

Native Food Crops of the Sonoran-Madrean Region

Guide 15 · The Indigenous Food Complex

*Beans · Corn · Peppers · Squash · Cactus · Mesquite · Agave · Yucca · Devil's Claw ·
Amaranth*

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- **Guide 1 — Hydroponic Primer & Library Map** · the front door + master multi-crop calendar
- **Guide 2 — Peppers in the Dragoons** · soil + hydroponic + variety-specific staking · the cultivated-pepper companion to this guide's Chiltepin chapter
- **Guide 3 — Bato Bucket Hydroponic Systems** · system build, water-treatment protocol, operations
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- **Guide 7 — Warm-Season Companions** · tomatoes, cucurbits, beans, corn, sweet potatoes · the cultivated-bed companion to this guide's beans, corn, and squash chapters
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- **Guide 12 — Harvest, Preservation & Storage** · canning, fermenting, drying, cellaring · the post-harvest companion for everything this guide grows
- **Guide 13 — Water in Cochise County** · sourcing, testing, treatment, drip-irrigation design
- **Guide 14 — Season Extension Structures** · cold frames, low tunnels, hoop houses, high tunnels
- **Guide 15 — Native Food Crops of the Sonoran-Madrean Region** (this guide) · 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 guide is the place-anchor of the library. Where Guide 7 covers tepary beans and Hopi blue corn as items on a long warm-season bench, this guide

covers them as members of a coherent body of knowledge — a 4,000-year agricultural inheritance the Dragoons still belong to. Where Guide 2 names the Chiltepin in its opening paragraph, this guide takes it apart: the wild bush, the dispersal ecology, the propagation challenge, the place in the kitchen. Cross-references to other guides are heavy here on purpose — this is the guide that connects everything else to the land that was already farmed before the library's other crops arrived.

About this guide

What this guide is · who it is for · how it relates to the rest of the library

There were corn, beans, squash, and chiles on the east side of the Dragoons before there were tomatoes, peppers in buckets, or grape vines on VSP trellises. The crops that ripened here without anyone watering them — the wild Chiltepin in the canyon, the mesquite pods that fell in July, the prickly-pear tunas in September, the agave that an Apache or O’odham party roasted in a pit for three days — are not a footnote to the library’s other guides. They are the original local food system. Everything else the library covers is a layer on top.

This guide is the layer the library was missing. The other fourteen guides treat native crops the way most modern reference works do: as items in a longer list, named in a variety table, footnoted to a heritage source. Tepary beans get six paragraphs in Guide 7. Hopi Blue corn gets a row in the corn-variety reference. The Chiltepin gets a sentence in the Guide 2 opening. None of those are wrong — but they leave the reader without a way to see the whole picture. The whole picture is what this guide is for.

What this guide assumes. That you are growing food on or near the Dragoons, at 4,200–5,500 ft, on alkaline soil over caliche, with monsoon rain in July and August and 3–6 hard-frost nights in January. That you have or want a small kitchen garden — even a few beds is enough — and an interest in the long history of food in this region. No special equipment is required for most of what’s in this guide. A few of the perennials (agave, prickly pear, mesquite) require nothing at all if they already grow on your land.

The reader this guide is written for is in one of three situations:

- **You’re new to the Dragoons** and want to grow the crops the land asks for, rather than fight it. Start with §3 (beans) and §4 (corn). The native varieties in those chapters will reward you for less work than the European crops in Guides 7 and 6.
- **You already grow tomatoes and peppers and brassicas**, and you want to add a layer of native crops that don’t compete for the same bed space — they ripen on different water, on different soil, with different timing. The chapters on mesquite (§8), agave (§9), prickly pear (§10), and yucca (§12) cover crops that grow without irrigation once established and yield for decades.
- **You want the history and the cultural context**, and a working reference for the crops that history produced. Read §1 and §2 first. The crop chapters that follow assume you’ve read the framing.

The guide is not a comprehensive ethnobotany. It does not attempt to retell the indige-

nous agricultural history of the Sonoran-Madreal region — there are better books for that, and §14 lists them. It does not give recipes (a few exceptions where the preparation is part of the harvest, as with agave). It does not cover ornamental native plants that aren't food.

What it does cover, for each of the ten crop families: where the crop comes from, what species and varieties exist, how to grow it (or harvest it, if it's wild), when to harvest, how to process and store the harvest, and a short note on cultural context. The cultural notes are factual and brief — this guide assumes you know that food is more than calories, and that crops with 4,000-year histories carry weight beyond their nutritional content, and it gestures toward that weight rather than centering it. Readers who want a deeper cultural treatment should read Gary Paul Nabhan's *Growing Food in a Hotter, Drier Land* (cited throughout) and connect with Tohono O'odham Community Action and Native Seeds/SEARCH (covered in §2).

LOCAL TIP

On voice and attribution. Crop names in this guide use both common and scientific names on first introduction; subsequent references use whichever is clearer. Where a crop is associated with a specific people — Tohono O'odham, Hopi, Akimel O'odham, Apache, Tarahumara, Pueblo — the attribution is given; where a crop is broadly Sonoran or Madreal, "Sonoran" or "Madreal" is used as a regional rather than cultural descriptor. The seed sources at the end of each chapter cite Native Seeds/SEARCH (NS/S) as the canonical regional source; specific accessions are theirs to maintain and ours to grow.

1 · The Sonoran-Madreal food complex

Why this place produced a coherent agricultural tradition · the four hands that shaped the crops · what the inheritance looks like today

The Dragoons sit at the convergence of three agricultural traditions and the upper edge of a fourth. The most important framing in this guide is geographic, and it takes one paragraph to lay out.

The Sonoran Desert reaches its eastern edge in Cochise County. The Madreal sky islands — of which the Dragoons are one — are the mountain archipelago that rises out of that desert on both sides of the US-Mexico border, from the Chiricahuas in the east to the Sierra Madre Occidental in the west. North of us, the Mogollon Rim climbs into Pueblo and Diné country. South of us, the Sonoran flatlands open into the heartland of Tohono O'odham agriculture. Between those two cultural centers, the sky-island corridor was farmed by Apache bands moving with the seasons, by Tarahumara across the modern border, and by ancestral Akimel and Tohono O'odham following the rivers up the bajadas into the foothills.

What that geography produced is a coherent body of food crops that share four characteristics. They tolerate intense heat. They require very little water — most of the cultivated varieties were bred to ripen on summer monsoon moisture alone. They yield reliably on alkaline soil. And they handle the 35°F+ diurnal temperature swing that defines southeastern Arizona without complaint. That set of constraints is unusual enough that the crops produced by it form a distinct agricultural tradition, not just a regional flavor on a generic one. A tomato that is fine in Phoenix is a different plant from a tepary bean that is fine in Phoenix; the tomato will require shade cloth and three gallons a week, and the tepary will require neither.

The four hands

It is useful to think of four agricultural lineages that shaped the crops in this guide. The boundaries between them blur — seeds traveled, people intermarried, the Spanish and later the Anglo-American economies disrupted everything — but the four traditions are real, and the crops carry signatures from each.

Tradition	Center	Signature crops	What they brought to the region
Tohono O'odham (and ancestral Akimel)	Sonoran flatlands, from the Avra Valley west to the Sierra Estrellas, south into Sonora	Tepary beans, O'odham 60-day corn, devil's claw, <i>bo'ola</i> (small Sonoran chile), Tarahumara squash	Domesticated and refined the canonical monsoon-keyed crops. Cultivated agriculture in the driest, hottest part of North America for at least 4,000 years. The crops that ripen on 4 inches of seasonal rain are theirs.
Hopi / Puebloan	Four Corners, the Pueblo arc south into the Rio Grande and west to Hopi Mesas	Hopi Blue corn, Anasazi beans, Hopi Yellow Lima, Glass Gem (Cherokee, brought west), Hubbard-derived squashes	A long agricultural lineage focused on dryland farming, terracing, and crop diversity. The flour corns and dry beans with the deepest names and longest memories.
Apache (Chiricahua, Mescalero, Western)	The sky-island corridor from the Sierra Madre north into eastern Arizona and New Mexico — including the Dragoons	Wild Chiltepin (managed), agave (managed and roasted), mesquite (managed), yucca (managed), corn and bean adoption from Pueblo neighbors	A wild-harvest plus light-cultivation tradition that took advantage of the rich wild food complex of the sky islands. The mesquite-agave-Chiltepin-yucca complex is the Apache inheritance.

Tradition	Center	Signature crops	What they brought to the region
Spanish / Mexican mestizo	Sonora and New Mexico, with deep roots in the Sierra Madre	New Mexico landrace chiles (Chimayo, Espanola, Anaheim line), wheat (introduced), fruit trees, hard cheeses, mesquite-fired ovens	Reworked the indigenous food complex through the lens of European agriculture and Catholic mission farming. The chile varieties grown by every modern New Mexican farmer trace through Spanish-period landraces back to indigenous <i>Capsicum annuum</i> lines.

Three of the four traditions are still present in Cochise County in some form, and the fourth (Apache) is present in the surrounding landscape — the Western Apache reservation is north of the county; Mescalero is east in New Mexico; the Chiricahua moved through the Dragoons themselves until 1886. The crops in this guide are the surviving threads of all four traditions, woven together.

What the inheritance looks like

Practically speaking, the inheritance shows up as a few dozen named varieties and a set of perennial harvest plants. The named varieties — tepary in brown and white, Hopi Blue corn, Painted Mountain corn, Anasazi beans, Hopi Yellow Lima, Glass Gem, Tarahumara squash, O’odham 60-day corn, Bo’ola chile, Tohono O’odham Yellow-Meated watermelon — are maintained by Native Seeds/SEARCH in Tucson, by Tohono O’odham Community Action, by Hopi seed keepers, by some Mescalero and Western Apache families, and by a network of dryland farmers and home gardeners who source from those keepers. The perennials — agave, mesquite, prickly pear, yucca, Chiltepin where wild, devil’s claw where naturalized — are present on the land, grown by no one in particular, and harvested seasonally by those who know how.

This guide treats both halves of the inheritance equally. The cultivated crops get planting calendars and varietal references and irrigation schedules; the perennials get harvest windows and processing protocols. Both halves yield food. Both halves are part of the same tradition.

The arc this guide follows

The chapter order in this guide is roughly: cultivated annuals first, perennials and wild-harvested plants second.

Chapter	Crop	Type	Typical bed footprint or harvest range
\$3	Beans (tepary, Anasazi, Hopi Yellow)	Cultivated annual	50–200 sq ft
\$4	Corn (Hopi Blue, Painted Mountain, O’odham, Glass Gem)	Cultivated annual, block-planted	100–400 sq ft minimum
\$5	Peppers — Chiltepin, NM landrace chiles	Wild perennial + cultivated annual	1 wild bush · 4–8 sq ft per chile plant
\$6	Native squash & gourds (Cushaw, Tarahumara, bottle gourd)	Cultivated sprawler	50–100 sq ft per plant
\$7	Devil’s claw	Cultivated or naturalized annual	6–10 sq ft per plant
\$8	Mesquite	Wild-harvested perennial	A mature tree or grove on or near your land
\$9	Agave	Cultivated or wild-harvested perennial	A few mature rosettes, 5–25 years of growth
\$10	Prickly pear	Wild or cultivated perennial	A patch — 50+ sq ft
\$11	Amaranth	Cultivated annual	20–100 sq ft
\$12	Yucca	Wild-harvested perennial	A few mature plants on or near your land

\$13 is a planting and harvest calendar that pulls all of the above together by month. \$14 is the seed-keeper section — Native Seeds/SEARCH, Tohono O’odham Community Action, books, and other sources.

2 · The seed-keeper network

Where to source the seed and the knowledge · Native Seeds/SEARCH · Tohono O’odham Community Action · the books that anchor the literature · attribution and reciprocity

Native crop varieties are not a commodity. They are maintained year over year by specific organizations and specific people who select for adaptation in specific places. The seed you buy from a regional seed bank carries 50–100 generations of selection by people whose names are sometimes recorded and sometimes not. The right relationship with that material is not “I bought a packet, the genetics are now mine”; it is closer to “I’m a custodian of this lineage for one season, and I should return seed back to the keepers when I have a surplus.” This chapter introduces the keepers.

The two organizations to know. Native Seeds/SEARCH (Tucson) is the canonical regional seed bank for the desert Southwest — a nonprofit that conserves heritage crop varieties from O’odham, Hopi, Navajo, Apache, Tarahumara, and other indigenous traditions, and sells small packets back to home gardeners. Tohono O’odham Community Action (TOCA), based in Sells, AZ, is the cultural and agricultural home of tepary cultivation and the indigenous food sovereignty movement in the Sonoran. Almost every cultivated variety in this guide can be sourced through NS/S. Almost every cultural question can be answered or referred-on by TOCA.

2.1 Native Seeds/SEARCH

Native Seeds/SEARCH (NS/S) is headquartered in Tucson at 3061 N Campbell Ave, with a retail store, a seed bank (about 1,900 accessions held at various levels of conservation), and a 60-acre conservation farm in Patagonia, AZ — itself in a sister sky-island valley, 90 miles southwest of the Dragoons. NS/S sells seed packets through its store and website (nativeseeds.org), publishes germination data, runs workshops, and supports a national network of dryland heritage seed growers.

For the crops in this guide, NS/S is the primary commercial source. Their accessions are typically listed by indigenous origin (e.g., *Tohono O’odham Brown Tepary*, *Tohono O’odham Yellow-Meated Watermelon*, *Hopi Blue Flour Corn*) and they are conservative about claims of regional adaptation: a variety from one O’odham community in the Sonoran flatlands is not assumed to be identical to one collected in a Sierra Madre Tarahumara village a thousand feet higher.

The NS/S catalog is large enough that some discernment helps. For a Dragoons reader, the relevant subsections are:

Crop family	NS/S subsection	Typical adapted varieties
Beans	<i>Phaseolus acutifolius</i> teparies (brown, white, plus minor lines); <i>P. vulgaris</i> common beans (Anasazi, Hopi Yellow, Hopi Black Turtle); <i>P. lunatus</i> limas (Hopi)	Brown Tepary; White Tepary; Anasazi; Hopi Yellow Lima
Corn	Flour corn (Hopi Blue, Hopi White); flint (Painted Mountain, Bloody Butcher, Glass Gem); dent (O'odham 60-day); popcorn (Tohono O'odham, Hopi)	Hopi Blue; O'odham 60-day; Painted Mountain
Squash	<i>Cucurbita pepo</i> (Tarahumara summer); <i>C. maxima</i> (Tarahumara Pumpkin); <i>C. moschata</i> (Tohono O'odham Yellow-Meated, <i>C. argyrosperma</i> Cushaw lines)	Tarahumara Pumpkin; Tohono O'odham Yellow-Meated; Cushaw
Chiles	<i>C. annuum</i> small-fruited (Bo'ola; New Mexico landraces); <i>C. annuum</i> var. <i>glabriusculum</i> (Chiltepin wild seed)	Bo'ola; Chimayo; Espanola Improved; Chiltepin (wild seed)
Other	Devil's claw (cultivated and wild forms); grain amaranth (Hopi Red Dye, Mercado); various Native gourds	Devil's Claw; Hopi Red Dye amaranth

A few practical notes on ordering: NS/S germination on heritage corn is often 70–85% (not the 95%+ you'd expect from a modern hybrid), so seed at slightly higher rates. Their tepary seed is fresh and germinates well (>85% typically). The Chiltepin seed is sometimes described as “wild” and germinates erratically — that's a feature of the genetics, not a problem with the lot.

NS/S members get a 10% discount and the satisfaction of supporting conservation work directly. The membership is inexpensive and worth it for anyone planting more than a packet or two per year.

2.2 Tohono O’odham Community Action

Tohono O’odham Community Action (TOCA) is a cultural and economic-development organization based in Sells, AZ, in the heart of the Tohono O’odham Nation about 130 miles southwest of the Dragoons. TOCA is not primarily a seed source — it’s a community organization — but it is the cultural anchor for tepary cultivation and the broader O’odham food sovereignty movement. TOCA runs a community farm, supports traditional ak chin farming (rain-fed monsoon agriculture), and publishes on Tohono O’odham food traditions.

For a Dragoons grower, TOCA matters in three ways. First, it is the source of context — anyone writing or teaching about O’odham crops should be aware that there is an active O’odham community working on these crops today, not just a historical tradition. Second, TOCA has a small product line of O’odham foods (tepary beans, *cholla* buds, mesquite flour) available through their website (tocaonline.org); buying from them sends income directly back to the community. Third, TOCA’s educational materials — short videos, blog posts, occasional workshops — are excellent supplementary reading for anyone growing these crops.

2.3 Other regional sources

- **Seed Savers Exchange** (Decorah, IA) — has some heritage Southwest varieties, particularly corns and amaranth. Smaller selection than NS/S but useful for cross-referencing.
- **Baker Creek Heirloom Seeds** (Mansfield, MO) — carries Glass Gem corn and a handful of Hopi varieties. Mainstream, easy to order, voice not regional.
- **High Desert Seed & Gardens** (CO) and **Snake River Seed Cooperative** (ID) — Mountain West sources with some Southwest crossover.
- **Local exchanges.** Cochise County has a small seed-saving community; the Cochise County Cooperative Extension office and the Bisbee Farmers’ Market occasionally host seed swaps. The Hereford Seed Library (Sierra Vista) and a handful of regional libraries also carry seed.
- **Wild seed.** For Chiltepin, devil’s claw (where naturalized), and amaranth, wild seed is sometimes the best source. See the chapter for each crop.

2.4 The literature

A short shelf of books anchors the literature on Sonoran-Madrean native crops. Reading any one of these will substantially deepen the use of this guide.

- **Gary Paul Nabhan, *Growing Food in a Hotter, Drier Land*** (Chelsea Green, 2013). The canonical reference for Sonoran-Desert agricultural adaptation, written in clear prose, with practical chapters on tepary, agave, mesquite, prickly pear. The book this guide most frequently cites.
- **Gary Paul Nabhan, *Gathering the Desert*** (University of Arizona Press, 1985).

Older but still definitive on the wild food complex of the Sonoran — agave, mesquite, cholla, prickly pear, yucca, organpipe cactus.

- **Gary Paul Nabhan, *Enduring Seeds*** (North Point Press, 1989). The book that helped found Native Seeds/SEARCH; on seed conservation and indigenous foodways.
- **Gary Paul Nabhan, *Food from the Radical Center*** (Island Press, 2018). On collaborative restoration of native food economies.
- **Carolyn Niethammer, *Cooking the Wild Southwest*** (University of Arizona Press, 2011). Recipes for wild-harvested native foods; the practical kitchen companion.
- **Carolyn Niethammer, *American Indian Cooking: Recipes from the Southwest*** (University of Nebraska Press, 2018 reprint). Older, more cultural framing.
- **Felipe Molina and Larry Evers (eds), *Yoeme: Lutu'uria Yoeme***. On Yaqui traditions, with food references — a sky-island people from the southern Sonoran.

2.5 Attribution and reciprocity

A practical question this chapter should answer: when you grow Hopi Blue corn or tepary beans in your Cochise County garden, what is the right relationship to the crops?

The answer is more cultural than legal. Most of these varieties are open-pollinated, freely traded for generations, and not under any formal protection. You can grow them, save seed, and give seed to neighbors without violating anything formal. But there is a soft norm in regional dryland-farming circles, and it is worth honoring: name the source when you grow named varieties (don't pass *Hopi Blue* off as "blue corn" once you've grown it for three years); buy seed from NS/S or TOCA rather than from generic seed houses when both options exist; and if you're a public-facing grower (CSA, farm-stand, restaurant chef), acknowledge the indigenous origin of the crop in your marketing rather than rebranding it. The market for these crops is not a competitive vacuum; it's a community.

The practical guidance for a home gardener is simpler. Grow them, eat them, save the best seed for next year, share the rest. That is the use the seed keepers want their work to support.

3 · Native beans — tepary, Anasazi, Hopi

The desert-native species · Pueblo dry beans · monsoon timing · seed-saving

Tepary beans (*Phaseolus acutifolius*) are not the same plant as the bean in every other guide in this library. They are a separate species — domesticated independently from common bean (*P. vulgaris*) at least 4,000 years ago in what is now the Sonoran heart of Tohono O’odham country — and they ripen on monsoon rain alone. Anasazi and Hopi Yellow beans are common beans, but they too carry a long indigenous lineage: the Anasazi (or Cave bean) was recovered from sealed Puebloan storage caves in the Four Corners and brought back into cultivation in the twentieth century, and Hopi Yellow Lima has been kept on the Hopi mesas continuously through that same span. All three belong in a Dragoons garden for reasons that have less to do with novelty than with the fact that they were already growing within a day’s walk of the Dragoons before any other bean in the library arrived.

Cultivation of beans as a category — bed prep, inoculation, trellising, snap-versus-dry harvest — is fully covered in *Guide 7 §8*. This chapter does not repeat that material. It covers what Guide 7 only touches: the species-level difference of tepary, the cultural lineage of each named variety, the monsoon-keyed sowing pattern, and seed-saving for next year.

3.1 Variety reference — the three named lines

Variety · lineage	Species	Habit · days	Use	Notes
<i>Brown Tepary</i> (Tohono O’odham)	<i>P. acutifolius</i>	Bush · 80 d on monsoon	Dry only	The canonical Sonoran tepary. Small tan-brown seed, dense earthy flavor, holds together in long cook.
<i>White Tepary</i> (Tohono O’odham)	<i>P. acutifolius</i>	Bush · 80 d on monsoon	Dry only	Slightly sweeter and lighter cook than brown. Same growing pattern.

Variety · lineage	Species	Habit · days	Use	Notes
<i>Mitla Black Tepary</i> (Oaxaca)	<i>P. acutifolius</i>	Bush · 85 d	Dry only	A Sierra Madre line; slightly less drought-tolerant than the Sonoran types.
<i>Anasazi / Cave bean</i> (Four Corners)	<i>P. vulgaris</i>	Bush · 90 d	Dry primary; young pods edible	Maroon-and-white spotted seed; sweet, holds shape. Pre-Columbian Pueblo crop.
<i>Hopi Yellow Lima</i> (Hopi mesas)	<i>P. lunatus</i>	Pole · 100 d	Dry; fresh shelly when young	Pale yellow-tan; sweet rich flavor; wants a long warm season.
<i>Hopi Black Turtle</i> (Hopi mesas)	<i>P. vulgaris</i>	Bush · 90 d	Dry	Small dense black bean. A workhorse for Pueblo pots.

Native Seeds/SEARCH is the canonical source for all six lines. TOCA carries Tohono O’odham brown and white tepary as part of their food product line.

3.2 Monsoon-keyed sowing — the tepary pattern

The cultivated bean in *Guide 7* sows in mid-May into warm bed soil with drip irrigation already running. The tepary inverts every part of that. The Tohono O’odham *ak chin* pattern — rain-fed monsoon agriculture — works because tepary genetics expect a single hard rain after a long dry stretch, followed by a humid month, followed by a dry finish. The grower’s job is to read the monsoon rather than the calendar.

The pattern, year by year:

1. **Do not pre-irrigate the bed.** Tepary planted into already-moist soil germinates fine but then loses the genetic cue that triggers vigorous taproot extension. Wait.
2. **Watch the forecast from July 1.** The first significant monsoon storm — half an inch or more of rain in a day, with cells visible on radar over the Dragoons — is the sow signal. In a normal year this is between July 5 and July 20.
3. **Sow into the wet ground within 24-48 hours of the storm.** Loosen the top 4 in only; do not deep-till. One inch depth, 4 in apart, in single rows 24 in apart. A

pound of seed plants roughly a 25-ft row.

4. **No supplemental water unless the monsoon fails.** A dry monsoon week (under one inch of rain in fourteen days) during flowering — typically mid-August — earns one deep drip irrigation. Otherwise the crop is rain-fed.
5. **Pods set August into early October.** Plants stay short (12–18 in) and bushy, with small white or pale-purple flowers.
6. **Harvest in October, whole-plant pull,** when 90% of pods are tan and dry. Thresh by stomping in a sheet or by hand-shelling.

Anasazi and Hopi Yellow Lima follow the *Guide 7 §8.3* pattern instead — sow in mid-May into warm soil, drip-irrigate at the rates in *Guide 7 §8.5*, harvest dry in October. They are common beans and behave like common beans.

Why tepary is the highest-return crop per gallon of water in this library.

A 25-ft row of tepary in a normal monsoon year produces 5–10 lb of dry beans on roughly 4 inches of seasonal rainfall and no irrigation. The same row of pinto beans would consume 80–120 gallons of drip water across the season for a comparable yield. The tepary is not a backup crop or a curiosity — it is the right bean for this place, and the Dragoons sit at the eastern edge of the climate it was bred for.

3.3 Saving seed

All three species in this chapter are self-pollinating. Cross-pollination between varieties is rare (under 5% in most years) but real, particularly if two varieties of the same species flower simultaneously in adjacent rows. For a home gardener saving seed casually, a 20-ft separation between varieties of the same species is enough. For seed intended to be returned to a seed-keeper network or a seed library, 50 ft is the standard and a row of a different crop between the two bean rows further reduces drift.

Tepary in particular has been kept genetically distinct from common bean for thousands of years; the two species do not cross. A row of brown tepary next to a row of pinto carries no risk of crossing. Two rows of tepary — brown and white — should be separated.

To save: select the most productive, earliest-finishing, healthiest-looking plants in the row and mark them in September. Harvest those plants separately. Hand-shell, sort out any cracked or off-color seeds, and store in a tightly-lidded glass jar with a silica desiccant packet in a cool dark cupboard. Properly dried tepary holds viability for 4–6 years; Anasazi and Hopi Yellow for 3–5.

3.4 In the kitchen

Tepary cooks differently from common bean. The seed is denser and the cook time is longer — three hours of simmer for a tepary that has not been soaked, versus 90 minutes for a soaked pinto. An overnight soak cuts tepary cook time to about two hours and improves digestibility. The flavor is earthier, slightly sweet, with none of the chalky quality of an underdeveloped pinto. The cooking liquid is rich enough that it works as a stock in its own right.

Anasazi is the easiest of the three in the pot — it holds shape, the spotted skin is tender, the flavor is sweet and broth-clean. It is the bean to introduce to a household that is suspicious of heritage varieties. Hopi Yellow Lima is the cook's prize: large flat creamy beans that read as something between a cannellini and a butter bean, excellent in stews and with corn.

4 · Native corn — Hopi Blue, Painted Mountain, O’odham 60-day, Bloody Butcher, Glass Gem

Flour · flint · dent · pop · isolation · nixtamal

Native corn in this region is not sweet corn. The five varieties this chapter covers are flour, flint, and dent corns — bred for grinding into meal or masa, not for eating fresh off the cob. The distinction matters because the harvest, processing, and kitchen use are entirely different from the *Guide 7 §9* sweet-corn workflow, and because the kernel chemistry that makes a corn good for grinding is the chemistry that makes it bad for fresh eating.

Cultivation — block planting for pollination, isolation distances, water demands, pest pressure, the basic calendar — is in *Guide 7 §9*. This chapter covers corn type theory, the cultural lineages of the named varieties, harvest at full dent, nixtamal and grinding, and seed-saving.

4.1 Corn types — flour, flint, dent, pop

The five corns in this chapter span three of the four kernel types. The type determines what the corn is for.

Type	Kernel chemistry	Texture when dry	Traditional use
Flour	Soft starch through the entire endosperm, no hard outer layer	Easily crushed between fingers when dry	Grinding into fine meal; piki bread; tortillas (sometimes with nixtamal)
Flint	Hard glassy outer endosperm around a small soft center	Resists grinding without nixtamal	Polenta, hominy after nixtamal, long-storing seed corn
Dent	Mostly hard endosperm with a soft starch core that dents inward as it dries	Hard, with characteristic dimple on the crown	Cornmeal, masa after nixtamal, livestock feed
Pop	Hard outer layer with a small pocket of moist starch that explodes when heated	Very hard, small kernel	Popcorn

Variety	Lineage	Type	Dragoon notes
<i>Hopi Blue Flour</i>	Hopi mesas; thousands of years of continuous cultivation	Flour	Deep blue kernel; the canonical blue cornmeal corn. Drought-tolerant. Plant May 10. Sacred crop in Pueblo cosmology — name the source when you grow it.
<i>Painted Mountain</i>	Montana heirloom developed by Dave Christensen from Mandan, Hidatsa, and Shoshone lines	Flint (with flour kernels in the mix)	Rainbow kernels — yellow, red, purple, blue, white. Short-season, cool-tolerant; the right variety for the Dragoons’ shoulder seasons. 85 days.
<i>O’odham 60-day</i>	Tohono O’odham; pre-Columbian Sonoran	Dent	White flour-dent corn. Sets ears in 60 days on monsoon moisture alone. Sow July 1–15 with the first monsoon storm. The fastest cycle in this chapter.
<i>Bloody Butcher</i>	Appalachian heritage, mid-Atlantic	Dent	Deep red kernels; excellent for cornmeal. Long season — 110 days. Use the full warm window; plant May 1.
<i>Glass Gem</i>	Cherokee lineage via Carl Barnes (Oklahoma)	Flint	Translucent multi-color kernels. Ornamental, but the kernels also make a good popcorn and a serviceable flint cornmeal. 110 days.

The five sit at different points on the cycle calendar. *O’odham 60-day* and *Painted Mountain* are short-season — both finish in time to dry on the stalk before the first

frost. *Hopi Blue* and *Glass Gem* are mid-to-long-season, marginal at Dragoons elevation if planted late. *Bloody Butcher* is long-season and wants every day of warm weather between May and October.

4.2 Isolation — the rule that protects the lineages

Corn is wind-pollinated and freely cross-pollinates. Plant *Hopi Blue* within 250 ft of *Glass Gem*, and within a single generation the Blue is no longer Blue — it is Blue-and-Glass-Gem, and you have damaged the seed line you bought from a keeper.

For seed-saving, the rules are stricter than for eating-quality:

Isolation goal	Distance between corn varieties	Or time separation
Eating quality only (no seed saved)	50 ft windward; 100 ft general	—
Saving seed for home use	250 ft	Or 3+ weeks between tasseling dates
Saving seed to return to a keeper network	660 ft (the agricultural standard)	Or 3+ weeks between tasseling dates

Time isolation is the practical lever in a small garden. *O’odham 60-day* tassels in mid-August (sown July); *Hopi Blue* tassels late August (sown May); *Painted Mountain* tassels mid-July (sown May). With careful scheduling, two varieties can share a small lot without crossing. Three is hard. A neighbor’s field corn over the fence is part of the equation — if you can see it from your bed, your seed line is at risk.

4.3 Harvest at full dent

The native flour, flint, and dent corns in this chapter are not harvested at the milk stage like sweet corn. They are left on the plant until the husk is fully brown, the kernels are hard, and a fingernail pressed into a kernel leaves no impression. In the Dragoons, this is typically late October for *Painted Mountain*, early November for *Hopi Blue* and *Glass Gem*, and mid-September for *O’odham 60-day*.

Snap the ears off, peel the husks back to the base (the husks become the hanging string), and tie ears in pairs over a beam or a wire in a dry shed or covered porch. The ears finish drying in 4–6 weeks in low-humidity Cochise air. A kernel is fully dry when it shatters rather than dents under a hammer.

To shell, twist two dry ears against each other over a tub — kernels rain off. For larger harvests, a hand-cranked corn sheller (about \$50; sometimes findable at farm auctions) processes a bushel in 20 minutes.

4.4 Nixtamal and grinding

Flint and dent corn cannot be made into edible bread by grinding alone. Without alkali treatment, the niacin in the kernel is bound and unavailable, the flavor is bland and starchy, and the dough does not hold together. The processing step that solves all three problems is **nixtamalization** — simmering the dry kernels in alkaline water (calcium hydroxide, also called *cal* or pickling lime) for an hour, soaking overnight, rinsing, and grinding wet to make masa.

The proportions: 1 lb dry corn, 4 cups water, 1 tablespoon food-grade calcium hydroxide. Bring to a simmer, hold 45–60 minutes (the kernel skins should slip off when rubbed between fingers), turn off heat, let stand 8–12 hours. Drain, rinse twice in cool water rubbing the kernels with your hands to release the skins, and grind wet.

A hand-cranked grain mill (Country Living, Diamant) handles dry corn for cornmeal; a wet masa requires either a dedicated *molino* or a heavy-duty food processor in batches. The traditional Pueblo tool — a *metate* and *mano*, two stones — still produces the finest texture, and a competent grinder can produce a cup of masa in 15 minutes from soaked kernels.

Hopi Blue is the exception among the flour corns. Because the entire endosperm is soft starch, it can be dry-ground straight to a fine blue cornmeal without nixtamal — and that cornmeal is the basis of *piki* bread, blue mush, and a deep lineage of Hopi cooking. Run the dry kernels through a grain mill on the finest setting, sift through a fine screen, return the coarse grit to the mill, and repeat until 80% of the meal passes the screen.

LOCAL TIP

Cochise air dries corn fast. A bunch of ears hung in a closed porch in October cures in 4 weeks here; the same bunch in coastal North Carolina would need 8 weeks plus a dehumidifier. The single best storage strategy is to hang the ears unshelled — the husk and cob protect the kernel from weevils, and the corn shells more easily when you actually need to grind. Shell only what you'll use in the next 4–6 months.

4.5 Saving seed

Select 12–20 of the largest, best-filled ears from the harvest before any shelling. From those, select kernels from the middle two-thirds of each ear (tip and butt kernels are often poorly-pollinated or smaller). Mix kernels across ears to maintain genetic diversity. Store in a glass jar with a desiccant packet. Heritage corn germination drops faster than commercial hybrid — plan to refresh stored seed every 2–3 years rather than the 5–7 years a modern hybrid holds.

For *Hopi Blue* and other heritage varieties grown for return to a keeper network, the

0. 4 · Native corn — *Hopi Blue, Painted Mountain, O'odham 60-day, Bloody Butcher, Glass Gem*
Dragoon Mountains

convention is to grow out at least 100 plants and select seed from 20+ to preserve genetic breadth. A 4×4 ft block of 16 plants is fine for eating; a 10×10 ft block of 100 is the minimum for seed-keeping.

5 · Native peppers — Chiltepin and New Mexico landrace chiles

The wild bush in the canyon · the bo'ola · Chimayo and Española · drying

The Chiltepin (*Capsicum annuum* var. *glabriusculum*) is the ancestral pepper. Every cultivated *C. annuum* in the world — every bell, every jalapeño, every poblano, every cayenne — descends from a wild bush like the one that grows in the canyons of the Dragoons. It is the only native pepper of North America, the only pepper in this library that was eaten here before any agriculture began, and the hardest pepper in this library to propagate. The framing reference is in *Guide 2 §2*; the drying method is in *Guide 2* and *Guide 12*. This chapter covers what those don't: the wild ecology, the propagation problem, the small Sonoran chiles in the same complex, and the New Mexico landraces that descend from indigenous *C. annuum* through the Spanish-period acequia farms.

5.1 Chiltepin in the wild

The Chiltepin grows as a low scraggly shrub (2–4 ft, occasionally to 6 ft against a sheltering rock), in the partial shade of mesquite, hackberry, or oak, on the rocky bajadas and lower canyon slopes of the sky islands from southern Arizona deep into Sonora and the Sierra Madre. In Cochise County it is patchy — present in some canyons, absent in adjacent ones — and the eastern Dragoons hold one of the more reliable wild populations. The pea-sized fruit ripens from green to brilliant red between August and November and is dispersed by birds (which are insensitive to capsaicin); the seed passes through the gut intact and germinates in the next monsoon.

The fruit is small — about 5 mm — round to slightly oblong, and very hot (50,000–100,000 Scoville). The heat is sharp and clean and lifts quickly rather than building. A single dried Chiltepin crushed into a pot of beans is enough for four servings.

On wild-harvesting Chiltepin. The traditional Sonoran ethic is to take no more than a third of the ripe fruit on any one bush, to leave seed on the plant for next year's birds, and to never strip a bush bare. The Coronado National Forest allows personal hand-harvest of edible plant parts on most of the Dragoons (check the current rules before collecting), but commercial harvest requires permits. The right pace for a household: a pint jar of dried whole Chiltepin per year, off three or four bushes, is a generous lifetime supply.

5.2 Propagating Chiltepin — the hard pepper

Chiltepin is famously difficult from seed. The genetics carry deep dormancy — bird-passage scarification, alternating temperature, partial light exposure, and patience are all part of the trigger. Even the Native Seeds/SEARCH wild-collected seed germi-

nates at rates that would be unacceptable for a cultivated pepper: 20–50% over 4–8 weeks, with stragglers continuing for months.

The pattern that works most reliably:

1. **Soak seed 24–48 hours** in room-temperature water with a single drop of dish soap (the soap breaks surface tension on the seed coat).
2. **Cold-stratify 4 weeks** in damp paper towel in a sealed bag in the refrigerator (35–40°F).
3. **Warm-germinate** at 80–90°F with a heat mat. Cover the cell tray with a clear dome to hold humidity. Light is helpful but not required.
4. **Wait.** First seedlings emerge in 14 days; last seedlings in 8–12 weeks. Do not discard a cell that hasn't germinated until you have given it 90 days.
5. **Transplant carefully.** Chiltepin seedlings sulk if root-disturbed before they are at the 4-true-leaf stage.

Once established, the plant is durable. It tolerates Dragoons winters in a sheltered south-facing site to about 25°F; below that, mulch heavily over the root crown and accept that the top may die back. A Chiltepin in a 5-gallon container moved into a covered porch or unheated greenhouse winters fine. The plant fruits in year 2 from seed and continues for 10+ years in container culture. A wild bush on the canyon side may be 25 years old.

5.3 The small Sonoran chiles — bo'ola and relatives

The *bo'ola* (sometimes spelled *bo'ol*) is a small Sonoran cultivated chile, a *C. annuum* in the same complex as Chiltepin but selected over generations for slightly larger fruit and slightly more cooperative growing habits. Native Seeds/SEARCH carries bo'ola seed; it germinates more reliably than wild Chiltepin (50–70%, 14–21 days, with standard pepper-starting protocols from *Guide 2*) and grows as a 2-ft compact bush. Fruit is dime-sized, round, ripening red, and used the same way as Chiltepin — dried whole, crushed into beans and stews. A few other small landrace chiles in the NS/S catalog (*Chile de Árbol*, *Chiltepin de San Bernardino*, various unnamed Sonoran accessions) fit the same culinary slot.

For a Dragoons grower who wants the Chiltepin flavor without the wild-harvest dependency, a row of bo'ola is the practical answer. Cultivation follows *Guide 2*'s standard pepper protocols: indoor start in February, transplant in May, drip irrigation through summer, harvest red fruit August–October.

5.4 New Mexico landrace chiles

The Chimayó, the Española Improved, and the broader Anaheim line are descended through Spanish-period mission and acequia farming from indigenous *C. annuum* lines that were already cultivated in the Rio Grande pueblos before the Spanish ar-

rived. The Pueblo lineage is the deep history; the Spanish overlay is the more recent shaping of variety and culinary use. The Chile Pepper Institute at New Mexico State University is the authority on these varieties; NS/S carries the principal regional landraces.

Variety · lineage	Heat	Days	Notes
<i>Chimayó</i> (Chimayó, NM)	Mild-medium (4,000–6,000 SHU)	80 d from transplant	The canonical northern New Mexico chile. Deep red when dried; complex sweet-smoky flavor. Has been continuously cultivated in the Chimayó valley for generations; the local lineage is closely held.
<i>Española Improved</i> (NMSU release)	Mild (1,500–3,000 SHU)	75 d	Earlier and more uniform than Chimayó; a good first chile for a grower learning the type.
<i>Sandia</i> (NMSU)	Medium (5,000–7,000 SHU)	80 d	Larger fruit; the workhorse green-chile-then-red-chile variety of the New Mexico bench.
<i>NuMex Joe E. Parker</i> (NMSU)	Mild (1,500 SHU)	75 d	The modern Anaheim. Productive, predictable; less depth of flavor than the older landraces.
<i>NuMex Big Jim</i> (NMSU)	Mild (2,500 SHU)	80 d	The very large fruited variety for stuffed chile rellenos; the green-stage harvest is the point.

These are cultivated like any other *C. annuum* — see *Guide 2* for the full protocol.

The Dragoons climate is closer to the Chimayó valley than to most pepper-growing regions and these varieties tend to perform well here.

5.5 Drying

Chiltepin is the easiest pepper to dry in this library and the only one the framework guides specifically name: pea-sized fruit, sun-dried whole on a screen in the shade, ready in 5–7 days in Cochise air. Store in a tightly-lidded jar; properly dried Chiltepin holds 2–3 years without losing heat or flavor.

For the larger New Mexico landrace chiles, the traditional form is the *ristra* — a long string of red fruit, threaded through the stems, hung in dry shaded air for 4–6 weeks. *Guide 12* covers the workflow in detail. The Dragoons low-humidity autumn is excellent ristra-drying conditions; a ristra hung on a north-facing porch in October is ready by Thanksgiving.

6 · Native squash and gourds

Cushaw · Tarahumara Pumpkin · Tohono O’odham Yellow-Meated · bottle gourd

The squashes of the Sonoran-Madreal food complex are a different family of plants from the supermarket butternut and the European zucchini. *Cucurbita argyrosperma* (the Cushaw line), *Cucurbita moschata* (Tohono O’odham Yellow-Meated), and *Cucurbita maxima* (Tarahumara Pumpkin) are three distinct species, each domesticated independently in central and northern Mexico thousands of years ago, each suited to dry summers and monsoon humidity, each with a place in the indigenous kitchen of this region. The bottle gourd (*Lagenaria siceraria*) is a fourth species — an Old World cucurbit that arrived in the Americas before any other crop and was naturalized into the indigenous food and tool complex for at least 8,000 years.

This is the only chapter in this guide that covers these crops; cultivation, curing, storage, and traditional use are all here.

6.1 Variety reference

Variety · lineage	Species	Days	Fruit	Use
<i>Cushaw</i> — Green Striped, Orange, Magdalena Big Cheese	<i>C. argyrosperma</i>	95–110 d	8–25 lb crook-neck winter squash, green or orange	Pies, soups, traditional Sonoran calabaza dishes. Excellent storage.
<i>Tohono O’odham Yellow-Meated</i>	<i>C. moschata</i>	100 d	8–15 lb pale tan rind, deep orange flesh	The canonical O’odham winter squash. Sweet, dense flesh; excellent baked or in soup. Drought- tolerant.
<i>Tarahumara Pumpkin</i>	<i>C. maxima</i>	100 d	10–30 lb orange pumpkin	A Sierra Madre heritage from the Tarahumara. Sweet rich flesh; excellent pie pumpkin.

Variety · lineage	Species	Days	Fruit	Use
<i>Hopi Pale Grey</i> (Hubbard-derived)	<i>C. maxima</i>	110 d	15-25 lb pale grey, Hubbard form	Hopi heritage selection of the Hubbard line. Sweet, stores 6+ months.
<i>Tarahumara Bottle Gourd</i>	<i>L. siceraria</i>	110 d	6-18 in hourglass or dipper	Hard-shelled gourd for water containers, ladles, rattles. Young fruit edible.

All five are open-pollinated and seed-saveable; NS/S is the main source. The three *Cucurbita* species do not cross with each other (different species), which means a Cushaw, a Tohono O’odham Yellow-Meated, and a Tarahumara Pumpkin can grow in the same bed without contaminating each other’s seed. Two varieties of the same species — two Cushaws, or a Tarahumara Pumpkin next to a Hopi Pale Grey — will cross freely.

6.2 Cultivation

These squashes are large vining plants. Each one needs 50-100 sq ft of bed space and a corner of the garden where its 12-ft runners can sprawl unconstrained. They are heavy feeders relative to beans and corn (which is why the Three Sisters rotation works — corn provides structure for bean vines, beans fix nitrogen for the squash, squash leaves shade out weeds and conserve soil moisture for all three).

Stage	Timing	Notes
Direct-sow	May 10 - June 5 (after soil $\geq 65^{\circ}\text{F}$)	Or start indoors mid-April; transplant carefully — cucurbits resent root disturbance
Spacing	4-6 ft apart, in hills of 3 seeds thinned to 2 plants	A 4×4 ft block per plant minimum
Soil	Heavy compost, 3 in tilled in pre-plant	The hungriest crops in this guide; 1 lb finished compost per sq ft is not too much

Stage	Timing	Notes
Watering	1.5-2 gal per plant per week through July; reduce as fruit matures	Drip preferred; squash leaves stay drier and resist powdery mildew
First harvest	September for short-season; October for long-season	When stem corks and rind resists thumbnail

The traditional indigenous spacing is wider than modern intensive gardening recommends — 6 ft on center in hills, with corn and beans interplanted in the gaps. The wider spacing tolerates erratic monsoon moisture; the closer modern spacing requires reliable drip.

LOCAL TIP

On javelina. Mature winter squashes have hard rinds and are usually left alone, but young fruit and growing shoots are favored javelina forage. *Guide 10* covers exclusion fencing in detail; for a squash bed, 4-ft welded wire 6 in into the ground is the standard. The squashes most worth protecting in the Dragoons are the ones already most adapted to javelina country — the Tohono O’odham Yellow-Meated, the Tarahumara — which adds a small irony to the calculus.

6.3 Curing and storage

A winter squash harvested at maturity but uncured stores poorly. The curing step — leaving the squash in warm dry air for 7-14 days after harvest — corks the stem scar, hardens the rind, and sweetens the flesh as residual starches convert to sugar.

The protocol: cut squash from the vine with 2 in of stem attached (a broken stem opens a rot pathway). Wipe the rind with a damp cloth if dirty. Lay squash on a covered porch, in a warm shed, or anywhere with temperatures of 75-85°F and good air movement for 7-14 days. Then move to a long-term storage location — a cool dry pantry or cellar at 50-60°F, well-ventilated, dry. *Guide 12* notes 4-6 months for most cultivated squash; the indigenous types here typically hold longer:

Variety	Storage life under correct conditions
Cushaw	4-6 months
Tohono O’odham Yellow-Meated	6-8 months
Tarahumara Pumpkin	5-7 months

Variety	Storage life under correct conditions
Hopi Pale Grey	6–9 months

A Hopi Pale Grey harvested in October and stored properly is still good for a March soup.

6.4 Bottle gourd — the dual crop

Lagenaria siceraria is grown both as a young vegetable (immature fruit, harvested 4–7 days after pollination, eaten like summer squash) and as a hard-shelled mature gourd for utensils. The two uses come from the same plant at different stages — pick young for the kitchen, leave on the vine until the leaves die back and the stem is fully dry for the tool crop.

For the tool crop, leave mature gourds on the vine through frost. After harvest, hang in a dry shaded place for 4–6 months. The skin will mold and discolor — this is normal and does not damage the underlying shell. After full drying (the gourd should rattle when shaken and feel light for its size), scrape off the moldy outer skin with a stiff brush, wash, and the gourd is ready to be cut and finished. Bottle gourds traditionally serve as water canteens, ladles, seed-storage containers, rattles, and birdhouses.

6.5 Cultural notes

The Tohono O’odham Yellow-Meated squash is part of the *bahidaj-bavi-ha:l* complex — saguaro fruit, tepary bean, and squash — that anchored the Akimel and Tohono O’odham agricultural year. Tarahumara Pumpkin comes from the Sierra Madre Tarahumara (Rarámuri), where it is grown in the runoff farms of the canyon-side milpa, and the variety reached Native Seeds/SEARCH through ethnobotanical collecting in the 1980s. Cushaw is the principal squash of much of northern Mexico and the Sonoran-Madrean borderlands and shows up in old recipes from Magdalena de Kino to Tucson. When you grow these, name them — they carry their origins in their names, and the names carry the work of the keepers.

7 · Devil's claw

Proboscidea parviflora · young pods for the pot · mature pods for basketry · Tohono O'odham black-seeded selection

Devil's claw (*Proboscidea parviflora*) is a sprawling annual herb of the Sonoran-Madrean bajadas, with sticky pinnate leaves, pale pink-purple trumpet flowers, and the distinctive curved seed pod that gives the plant its English and Spanish names — the mature pod splits along its length into two long woody claws that hook onto passing mammals as a seed-dispersal strategy. The plant is native, naturalized, and cultivated; the cultivated form is a Tohono O'odham black-seeded selection bred over generations for longer, blacker claws, which are the basketry fiber that makes Tohono O'odham coiled baskets distinctive.

This is the only chapter in this guide that covers devil's claw. It is both a food crop (young pods) and a fiber crop (mature pods), and the management of those two harvests is mutually exclusive on the same plant.

7.1 The plant

Two forms matter: the wild type (*P. parviflora* var. *parviflora*) and the cultivated Tohono O'odham black-seeded type (*P. parviflora* var. *hohokamiana*, sometimes treated as a domesticate). Wild devil's claw produces shorter claws (4–8 in) with pale seeds; the cultivated type produces claws of 12–18 in or more with deep black seeds. Native Seeds/SEARCH carries both forms.

The plant is a heat-loving annual that germinates in soil above 75°F, grows rapidly through July and August on monsoon moisture, flowers from late July through September, and sets seed pods from August through frost. Mature plants sprawl 4–6 ft across; a single plant produces 20–50 pods. The leaves are covered with sticky glandular hairs that catch debris and smell faintly skunky — touching them once is enough to know the plant by feel.

7.2 Cultivation

Stage	Timing	Notes
Direct-sow	June 1 – July 5 (soil ≥ 75°F)	Indoor-started seedlings transplant poorly — direct-sow into the bed
Spacing	24 in apart, 36 in between rows	A single plant covers 6–10 sq ft
Soil	Sandy loam, well-drained, modest fertility	Tolerates the alkaline native Dragoons soil without amendment

Stage	Timing	Notes
Watering	Drip-irrigate through germination; monsoon thereafter	The cultivated type tolerates more water than the wild but does not require it
Pollination	Bumblebees, native long-tongued bees	Flowers are large and showy; not self-fertile-favorable

Devil's claw is one of the easier crops in this guide once it germinates. The challenge is the germination — seeds carry hard coats and irregular dormancy. Soaking seed 24 hours in warm water before sowing, or filing a small notch in the seed coat with a nail file, doubles the germination rate. Plan for 40-60% germination on unscarified NS/S seed; 70-80% on scarified.

7.3 The fork in the road — food or fiber

A plant managed for young pods (food) and a plant managed for mature pods (basketry fiber) follow different schedules. You cannot do both on the same plant.

For young pods as food. Harvest pods at 2-4 in long, while still tender and green, before the woody claw has developed. They eat like young okra — sliced and stir-fried, pickled, dropped into stews. The flavor is mildly mucilaginous, slightly tart, vegetable. Pick frequently; harvest pressure stimulates the plant to set more flowers and more pods. A single plant yields 30-60 young pods across the season.

For mature pods as fiber. Let the pods stay on the plant until full maturity — the pod elongates, the outer green sheath dries and splits, and the inner woody claw is exposed. This happens 6-10 weeks after pod set. Pick the mature claws after the outer sheath has dried but before they fall to the ground (where they will be raked up by anything that walks through). A single plant yields 20-50 mature claws.

For a household interested in basketry, the protocol is to let the first 20+ pods on a plant mature for fiber and pick later-season pods young for food. The plant continues setting new pods through frost; the late-season pods rarely have time to fully mature for fiber, so eating them is the right use.

7.4 Preparing the basketry fiber

The black inner strip of a mature devil's claw pod is the fiber used in Tohono O'odham coiled basketry — woven against bear grass and yucca to create the black designs that distinguish O'odham baskets from neighboring traditions. The preparation is patient work:

1. **Soak the dried claw** in water overnight to soften the woody sheath.
2. **Split each claw lengthwise** along the natural seam with a sharp knife or thumb-nail.
3. **Strip the outer layer** off the inner black fiber. The fiber is the long flat strip on the inside of each half-claw.
4. **Trim the fiber** to even widths (typically 1–2 mm wide).
5. **Keep damp until use.** Dry fiber is brittle; weavers work with fiber that is just damp.

A serious basket consumes the claws from 8–15 plants. A household growing devil's claw for occasional craft use can plant 3–5 plants and accumulate fiber across multiple years.

7.5 Cultural attribution

Devil's claw is one of the few documented examples of domestication of a North American native plant within the indigenous food and craft complex — Tohono O'odham seed selection over many generations produced a plant materially different from its wild ancestor, with longer claws, blacker fiber, and a more cooperative growing habit. The black-seeded cultivated form belongs to the O'odham tradition specifically; when you grow it, the right framing is that you are tending an O'odham heritage crop, not a generic wild plant.

8 · Mesquite

Prosopis velutina · *P. juliflora* · the July pod harvest · milling and storing the flour

Mesquite is the tree this guide does not ask you to plant. If you live in or near the Dragoons, mature mesquites are already on your land — velvet mesquite (*Prosopis velutina*) is the dominant tree of the central Cochise County bajadas, with honey mesquite (*P. glandulosa*) and screwbean mesquite (*P. pubescens*) present in smaller numbers, and the introduced South American *P. juliflora* and *P. chilensis* showing up in disturbed sites and old plantings. A 25-year-old velvet mesquite produces 25–60 lb of edible pods in a good year, and the harvest tradition is one of the oldest in the region — pre-agricultural, predating corn in this landscape, mesquite was the late-summer staple food of the Akimel and Tohono O’odham, the Apache, and earlier peoples.

This chapter covers identifying a producing tree, harvesting the July pod drop, processing the pods to flour, and storing the flour. It does not cover cultivation — there is no reason to plant a mesquite in the Dragoons when nature has done it for you.

8.1 Identifying a producing tree

Velvet mesquite is the species you are most likely encountering. It is a multi-trunked tree of 20–35 ft height with bipinnate leaves (small leaflets in pairs along secondary stems), white catkin flowers in May–June, and the long flat sweet pod that ripens July through August. The bark is rough, fissured, and reddish-brown. Twigs carry paired straight thorns 0.5–1 in long. A mature trunk is 8–18 in in diameter.

Not all mesquites are good food trees. The pods vary in sweetness from tree to tree — some are bland, some moderately sweet, a few are exceptionally sweet. Sample a few pods from each candidate tree in mid-July: snap a pod open and chew a small piece. Sweet pods taste like cinnamon-sugar with a slight wood note; bland pods taste mostly woody. A neighborhood mesquite hunt to find the two or three sweetest trees in a half-mile radius is well-spent half a day.

The South American honey mesquite *P. juliflora*, introduced as a landscape and forage tree, has longer and often sweeter pods than the natives — but it is also locally invasive in some sites and the wood is hotter-burning and harder than native velvet mesquite. For pod harvest, *P. juliflora* trees are fine targets; the species distinction matters more for woodlot management.

8.2 The July harvest

Mesquite pods ripen across a 4–8 week window. The right harvest stage is **fully tan, fully brittle, still on the tree or recently dropped**, and **dry** — never green, never moist. A pod the color of dark cardboard, snapping rather than bending, is ready. A green pod or a moist pod will mold during storage and is unusable.

Window	What you'll find
Late June	Green pods still developing
Early July	First ripe pods on some trees; harvest sampling phase
Mid-July	Peak ripening; sustained harvest begins
Late July – early August	Peak drop; ground collection phase
Mid-August	Late pods; tail end of the harvest

The harvest pattern that works:

1. **Spread a clean tarp** under the tree.
2. **Shake the lower branches** with a long pole or by hand. Ripe pods drop; immature pods stay. The tree sorts itself.
3. **Pick up only pods that are fully tan and brittle.** Reject any pod with green tinge, moisture, mold spot, or insect hole (bruchid beetles are common; their exit holes are easy to spot).
4. **Spread harvested pods on a screen** in a dry shaded place for 3–5 days to drive off any residual moisture before milling. This step is critical in monsoon years.

A productive tree can yield 5–10 lb of clean dry pods per session. Two sessions a week across the 4–6 week peak yields 40–80 lb from a single good tree — a substantial annual flour supply.

The bruchid beetle problem. Mesquite bruchids lay eggs in green pods; the larvae develop inside the seeds. By the time you collect mature pods, many seeds may be hollowed. Two protocols: (1) **freeze the cleaned pods for 72 hours** before milling to kill any remaining larvae; or (2) **mill only the pulp**, discarding the seeds, which is also the traditional Tohono O’odham practice — the seeds are tough to grind and the sweet flavor is in the pulp.

8.3 Milling to flour

Mesquite flour is the cinnamon-colored, slightly sweet, slightly tart powder produced by grinding clean dry pods. The traditional tool is a wooden mortar and pestle, or the *metate*. The modern household tool is a hammermill (commercial mesquite millers use these) or a high-power blender like a Vitamix. A hand grain mill struggles with mesquite because the pods are tough and slightly oily and gum the burrs.

The Tucson area runs **community mesquite-milling events** in July and August, organized by Desert Harvesters and other groups — drop off your dried pods, get back flour, pay a small per-pound fee. For a Dragoons grower without milling equipment,

this is the easiest path. Check desertharvesters.org for current dates and Tucson-area locations.

For at-home milling in a Vitamix: break dry pods into 1-inch pieces, fill the blender pitcher half full, run on high speed in 30-second bursts until the pods are reduced to coarse meal. Sift through a fine screen, return the coarse to the blender, repeat. A second pass through a small spice grinder produces a finer texture. Plan for 30–50% flour yield from raw pod weight — a 10 lb pod harvest produces 3–5 lb of flour.

8.4 Storing and using

Mesquite flour stores well — 6–12 months at room temperature in a tight glass jar, longer in the freezer. The flavor is naturally sweet (the pods contain 15–30% sugars by weight) with caramel and mild tart notes. Use it as a partial substitute (10–30%) for wheat flour in pancakes, quick breads, cookies, and crusts; as a stir-in to oatmeal or yogurt; or whisked into water for a traditional Tohono O’odham *atole*-style cold drink. Mesquite flour is not gluten-bearing — recipes that depend on gluten structure need to retain wheat flour as the base.

8.5 Cultural notes

Mesquite was the calorie anchor of the Sonoran-Madrean food year for thousands of years before the introduction of corn cultivation. The harvest tradition is shared across Akimel O’odham, Tohono O’odham, Apache, Yaqui, and Tarahumara peoples. Modern food sovereignty groups — TOCA in Sells, Desert Harvesters in Tucson, San Xavier Co-op Farm — have rebuilt commercial-scale mesquite milling over the past two decades, and the flour is now widely available in the regional food economy. *Guide 12* references Nabhan on mesquite as a foundational source.

9 · Agave

Agave palmeri · *A. parryi* · *A. murpheyi* · the pit roast · pups · the long patience

Agave is the long-haul crop in this guide. A *Palmer agave* (*Agave palmeri*) seeded in a Dragoons garden in 2026 will be ready to harvest its heart in 2046 or 2051 — 20 to 25 years to maturity. A propagated pup from an established mother plant is faster: 10 to 15 years. The food is the heart (*piña, mescal*), pit-roasted for 24 to 72 hours until the inulin and other complex polysaccharides convert to fermentable sugars and the heart becomes sweet and amber. The same heart distilled produces mezcal; the Sonoran regional version, made from *A. angustifolia*, is *bacanora*. None of this is fast, but a small agave planting started now is an asset for the next generation.

This chapter covers the species relevant to a Dragoons garden, the pit-roast tradition in outline, harvest timing, and propagation from pups. It does not cover distillation — *bacanora* and *mezcal* are regulated, regional, and a different scale of project.

9.1 The species

Species	Native range	Maturity	Heart weight	Notes
<i>A. palmeri</i> (Palmer agave)	Sky islands of southeastern Arizona and Sonora — including the Dragoons	20–30 yr from seed	30–80 lb	The principal traditional Apache mescal agave. Tall flower stalk; grey-green rosette to 3–4 ft.
<i>A. parryi</i> (Parry’s agave, mescal agave)	Higher elevations of the sky islands and the Mogollon Rim	20–30 yr	25–50 lb	Tighter, more compact rosette. Apache and Western Pueblo food. Slightly more cold-hardy than <i>palmeri</i> .

Species	Native range	Maturity	Heart weight	Notes
<i>A. murpheyi</i> (Hohokam agave)	Documented archaeologically on Hohokam sites; persists in old plantings	8-15 yr (the fastest of the three)	20-40 lb	A cultivated agave from pre-contact Hohokam agriculture, possibly an early domesticate. Produces pups abundantly.
<i>A. americana</i> (century plant)	Introduced; widely planted	10-25 yr	50-150 lb	The huge landscape agave. Edible but not the traditional food species; flavor is less refined.

For a Dragoons grower who wants traditional roasted-agave food in their lifetime and has bought property in their thirties, *A. murpheyi* is the practical choice — pups available from regional nurseries, 8-15 year cycle, generous pup production, documented food use. *A. palmeri* and *A. parryi* are slower but native; for a long-horizon planting they are the right species.

Agave harvesting is permanent. An agave plant flowers once, sets seed, and dies. The heart is harvested at the right stage — just as the plant begins to bolt the flower stalk, before any energy goes into seed — and the harvest kills the plant. Plan the planting as a permanent rotation: a new pup planted every year produces a harvestable plant every year, decades later. A single agave is a single harvest. A row of ten agaves is ten harvests across ten years, if planted on the right cadence.

9.2 Propagating from pups

All four species sucker — that is, they produce pups (offshoots) from the root system that emerge as small clones of the mother plant. *A. murpheyi* is the most prolific pupper; *A. palmeri* and *A. parryi* pup less reliably.

Pup propagation is the right method for a home grower. Seed propagation works but adds years to an already-long cycle, and pups carry the same genetics and similar maturity timing as the mother.

The protocol:

1. **Find a mother plant with established pups.** Look for pups 6-12 in tall — small enough to lift without damage, large enough to have an independent root system. Pups can come from your own landscape, a neighbor's, a regional nursery (Civano in Tucson, Desert Survivors), or a friend with mature plants.
2. **Dig around the pup** with a sharp shovel, cutting cleanly through the rhizome that connects pup to mother. The cut should be 2-4 in from the pup base.
3. **Cure the cut for 7-14 days** in a dry shaded place before planting. The cut surface needs to callus over; planting a fresh-cut pup invites rot.
4. **Plant in well-drained soil**, full sun, on a slight mound if your site has any drainage issue. No amendment is necessary — the native Dragoons soil is what agave wants.
5. **Water once at planting**, then nothing for two weeks. After establishment, supplemental water is unnecessary except in extreme drought; agaves are designed for this climate.

A pup planted in October establishes through the cool season and grows through the next summer. After year 1, the plant requires essentially no care.

9.3 Harvest — reading the bolt

The agave heart is harvested at the precise moment the plant begins to bolt its flower stalk. Before that point, the sugars are not concentrated. After bolt, the plant pumps stored sugars into the stalk for flowering, and the heart becomes fibrous and bland.

The bolt signal: the central spike of the rosette elongates noticeably, becoming a long pointed stalk that can grow 8-12 in per day. The traditional indigenous timing — confirmed by Apache and O'odham practice — is to harvest when the stalk has just begun to extend, before any flowers form. This window is short, typically 2-4 weeks.

Cut the leaves away from the heart with a sharp machete or *coa* (a long-handled curved blade), working from the bottom up. Trim the heart to a compact ball or barrel shape, removing all green leaf bases. A trimmed heart looks like a giant pineapple — hence *piña*. Weight varies by species and individual plant; 30-60 lb is typical for a Dragoons-grown *A. palmeri*.

9.4 The pit roast

The traditional Apache and O'odham method for cooking the heart is a pit roast of 24-72 hours. The pit converts the inulin and other complex polysaccharides in the heart to digestible sugars; the result is a sweet, smoky, dense food that can be eaten directly or stored.

The outline:

1. **Dig a pit** roughly 3 ft deep and 4 ft across.

2. **Line with rocks** (volcanic or river rock; never sandstone or limestone, which can shatter).
3. **Build a hardwood fire** in the pit and let it burn down to coals. The rocks need to be very hot — heated for 4–8 hours.
4. **Cover the coals with a layer of green vegetation** — grass, agave leaves, bear grass — to insulate the heart from direct contact with the rocks.
5. **Place the heart** (single or multiple) on the green layer.
6. **Cover with more green vegetation, then a layer of soil** to seal the pit.
7. **Leave 24–72 hours.** The longer the roast, the deeper the conversion and the sweeter the result.
8. **Uncover, lift the heart out.** It should be soft enough to cut, with amber-brown caramelized flesh and the deep smoky-sweet flavor that anyone who has tasted traditional mescal will recognize.

Roasted heart keeps several months in a cool dry place. Slices can be dried for longer storage or pressed for syrup.

A serious pit roast is a 2–3 day undertaking and is typically a community project — neighbors, family, an event rather than a meal. The pit-roast tradition in the sky islands runs back thousands of years and remains practiced in some Apache and O’odham communities today, often in connection with seasonal ceremonies.

9.5 Cultural notes

The Apache name for *A. palmeri* is *mescal*, which is also the name of the food and the word that gave English-language *mescal* and *mezcal* their origin. The Chiricahua, Western Apache, and Mescalero traditions all center on agave; the Mescalero name itself derives from this food. Modern bacanora — a Sonoran spirit distilled from roasted *A. angustifolia* — is a denomination of origin product made primarily in the municipality of Bacanora, Sonora, and represents the closest commercial relative of the Apache mescal tradition. A bottle of small-producer bacanora from a Cochise County importer tastes recognizably of the pit-roast and is the easiest entry point into this lineage for a household not running its own pit.

10 · Prickly pear

Opuntia engelmannii · *O. ficus-indica* · pads and tunas · the September harvest · dethorning

The prickly pear of the Dragoons is *Opuntia engelmannii* (Engelmann’s prickly pear) and the closely related *O. phaeacantha*, the two dominant pad-cacti of the central Cochise bajadas. Both are wild, both produce edible pads (*nopales*, *nopalitos* when sliced) and edible fruit (*tunas*), and both are present on most undeveloped Dragoons land. The cultivated *Opuntia ficus-indica* — the spineless or near-spineless commercial prickly pear of Mexico, Italy, and California — is the easier kitchen plant: larger pads, larger sweeter fruit, fewer spines. Both have a place in a Dragoons garden, and both have a place in the indigenous food complex.

The vinegar recipe from foraged tunas is in *Guide 4* §3.2.1. This chapter covers the pads as a cooked vegetable, the tunas at harvest stage, dethorning protocols, and the practical use of both wild and cultivated forms.

10.1 Two species, two roles

Species	Form	Pad size	Tuna	Notes
<i>O. engelmannii</i> (Engelmann’s prickly pear)	Wild; sprawling clump 3–6 ft tall	8–14 in oval pads with conspicuous spines plus glochids	Red-magenta, 1.5–2.5 in, ripens August–September	The Dragoons native. Already on your land.
<i>O. phaeacantha</i> (brown-spined prickly pear)	Wild; lower-growing	6–10 in pads	Purple-red, slightly smaller	Often grows interspersed with <i>engelmannii</i> ; harvest the same way.
<i>O. ficus-indica</i> (Indian fig)	Cultivated; tree-like, 6–12 ft	12–18 in pads, near-spineless in good selections	Yellow, orange, red, or pink, 2–4 in, larger and sweeter than wild	Plant a pad in spring; harvest pads from year 2, fruit from year 3.

For wild-harvesting, the Engelmann is what you have. For planting a kitchen-scale stand, *O. ficus-indica* — sourced as a pad cutting from a regional nursery — establishes quickly and produces more usable food per square foot. The two are not mutually exclusive: a household with wild Engelmann on the property line and a cultivated *ficus-indica* in the kitchen bed has the full range of pad and fruit options.

10.2 Planting *O. ficus-indica*

Step	Action
Source	A pad cutting from a regional nursery (Civano, Desert Survivors, Native Seeds/SEARCH retail), or a neighbor with a productive stand
Cure	Lay the cut pad in dry shade for 7–14 days; the cut surface must callus before planting
Plant	Insert the bottom third of the pad into well-drained soil, full sun, in late spring or early summer (warm soil is essential)
Water	Soak once at planting; then nothing for 4–6 weeks. After roots establish, occasional supplemental water in dry summer accelerates growth.
First harvest	Pads from year 2; fruit from year 3; full production by year 5

A single pad becomes a 4-ft plant in five years. Three pads spaced 4 ft apart become a productive hedge in a decade.

10.3 Pads — *nopalitos* for the kitchen

Young pads — 4–8 in long, tender green, before the glochids have hardened — are the kitchen target. Pick in spring (March–May for cultivated, May–June for wild Engelmann), when new pad growth is concentrated. Older pads work but are tougher and more fibrous.

The dethorning protocol for wild Engelmann pads:

1. **Cut the pad from the parent** with kitchen tongs and a knife, handling only with tongs (the glochids — tiny barbed hairs — are worse than the visible spines).
2. **Hold the pad flat** against a cutting board with the tongs.
3. **Scrape both faces** with the back of a knife to remove glochids, then trim the edge thoroughly.
4. **Singe over a gas flame** to burn off any remaining glochids. The pad goes from bright green to slightly grey-green.
5. **Slice** into strips (*nopalitos*) for cooking.

O. ficus-indica selections are largely spineless and skip the singe step, though glochids are usually still present at the areoles and need scraping. The flesh is mucilaginous in the same way okra is — useful in stews and chiles, where the

mucilage thickens the dish; less useful raw, where the texture is divisive. Grilling whole pads (after dethorning) drives off most of the mucilage and produces a firm vegetable that works alongside meats.

10.4 Tunas — the September harvest

Prickly pear fruit ripens August through October. The right harvest stage is **deep red-magenta** for Engelmann (the green stage has no sweetness; the wrinkled stage is over-mature), **deep purple to scarlet** for phaeacantha, and color-appropriate-to-variety for *ficus-indica* (yellow, orange, red, or pink depending on cultivar). *Guide 4* §3.2.1 notes the September deep-red Engelmann harvest specifically.

The protocol:

1. **Harvest with kitchen tongs** into a bucket. Never handle tunas with bare hands — the glochid load on a ripe tuna is severe, and embedded glochids in the fingers are a multi-week annoyance.
2. **Roll the tunas** through coarse sand or against rough gravel to break off most of the glochids, then rinse heavily with a strong hose.
3. **Singe** if any glochids remain. The fruit can take a brief flame without affecting flavor.
4. **Peel** by cutting off both ends and slitting the skin lengthwise — the flesh slips out as a whole pink-red lobe.
5. **Use immediately or process** — tunas hold 1-2 days refrigerated.

A productive wild patch on a Dragoons property line produces 50–200 lb of tunas in a good monsoon-watered year. A cultivated *ficus-indica* stand of 6–10 plants in production produces a comparable harvest of larger sweeter fruit.

10.5 What to make from tunas

The fruit's flesh is sweet and slightly tart, with a melon-and-bubblegum flavor and a deep red color that stains everything it touches. The seeds are hard, small, abundant, and inedible — they pass through the body intact but are unpleasant to crunch. Almost all tuna preparations involve straining out the seeds.

- **Syrup:** simmer peeled tunas with their juice for 30 minutes, strain through a fine mesh or cheesecloth to remove seeds, reduce the liquid by half with sugar to taste. Yields a magenta syrup excellent over ice cream, in cocktails, or as a glaze.
- **Vinegar:** the recipe in *Guide 4* §3.2.1. Wild ferment of crushed tunas; produces a pH 3–4 fruit vinegar useful as a pH-down replacement in hydroponic systems and as a kitchen vinegar.
- **Jelly:** standard fruit-jelly preparation with added pectin.
- **Juice:** strained tuna juice, on its own or cut with lime, is a traditional Sonoran summer drink.

- **Frozen pulp:** peel, freeze whole peeled tunas, thaw and use through winter.

10.6 Cultural notes

Prickly pear is shared across virtually every food tradition of the Sonoran-Madrean region — O’odham, Apache, Yaqui, Tarahumara, Mexican mestizo. The September *tuna* harvest is a regional marker as significant as the July mesquite harvest. *O. ficus-indica* is the dominant *nopal* species of central Mexican cuisine and the basis of the urban produce-market *nopal* trade; it was brought north into the Sonora-Arizona borderlands during the Spanish period and is now naturalized in places.

11 · Amaranth

A. hypochondriacus · *A. cruentus* · the grain harvest · the leaf-as-green tradition · popping

Amaranth is the grain crop that ripens on heat. Two species are relevant to the Dragoons: *Amaranthus hypochondriacus* — Hopi Red Dye is the canonical heritage variety, kept on the Hopi mesas for the deep red dye made from the bracts and now grown widely as a grain — and *A. cruentus*, the Mexican grain amaranth domesticated in central Mexico thousands of years ago. Both produce abundant small seed in dense plume-shaped seed heads from late summer through fall; both produce edible leaves through the growing season; both tolerate Dragoons heat and alkaline soil better than any wheat or oat ever planted here.

This chapter is the only home for amaranth in this library. The framing reference in *Guide 1* notes it as a heat-tolerant grain green; *Guide 10* notes blister beetle leaf damage; this chapter covers cultivation, harvest of seed heads, threshing and winnowing, popping, and the leaf harvest.

11.1 Variety reference

Variety · lineage	Species	Habit	Use	Notes
<i>Hopi Red Dye</i> (Hopi mesas)	<i>A. hypochondriacus</i>	4–6 ft tall, deep red plumes	Grain primary; bracts as red dye	The canonical Hopi variety. Striking in the bed. Grain is pale tan.
<i>Mercado</i> (Mexican)	<i>A. cruentus</i>	5–8 ft tall, red-purple plumes	Grain primary	Tall, productive, vigorous. The commercial-scale grain amaranth.
<i>Golden Giant</i> (selection from <i>cruentus</i>)	<i>A. cruentus</i>	6–8 ft tall, gold-tan plumes	Grain primary	Light-colored seed heads; productive.
<i>Plainsman</i> (USDA release)	<i>A. cruentus</i> × <i>A. hypochondriacus</i>	5–6 ft, semi-determinate	Grain primary	Bred for mechanical harvest; uniform maturity.

Variety · lineage	Species	Habit	Use	Notes
<i>Burgundy</i>	<i>A. hypochondriacus</i>	5-6 ft, deep red	Both leaves and grain	The variety to grow if you want to take the leaf-as-green tradition seriously.
<i>Hopi Black</i> (Hopi mesas)	<i>A. hypochondriacus</i>	5-7 ft, dark purple-black plumes	Grain	Less common; striking; Hopi heritage.

NS/S carries Hopi Red Dye and Hopi Black; Seed Savers Exchange carries most of the others.

11.2 Cultivation

Stage	Timing	Notes
Direct-sow	May 15 – June 15 (soil $\geq$ 65°F)	Or start indoors mid-April and transplant May
Spacing	12-18 in apart, 24 in between rows	Plants need room — overcrowded amaranth lodges in monsoon winds
Soil	Native Dragoons soil works; tolerates alkaline pH	Modest compost; not a heavy feeder
Watering	1 gal per plant per week through July	Drought-tolerant once established
Flowering	August onward	Plume heads form on terminal stems; lateral plumes follow
Seed harvest	September – October	Seed shatters once fully ripe — harvest before shatter peaks

Amaranth is among the easiest crops in this guide once it germinates. The seed is tiny and needs to be sown shallow ($\frac{1}{4}$ in or less) on a fine seedbed. Germination is fast (5-10 days) in warm soil. Self-sown amaranth from a previous year's seed-shatter is common; some growers maintain a permanent amaranth corner by letting one or two plants shatter each fall.

LOCAL TIP

On blister beetles. *Guide 10* notes blister beetles eating amaranth foliage; in the Dragoons, the Iron Cross blister beetle (*Tegrodera aloga*) and the three-striped blister beetle (*Epicauta vittata*) are seasonal but rarely catastrophic on amaranth. They prefer the leaves to the seed heads, so leaf-stage damage is more likely than grain-stage damage. Hand-pick into a bucket of soapy water; do not crush (blister beetles secrete cantharidin, which raises welts on bare skin).

11.3 Harvesting the seed heads

Amaranth seed ripens unevenly within a plume — the lowest flowers ripen first, the tips last. The harvest window is the narrow interval between “most seed is ripe” and “ripe seed has begun to shatter.” Visual cues: the plume color deepens, individual flowers shed their dry bracts when rubbed between fingers, and a gentle shake produces a small rain of seed.

The protocol:

1. **Cut whole seed heads** with pruners, leaving a 4-6 in stem. Late September into October in the Dragoons.
2. **Transfer to a paper bag or large basket** — never a plastic bag, which holds moisture and starts mold.
3. **Hang upside down** in a dry shaded place for 2-3 weeks. Loose seed collects in the bottom of the bag.
4. **Thresh the remaining seed** by rubbing the dry seed heads between gloved hands over a wide basin or clean tarp. The seed is small and pale; the chaff is the dry bract material around it.
5. **Winnow** in a steady light breeze, pouring the seed from one container to another about 18 in apart. The lighter chaff blows away; the heavier seed falls into the lower container. Repeat 4-6 times until the seed is clean.

A productive plant yields 1-4 oz of clean seed. A 50 sq ft amaranth patch yields 3-8 lb. Stored in a tight glass jar with a desiccant, the seed holds 5+ years.

11.4 Popping and other kitchen uses

Amaranth grain is popped, not boiled — though boiling works and produces a porridge similar to teff or quinoa. To pop:

1. **Heat a dry heavy skillet** (cast iron is ideal) over medium-high heat for 5 minutes.
2. **Drop 1 tablespoon of seed** into the hot skillet. Cover loosely.
3. **Shake constantly** for 15-30 seconds. The seeds pop into tiny white puffs — about a third their size when popped, but visibly transformed.

4. **Pour out immediately** into a bowl. Unpopped seed scorches if left in the pan.
5. **Repeat in small batches.** A larger batch reduces the surface heat and produces fewer pops.

Popped amaranth is a breakfast cereal in its own right, a base for the traditional Mexican confection *alegría* (popped amaranth bound with honey or piloncillo), and a topping for yogurt or salads. Unpopped, the grain cooks like quinoa: 1 cup grain to 2.5 cups water, simmer 20 minutes, eat as a porridge or savory side.

11.5 The leaf-as-green tradition

Amaranth was a leaf vegetable across pre-contact Mesoamerica and a leaf vegetable for the same reasons it is one in west Africa, India, and China today: it grows in heat that kills lettuce and spinach, the leaves are mild and useful, and a single plant produces leaves continuously from young-stage through bolting. *A. cruentus* and *A. hypochondriacus* both produce edible leaves; the related *A. tricolor* (Joseph's Coat, Red Garnet) is the specifically leaf-targeted species.

Pick young tender leaves from the upper third of the plant from June through August. Use the same way you would use spinach — sauté in oil and garlic, drop into soups, fold into omelets. The flavor is mild, slightly mineral, more interesting than spinach. Harvest moderately — stripping a plant of all leaves stresses it and reduces grain yield — and the same plant produces grain in the fall.

12 · Yucca

Yucca elata · *Y. baccata* · the flower stalk · the banana yucca fruit · fiber as bonus

Yucca is the perennial that does not ask anything of you. *Yucca elata* (soaptree yucca, *palmilla*) is the tall slender-trunked yucca with the long white flower spike that lights up the Dragoons grasslands in May and June; *Y. baccata* (banana yucca, *datil*) is the lower-clumping yucca with the large fleshy green-purple fruit that ripens August through September. Both are native, both produce food, both grow on the Dragoons bajadas and into the foothills, and neither needs to be planted — the right relationship with yucca is wild-harvest from established stands, the same way mesquite is.

This is the only chapter that covers yucca in this guide. *Guide 13* notes yucca's salt tolerance in passing; this chapter covers the edible parts in detail: the young flower stalk before it elongates, the flowers themselves in season, the *Y. baccata* fruit, and the fiber harvest as a side product of the food harvest.

12.1 Identifying the two species

Soaptree yucca (*Y. elata*). Single or branching trunk 6–15 ft tall, topped with a rosette of narrow grasslike leaves 24–36 in long. The leaves curl back and have fine fibrous edges (the *soap* in the name comes from a saponin-rich root, traditionally used as a hair-cleanser by Apache and O'odham peoples). The flower stalk emerges from the center of the rosette in May, elongates 3–6 ft in a few weeks, and bears dozens of large creamy-white bell-shaped flowers from May into June. Pods are dry capsules with hard black seeds — not edible.

Banana yucca (*Y. baccata*). Low clumping rosette with no trunk to speak of; leaves are stiffer, broader, more sword-like than *elata*, 18–30 in long. The flower stalk is shorter (2–4 ft) and emerges from the rosette April–May. The flowers are creamy with red-purple tinges. The fruit — the *datil* — is the food: 4–7 in long, banana-shaped, green-purple, fleshy and sweet when fully ripe in late summer. The fruit distinguishes *baccata* from every other regional yucca.

Species	Distribution in the Dragoons	Edible parts	Harvest season
<i>Y. elata</i>	Grasslands and lower bajadas	Young flower stalk (pre-bolt); flowers	April – June
<i>Y. baccata</i>	Higher bajadas, foothills, oak woodland	Young flower stalk; flowers; fruit	April – June (stalk/flower); August – September (fruit)

Species	Distribution in the Dragoons	Edible parts	Harvest season
<i>Y. schottii</i>	Higher elevations of the Dragoons (oak-pine ecotone)	Fruit (smaller than <i>baccata</i>)	September

12.2 The flower stalk — eaten young

The most overlooked yucca food is the young flower stalk, harvested before it bolts and before flowers form. Both *Y. elata* and *Y. baccata* produce a stalk that emerges as a fat tender central spike in spring; at the 6–18 inch stage, before any flower buds have differentiated, the stalk is tender and sweet — somewhere between asparagus and palm heart in texture, mild and slightly sweet in flavor.

Cut the stalk at the base with a sharp knife when it is still pliable enough to bend. Peel off the fibrous outer layer. The inner core is the edible part. Slice and steam, grill, or pickle.

A harvested stalk is the last flowering season for that rosette — the plant returns the following year. A wild-harvester takes one stalk from a clump of multiple rosettes, leaving the others to flower and reproduce.

12.3 The flowers in season

When the flower stalk is not harvested young and the plant proceeds to bloom, the open flowers themselves are edible. Pick fresh open flowers in the morning when they are firm and at their best — wilted flowers are mealy and not worth processing. Remove the bitter pistil from the center of each flower. The petals are sweet and slightly soapy in raw form; sautéed in butter or oil, the soapy edge disappears and the petals become a mild creamy vegetable. Drop into omelets, soups, or stir-fries.

A single yucca flower stalk produces 20–80 open flowers across a 2–3 week bloom. A modest harvest of 1–2 cups of flowers feeds a household for a single meal.

12.4 The banana yucca fruit

Y. baccata produces a fleshy fruit that is unlike anything else in the indigenous food complex of the region — large, sweet, banana-shaped, ripening green-purple on the plant from late August through September. This is the fruit that gives the species its name (*baccata* means berry-bearing in Latin; *datil* is the Spanish-language name throughout the borderlands).

The harvest stage: fruit is fully sized (4–7 in long), the skin has softened slightly, the color has deepened from bright green to dusky purple-green. A ripe fruit gives slightly to thumb pressure. Picked too early, the fruit is bitter and astringent; picked

too late, it splits and ferments on the plant.

Cut the fruit from the plant with pruners. Peel — the skin slips off a ripe fruit easily. Remove the central column of black flat seeds (inedible). The remaining flesh is sweet, dense, somewhere between a baked sweet potato and a date in texture. Eat fresh; roast over coals in the traditional way; or simmer down to a sweet paste for storage. A productive *Y. baccata* clump produces 4–15 fruits per year on different rosettes within the clump.

Apache and Western Pueblo traditions cooked *Y. baccata* fruit in earth ovens (similar to but smaller than the agave pit), producing a deep-cooked sweet paste that was sun-dried into cakes and stored for winter.

12.5 Fiber as a side product

Yucca leaves carry strong long fibers that have been used across the Southwest for cordage, sandals, baskets, and brushes for thousands of years. The fiber harvest is compatible with the food harvest — leaves can be taken from any rosette that has been harvested for flower stalk or that has already flowered and is regrowing.

The protocol: cut leaves at the base. Soak in water for 3–7 days; the soft green pulp softens and the fibers remain. Pound the soaked leaves with a smooth rock or mallet on a hard surface; the pulp breaks down and rinses away; the fibers remain. Air-dry. The result is a bundle of long pale fibers, suitable for spinning into cordage or weaving into coarse cloth.

For most modern households, fiber preparation is more curiosity than necessity. But the option is there — a yucca clump on a Dragoons property line produces food, drink, and fiber, with the only input being a sharp knife and the patience to identify the right harvest stage.

On wild-harvesting yucca. *Yucca* grows slowly. A clump of *Y. baccata* may be 50–100 years old; a *Y. elata* trunk that is 12 ft tall is older still. The harvest ethic is the same as for Chiltepin and mesquite — take part of what each plant offers, not all of it; leave the reproducing flowering portion alone; and never harvest in a way that damages the rosette or the trunk. A household using yucca foods regularly should identify three or four clumps within walking distance and rotate among them rather than harvesting the same clump year after year.

13 · A native annual calendar

The year as the indigenous crops actually run it · pulled together from the chapters above

The crops in this guide do not all share the same calendar. The cultivated annuals (beans, corn, peppers, squash, devil's claw, amaranth) follow the standard sow-grow-harvest arc but with monsoon-keyed timing in the case of tepary and O'odham corn. The perennials follow harvest-only calendars — agave, mesquite, prickly pear, and yucca each have their own narrow windows. This chapter compiles all of them into one annual view.

Month	Cultivated annuals	Perennials & wild-harvest
Jan	Plan blocks; order seed from NS/S and TOCA.	Agave: continued maturity assessment of multi-year rosettes; first frost-sweetened tunas may persist on prickly pear.
Feb	Last seed orders. Order tepary, O'odham corn, Hopi Blue early — they sell out by April.	Quiet month. Prune dead agave leaves if needed.
Mar	Soil prep on bean and corn beds.	Mesquite leafing out late month.
Apr	Direct-sow cool-tolerant amaranth (mid-April). Devil's claw indoors mid-month for early start.	Mesquite blooming; bees working.
May	Direct-sow long-season corn (<i>Bloody Butcher</i> , <i>Glass Gem</i>); plant <i>Hopi Blue</i> and <i>Painted Mountain</i> mid-month; sow native squash and amaranth direct in beds. Common beans (Anasazi, Hopi Yellow Lima) at this window if going by Guide 7 pattern.	Yucca flower-stalk harvest window opens late month.
Jun	Devil's claw transplanted out. Squash establishing. Corn knee-high; side-dress N. Tepary BED PREP — do not sow yet, do not pre-irrigate.	Yucca flower-stalk peak. <i>Y. elata</i> flowers ripening. Mesquite pods green and forming.

Month	Cultivated annuals	Perennials & wild-harvest
Jul	Watch the monsoon. First substantial storm ($\geq$ 0.5 in) is the tepary sow signal; sow within 48 hours. Sow O'odham 60-day corn same week.	Mesquite harvest begins late month — pods turn yellow-tan. Test for sweetness; harvest is July 25 – August 25 in a typical year.
Aug	Tepary flowering on monsoon humidity. Long-season corn tasseling. Devil's claw flowering. Amaranth flowering.	Mesquite harvest peak. Banana yucca (<i>Y. baccata</i>) fruit sizing.
Sep	Squash filling out. Corn drying on stalk (early varieties). Tepary podding up. Chiltepin flowering or fruiting if you have a wild bush.	Prickly pear tuna harvest — September is the canonical month. Banana yucca fruit ripening.
Oct	Harvest dry beans (tepary, Anasazi, Hopi Yellow); harvest corn after kernel-dent (the <i>milk-line test</i> in <i>Guide 7 §9.6</i>); cut amaranth seed heads; cure winter squash 10 days at 80°F.	Chiltepin harvest peaks — pea-sized red berries, dry on the bush. Prickly pear tuna continues.
Nov	Thresh and clean amaranth seed; hand-shell beans; finish curing squash; mill mesquite if not done. Frost ends most field work.	Prickly pear cleanup; chiltepin late harvest as berries dry on the bush. Agave roast — traditional fall pit-roast window.
Dec	Inventory seed; assess saved-seed quality; begin planning next year's blocks.	Quiet. Identify candidate agaves for the following year's harvest by their stalk emergence.

A few patterns this table reveals:

- **The native calendar peaks in late summer and fall.** The cultivated annuals harvest in October. The perennials harvest from July (mesquite) through November (agave). The dead months are January through April — exactly when the European crops in Guides 6 and 7 are planning, sowing indoors, and transplanting. The two calendars stagger cleanly.

- **The monsoon is the central event.** Tepary, O’odham corn, devil’s claw, amaranth, and the entire wild perennial complex either time to the monsoon or depend on it. A Dragoons garden that integrates native crops is structurally less drought-vulnerable than one that doesn’t.
- **The fall harvest is processing-intensive.** A working native-crops garden in October and November is busy threshing, milling, drying, and curing — different work from the canning and freezing of *Guide 12* but compatible with it. The two harvest workflows share equipment (dehydrator, grinder, jars) and use the same months.

LOCAL TIP

Stagger your blocks. A garden running 50 sq ft of tepary, 100 sq ft of corn (any variety), 20 sq ft of amaranth, and an established wild Chiltepin or two — plus access to a mesquite tree, a prickly pear patch, and a yucca clump — is producing meaningful food on a footprint smaller than a single cultivated tomato row. The land does most of the work. The grower’s job is to be there for the harvest windows.

14 · Sources & references

Where to buy seed and where to read deeper · the canonical literature · cross-references within the library

14.1 Seed sources — by crop

Crop	Tier 1 (canonical)	Tier 2 (supplementary)
Tepary (brown, white)	Native Seeds/SEARCH; Tohono O'odham Community Action	Seed Savers Exchange
Anasazi, Hopi Yellow Lima, Hopi Black Turtle	Native Seeds/SEARCH	Adaptive Seeds (OR); Seed Savers Exchange
Hopi Blue, Painted Mountain, O'odham 60-day	Native Seeds/SEARCH	Seed Savers Exchange (Painted Mountain); Baker Creek (Glass Gem)
Bloody Butcher, Glass Gem	Baker Creek; Seed Savers Exchange	Native Seeds/SEARCH (Glass Gem)
Chiltepin	Native Seeds/SEARCH (wild seed); locally collected from established bushes	Cross Country Nurseries (mail-order plants)
New Mexico landrace chiles (Chimayo, Espanola Improved)	Native Seeds/SEARCH; New Mexico State University Chile Pepper Institute	Plants of the Southwest (Santa Fe)
Native squash (Cushaw, Tarahumara Pumpkin, Tohono O'odham Yellow-Meated)	Native Seeds/SEARCH	Seed Savers Exchange
Devil's claw	Native Seeds/SEARCH	Plants of the Southwest
Mesquite	Wild-harvested locally — no seed purchase required	Trees of Antiquity (rooted velvet mesquite cultivars)
Agave	Wild-harvested pups, or specialty nurseries (Civano Nursery, Tucson; Mountain States Wholesale)	Plants of the Southwest
Prickly pear (<i>O. ficus-indica</i> spineless types)	Civano Nursery, Tucson; Plants of the Southwest	Cuttings from local established patches
Amaranth (Hopi Red Dye, Mercado, grain types)	Native Seeds/SEARCH; Seed Savers Exchange	Adaptive Seeds; High Desert Seed

Crop	Tier 1 (canonical)	Tier 2 (supplementary)
Yucca (<i>Y. elata</i> , <i>Y. baccata</i>)	Wild on the land — already present in most Dragoons properties	Plants of the Southwest

14.2 Reading deeper

The literature foundation for this guide, repeated from §2 for the reference reader:

- Gary Paul Nabhan, *Growing Food in a Hotter, Drier Land* (2013). The canonical reference. Cited throughout.
- Gary Paul Nabhan, *Gathering the Desert* (1985). The wild food complex.
- Gary Paul Nabhan, *Enduring Seeds* (1989). On seed conservation.
- Gary Paul Nabhan, *Food from the Radical Center* (2018). On collaborative restoration.
- Carolyn Niethammer, *Cooking the Wild Southwest* (2011). Recipes for wild foods.
- Carolyn Niethammer, *American Indian Cooking* (2018 reprint). Cultural cookbook.
- Wendy Hodgson, *Food Plants of the Sonoran Desert* (University of Arizona Press, 2001). The botanical reference, encyclopedic.
- Amadeo Rea, *At the Desert's Green Edge* (1997). Akimel O'odham (Pima) ethnobotany.
- Daniel Moerman, *Native American Ethnobotany* (1998). The comprehensive North American reference; useful for cross-checking less-common uses.

14.3 Web and organizational references

- **Native Seeds/SEARCH** — nativeseeds.org · seed bank and retail; the regional anchor.
- **Tohono O'odham Community Action (TOCA)** — tocaonline.org · O'odham food sovereignty; tepary and cholla bud products.
- **Hopi Tutskwa Permaculture** — hopitutskwa.org · Hopi seed and agriculture education.
- **University of Arizona Cooperative Extension, Cochise County** — Sierra Vista office; regional growing-season data, soil testing referrals.
- **Chile Pepper Institute, NMSU** — cpi.nmsu.edu · the academic home for New Mexico landrace chiles.
- **Borderlands Restoration Network** — borderlandsrestoration.org · Patagonia, AZ; native plant restoration ecology, useful for the sky-island ecosystem context.

14.4 Within the library

Every chapter in this guide cross-references one or more of the other guides. The full cross-reference index:

This guide	Other guide
\$3 Beans — cultivation (bed prep, inoculation, snap vs dry harvest, common-bean watering)	<i>Guide 7 §8</i>
\$4 Corn — cultivation (block planting, isolation, pest management, sweet-corn pattern for comparison)	<i>Guide 7 §9</i>
\$5 Chiltepin — drying methods	<i>Guide 2 §9</i> (pepper drying); <i>Guide 12 §3.1</i> (chile-drying detail)
\$5 NM landrace chiles — cultivation as cultivated <i>C. annuum</i>	<i>Guide 2 §5–§7</i> (full pepper cultivation arc)
\$6 Native squash — cultivation, storage curing	<i>Guide 7 §6</i> (cucurbit family); <i>Guide 12 §6.2</i> (squash storage)
\$8 Mesquite flour — kitchen use	<i>Guide 12</i> (preservation reference includes mesquite flour)
\$9 Agave — soil tolerance	<i>Guide 13 §RO</i> (salt-tolerant species list)
\$10 Prickly pear — vinegar	<i>Guide 4 §3.2.1</i> (prickly pear vinegar pH-down recipe)
\$11 Amaranth — blister beetle pressure	<i>Guide 10 §6</i> (blister beetle catalog)
\$13 Calendar	<i>Guide 1 §9</i> (master multi-crop calendar) — read this guide’s calendar alongside that one

15 · Closing

The native food complex of the Sonoran-Madreaan region is not a museum collection. It is a working agricultural inheritance — varieties that ripen reliably on a calendar Cochise County still has, on water Cochise County still gets, on soil Cochise County still produces. The Dragoons sit at the eastern edge of its range and at the same time at a junction where four agricultural traditions converged. A garden here is the right scale for that inheritance: small enough to be intimate with the seasons, large enough to integrate a meaningful proportion of native crops alongside the European ones in Guides 6 and 7.

The grower who plants a row of tepary in a wet July, picks Chiltepin off a wild bush in October, mills mesquite pods in August, and roasts an agave heart in November is not doing anything novel. They are doing what the people of this place have done for at least four thousand years. The library treats that continuity as one of its central commitments. This guide is the place in the library where the continuity becomes most explicit.

A starting point. If you are new to native crops, pick three: a 20-ft row of *Brown Tepary*, a small block of *Painted Mountain* corn, and either a wild Chiltepin you've identified on a hike or an *Opuntia ficus-indica* pad you've planted from a cutting. That is enough to anchor a fall harvest, to teach a season's worth of native-crop rhythm, and to land you in conversation with Native Seeds/SEARCH about what you'd grow next. Everything else in this guide builds outward from a starting block like that.

The other guides in the library will tell you how to grow more pounds per square foot, how to extend the season into December, how to fight harlequin bug, how to test your water. This guide will tell you what was already here when those questions started being asked, and what the answers look like when you let the land carry more of the work. Both halves of the library matter. The Dragoons are big enough for both.

— Guide 15, completed 2026-05-17
Dragoon Mountains, Cochise County, Arizona