, melon	High where beetles are present
Tomato mosaic virus (psyllid vector)	Spring	Tomato, eggplant	Low-to-moderate
Curly top virus (leafhopper vector)	Apr – Jun	Tomato, bean	Year-dependent — bad in some years
Powdery mildew	Jul – Sep monsoon	Squash, zucchini, melon, cucumber	Moderate

11.2 Cross-cutting IPM principles

Principle	What it looks like in practice
Row cover is the most useful single tool	One roll covers cucumber-beetle exclusion at transplant, flea beetle on eggplant seedlings, hornworm moth exclusion, curly top vector exclusion. Buy quality once — see Guide 6 \$6.7 for the same principle in cool-season application.
Hand-pick at dusk and dawn	Hornworm, squash bug, cucumber beetle, grasshopper — all are easier to spot and slower to escape in low light. A daily dusk walk through the bed with a flashlight beats any spray on small plantings.
Bt for caterpillars; not for beetles	<i>Bt kurstaki</i> kills hornworm, looper, and corn earworm cleanly. It has no effect on cucumber beetle, squash bug, or psyllid. Use pyrethrin or insecticidal soap for those.
Spray at dusk to protect pollinators	All sprays applied after sunset; bees stop foraging at sunset and pyrethrin/neem break down in UV.
Trap crops are underused	A <i>Blue Hubbard</i> squash at the bed edge draws cucumber beetles off real crops. A row of <i>Tagetes patula</i> (marigold) draws aphids. Nasturtiums hold flea beetles.
Time of day matters for spraying	Bt and pyrethrin both break down in UV; spray at dusk. Insecticidal soap is most effective on dry mornings.

Principle	What it looks like in practice
Aluminum foil at stem base	For squash vine borer — see §6.4. Highest-return single intervention for any zucchini bed.
Cull infected material aggressively	A bacterial wilt cucumber vine, a virus-infected tomato, a borer-collapsed squash — pull them within 48 hours. Trash, don't compost.
Rotate beds	Same family in the same bed two years running concentrates pests and pathogens. The standard 4-year rotation (Guide 6 §7) breaks these cycles.

11.3 The Dragoon signature pests

Four pests give the Dragoons their warm-season fingerprint. If you're new to growing here, plan for these specifically:

- **Cucumber beetle** (§5.5) — exclusion + dusk pyrethrin around the first July monsoon storm.
- **Squash vine borer** (§6.4) — aluminum foil at stem base in May; second sowing late July as insurance.
- **Tomato hornworm** (§3.13) — daily dusk inspection through August; Bt during heavy monsoon.
- **Corn earworm** (§9.4) — plant corn April 15 to dodge peak flight; mineral oil drop on silks if needed.

Combining preventatives for these four addresses about 80 % of warm-season pest losses in a typical Dragoons garden.

WARNING

Don't spray pyrethrin or neem during bee activity. Pollinators are critical for cucumber, squash, melon, and bean production. Pyrethrin kills bees on contact; neem is a milder pollinator hazard but should still be limited. Spray all insecticides after sunset; never on plants in active bloom in midday. If you must intervene during a heavy daytime pest surge, water-blast or hand-pick instead.

12 · Crop rotation handoff with the cool season

What comes out, what goes in — the warm-to-cool October handoff

This chapter is the warm-season counterpart to **Guide 6 §7**, which covered the cool-season-to-pepper handoff. Where Guide 6 §7 walked from late September pepper-bed clearing through October allium planting, this chapter walks from late October warm-season bed clearing through November-December cool-season transitions.

The full 4-year rotation table from Guide 6 §7 is canonical and not repeated here. This chapter focuses on the **specific October handoff for the warm-season crops in this guide**.

12.1 The handoff — late October

Most warm-season crops finish in October. First frost (typically October 25 – November 10) kills tomato, pepper, eggplant, cucumber, squash, melon, and bean foliage. Sweet potato is harvested before frost (§10.6). The bed handoff window — pull old crop, amend soil, plant cool-season replacement — is the last two weeks of October and the first two weeks of November.

Date	Warm-season bed activity	Cool-season bed activity
Late September	Last meaningful tomato/pepper harvest; assess green tomatoes	Brassica transplants going out (per Guide 6 §2)
Early October	Pull spent cucumber, squash, melon vines; assess remaining fruit	Final brassica transplants for fall harvest
Mid-October	Pull determinate tomatoes; broadfork former cucurbit beds	Garlic and shallots being separated for planting
October 15-25	Pull spent indeterminate tomatoes; clear stakes, drip lines	Plant garlic, shallots, overwintering onions in cleared warm-season beds
Late October	Harvest sweet potatoes; harvest last fall tomatoes; pull pepper plants after first hard frost	Mulch new allium plantings 3–4 in deep
Early November	Pull any remaining tomato cages and stakes; clean and store	Spinach, mâche, last brassica successions
Mid-November	Bed rests under cover crop or mulch	Cool-season crops establishing

12.2 Bed-by-bed handoff recommendations

What you pulled (October)	What goes in (October–November)	Why this works
Tomato bed (heavy feeder, deep root, <i>Solanaceae</i>)	Garlic, shallots, overwintering onions (light feeders, shallow root, <i>Alliaceae</i>)	Tomato draws down nitrogen; alliums actively prefer the low-N residue. Allium follows family rotation cleanly.
Pepper bed (heavy feeder, <i>Solanaceae</i>)	Brassicas (heavy feeder, <i>Brassicaceae</i>) or alliums	Brassicas use what's left of pepper nutrients with light compost top-up. Family rotation is good.
Cucumber / squash bed (heavy feeder, <i>Cucurbitaceae</i> , shallow root)	Carrots, beets, turnips (light feeders, deep root) or kale/spinach	Roots go deep where cucurbits stayed shallow; opposite soil-zone use.
Bean bed (light feeder, N-fixer, <i>Fabaceae</i>)	Brassicas (heavy feeder)	The classic rotation pair — brassica gets fixed N.
Sweet corn bed (heavy N-user, grass family)	Cover crop (crimson clover + cereal rye) or brassicas	If brassicas, top-dress compost; corn depletes N hard.
Sweet potato bed (light feeder, <i>Convolvulaceae</i>)	Leeks, scallions, or carrots	All are clean follows; the ridged sweet-potato bed reduces nicely into the flat carrot row.
Melon bed (heavy feeder, <i>Cucurbitaceae</i>)	Garlic or fall brassicas	Same logic as cucumber.

The October hinge. The two weeks October 15–25 are the most productive single planning window in the Dragoons garden year. Warm-season crops are finishing or finished; cool-season anchor crops are going in; the soil is still warm enough for new-crop establishment but cool enough that cool-season seeds and transplants thrive. A clear bed plan for this window — which beds get garlic, which get brassicas, which get cover crop — is the single highest-return planning act of the year.

12.3 The cover-crop year

The 4-year rotation in Guide 6 §7 has a single bed slot per cycle dedicated to a cover crop rather than a cash crop. The standard mix:

- **Cowpeas** (*Vigna unguiculata*) — summer N-fixer, deep root, heat-tolerant,

monsoon-keyed (sow with monsoon, like teparies)

- **Buckwheat** (*Fagopyrum esculentum*) — summer flowering smother crop, attracts pollinators, breaks down fast
- **Crimson clover** (*Trifolium incarnatum*) — overwinter N-fixer
- **Cereal rye** (*Secale cereale*) — overwinter root-builder, deep structure

Sow cowpeas + buckwheat in late June; cut at flowering (early August), leave on bed. Sow crimson clover + cereal rye in mid-October as a winter cover. Cut and turn under in March before peppers/tomatoes go in.

A cover-cropped bed coming out of the cycle in spring 5 is the best soil any Dragoons grower will work with. Same compost amendments, same drip irrigation, but the structure and biology have rebuilt.

Sources & references

Reference material consulted, suggested for further reading, and where to verify or extend the claims in this guide.

Local resources

- **UA Cooperative Extension — Cochise County office (Sierra Vista)** — soil testing, hornworm and psyllid identification, *Vegetable Variety Recommendations for Arizona*, and IPM consultations. Phone 520-458-8278.
- **UA Cooperative Extension Master Gardener program** — Cochise County volunteer help desk for sick-plant diagnosis and variety questions specific to local conditions.
- **Native Seeds/SEARCH (Tucson)** — the canonical regional source for *Phaseolus acutifolius* tepary lines, *O'odham* 60-day corn, Hopi heritage corns, and other Sonoran-adapted seed.
- **Tohono O'odham Community Action (TOCA)** — the cultural and agricultural home of tepary cultivation; resources on indigenous Sonoran Desert agriculture.
- **Sulphur Springs Valley feed and farm supply** — aluminum foil rolls, row cover, drip irrigation parts, bulk straw for mulch.

Books & references

- *Growing Food in a Hotter, Drier Land* by Gary Paul Nabhan — Sonoran-Desert agronomy and heritage-variety context for teparies, heritage corn, and the three-sisters pattern in this guide.
- *The Tao of Vegetable Gardening* by Carol Deppe — variety adaptation, breeding for local conditions, the bean and squash chapters in particular.
- *Heirloom Vegetable Gardening* by William Woys Weaver — the encyclopedic reference for the heirloom tomato, bean, and squash varieties named in this guide.
- *Hydroponic Food Production* by Howard Resh — the system-selection logic behind the \$3.8 Bato bucket recommendation and the EC/pH curves in §3.11.
- *The New Organic Grower* by Eliot Coleman — bed preparation and rotation logic translating cleanly to the Dragoons warm season.

Online resources

- **UA Cooperative Extension publications** (extension.arizona.edu) — *Vegetable Variety Recommendations for Arizona*, the SE Arizona IPM series, and the alkalinity-management bulletins.
- **PennState Extension — Cucurbit IPM** (extension.psu.edu) — the most thorough free reference for squash vine borer, cucumber beetle, and bacterial wilt identification and control.
- **Native Seeds/SEARCH online catalog** (nativeseeds.org) — variety histories, growing notes, and the seed source for everything tepary- or *O'odham*-related in

this guide.

- **Johnny's Selected Seeds growing guides** (johnnyseeds.com) — variety-specific notes for nearly every tomato, cucumber, melon, and bean variety listed.
- **OMRI (Organic Materials Review Institute)** (omri.org) — verify *Bt*, pyrethrin, neem, and other inputs before applying.

Closing

The Dragoons warm season is brief and intense compared to East Coast or Midwestern gardens, but more productive than most newcomers expect. The framework is the same one that organizes the cool-season guide (Guide 6) and the pepper guide (Guide 2): a short list of high-leverage decisions (soil temperature at transplant, variety selection for heat tolerance, monsoon-keyed pest preventatives, calendar discipline in the May planting wall and the October handoff), and then daily attention through the year.

Eight crop families fit into the same warm window: tomatoes (the anchor, on the same scale as peppers); eggplant (a near-clone of pepper biology); cucumbers, squash, and melons (cucurbits with the same beetle and borer problems); beans, sweet corn, and sweet potatoes (rotation builders and storage crops with cultural depth). Most growers run a subset of these. The heritage and indigenous varieties — teparies, Hopi Blue corn, *O’odham 60-day*, *Painted Mountain* — are some of the most regionally-appropriate crops anywhere in this guide and deserve to be planted regularly, not just as curiosities.

What this guide doesn’t replace: trial and error in your own beds. A west-facing slope cooks tomatoes that a north-facing slope ripens perfectly. A wet monsoon year and a dry one feel like different growing climates. The pre-monsoon heat hole arrives earlier some years than others. Keep notes — dates, varieties, soil temperatures at transplant, harvest weights — and after three seasons your calendar will beat this one for your specific spot.

The two seasons knit together cleanly. Tomatoes, peppers, and eggplant come out in late October as garlic and brassicas go in. Cucumbers and squash clear by August or September; carrots, beets, and fall greens follow. Sweet corn and beans build soil for next year’s heavy feeders. Sweet potatoes come out before frost; the bed they leave is loose, sandy, and almost ready to plant. The full rotation rolls forward across all twelve months.

RELATED GUIDES

The 14 guides in the library: - **Guide 1 — Hydroponic Primer & Library Map** · the front door + master multi-crop calendar - **Guide 2 — Peppers in the Dragoons** · soil + hydroponic + variety-specific staking - **Guide 3 — Bato Bucket Hydroponic Systems** · system build, water treatment, operations - **Guide 4 — Hydroponic Nutrients** · Masterblend + DIY + pH + Indoor/LED - **Guide 5 — Grapes in the Dragoons** · Cochise County viticulture - **Guide 6 — Cool-Season Crops** · brassicas + alliums + greens + roots - **Guide 7 — Warm-Season Companions** (this guide) · tomatoes, cucurbits, beans, corn,

sweet potatoes - **Guide 8 — Herbs in the Dragoons** · annual + perennial · soil & hydroponic - **Guide 9 — Backyard Orchard in the Dragoons** · figs, pomegranates, jujubes, stone fruits - **Guide 10 — Pest, Disease & Wildlife** · IPM + Cochise wildlife exclusion - **Guide 11 — Foundations: Soil & Seed** · soil-building, composting, seed-starting, propagation - **Guide 12 — Harvest, Preservation & Storage** · canning, fermenting, drying, cellaring - **Guide 13 — Water in Cochise County** · sourcing, testing, treatment, rainwater, conservation - **Guide 14 — Season Extension Structures** · cold frames, low tunnels, hoop houses, high tunnels - **Guide 15 — Native Food Crops of the Sonoran-Madrean Region** · the indigenous food complex of the Dragoons and the wider sky-island region - **Guide 16 — Companion Plantings & Polycultures** · the design layer — companion matrix, anti-companions, cover crops, 9 Dragoons-specific guild designs - **Guide 17 — Recipes & Kitchen Integration** · what to cook with what came out of the garden this morning · by-crop recipes + seasonal menus

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