SKILL GUIDE · WATER & FOOD

Improvised Cold Storage: Root Cellars & Evaporative Cooling

The Water & Food chapter's Skills to Build section names "root cellaring" as part of food preservation without relying on grid electricity, without explaining how. This guide is that explanation: the actual temperature and humidity targets by crop, four real construction methods ranging from a buried trash can to a full earth-bermed cellar, and an honest look at what evaporative cooling can and can't do, since it's genuinely oversold online.

The real targets: temperature and humidity by crop

"Cold storage" isn't one target; different crops fail in different ways if the humidity is wrong, even at the right temperature. These figures come from university extension research, not general folk advice.

Crop group	Temperature	Humidity	Examples
Cold & very moist	32–40°F	90–95%	Beets, carrots, parsnips, turnips, celery, winter radishes, leeks, Jerusalem artichokes
Cold & moderately moist	32–40°F	80–90%	Potatoes, cabbage, apples
Cool & dry	32–50°F	50–60%	Garlic, onions

Getting the humidity wrong in either direction fails differently than getting the temperature wrong: too dry and root vegetables shrivel; too damp (or too little airflow) and mold takes over. Shelves standing 1–3 inches off the walls, not flush against them, are what actually keep air moving enough to prevent that.

Four ways to actually build this, by effort and property type

Method	Effort	Best fit
Buried galvanized trash can	Low, a weekend	Small harvest, no basement, renters or small yards
Insulated box against a north wall (garage, shed, porch)	Low–moderate, no digging	Suburban homes with an unheated outbuilding, climates where winter lows stay near 32–50°F
Window well conversion	Moderate	Homes with an existing, unused basement window well
In-ground or earth-bermed walk-in cellar	High, real excavation	Larger harvests, a permanent Tier 3 setup, enough yard and the right water table

The **buried trash can** version: drill drainage holes in the bottom, set it in a gravel-lined hole with 3–4 inches of the rim above grade, and layer produce inside separated by straw, topped with a lid, then a foot of straw, then a weighted tarp. The **insulated box** version needs plywood or rigid foam construction, protection from rain, rodents, and direct sun, and enough ventilation to avoid condensation, since it's relying on the surrounding unheated space staying in range rather than the earth's own temperature. A full **walk-in cellar** needs its floor at least 4 feet below the surrounding grade to reach stable earth temperature, and its footing dug below the local frost line, not just deep enough to look sufficient.

The **window well conversion**: pick a well on the north side of the house if there's a choice, less sun exposure means a more stable temperature. Remove the window's glass and replace it with an insulated panel, a sandwich of 1-2 inch rigid foam board glued between two layers of half-inch exterior-grade plywood, with vent holes cut through it and screened to keep out insects and mice. Cover the well itself with a sheet of OSB or plywood, weighted down, with a layer of straw bales on top for extra insulation, and insulate the well's own side walls with rigid foam if the basement side of that wall runs warmer than you want the produce to see; a warm basement wall bleeding heat into the well defeats the purpose otherwise.

The traditional zero-structure option: a potato clamp

For a large one-time harvest with no cellar at all, a **clamp**, an outdoor mound, is a real, centuries-old method that saw wide use again during WWII food rationing. Lay 6–8 inches of straw on bare soil, pile produce on top as steeply as it will hold (roughly 32–40 inches high), cover with another 6–8 inches of straw, then cap the whole mound with 6–8 inches of packed soil. Leave straw exposed at ground level and poke a few straw "chimneys" through the soil cap every few feet; the point is a slow upward airflow that vents excess moisture without losing the earth's insulating heat. A shallow drainage ditch dug around the base, with that soil used for the cap, keeps the clamp from sitting in standing water.

Evaporative cooling: real, but genuinely climate-dependent

A **zeer pot** (a porous unglazed clay pot inside a slightly larger one, wet sand packed between them, a damp cloth over the top) cools by evaporation: as water pulls out through the porous clay and evaporates, it draws heat from the inner pot. It requires no power and almost no material cost, and real research backs a genuine effect: pot-in-pot systems average a 15–27°F drop below ambient temperature, with average cooling efficiency around 67%. Build it with an outer pot roughly 2 inches wider in diameter than the inner one, and pack wet sand into that gap on all sides, plus a 1-2 inch layer in the bottom, keeping both pots' rims level with each other (or the inner one just barely higher). Keep the sand saturated, not just damp, and cover the open top with a wet cloth; the whole system's cooling comes from that sand and cloth actually evaporating, not from the clay alone.

> **WARNING**
>
> **A zeer pot does not get as cold as a refrigerator, and most online claims oversell it**
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> A modern refrigerator holds roughly 39°F. A zeer pot's best documented case, under true desert conditions (10–30% relative humidity, ambient temperature under about 65°F), reaches only around 43°F. Under more ordinary hot, dry conditions it typically lands closer to 55–60°F, still enough to meaningfully extend produce life, but a genuinely different, warmer target than "refrigeration." It also needs upkeep most fridges don't: water added one to three times a day, and a shaded, well-ventilated spot, since wind speed and evaporation surface area are what actually drive its performance.

The harder limit: evaporative cooling barely works at all above roughly 40% relative humidity, since the air is already too saturated to pull much more moisture out of the sand. That makes it a poor fit for the humid Southeast or Gulf Coast, and a genuinely good fit for arid and semi-arid Western climates, including Utah's, where summer relative humidity commonly runs well under that threshold.

Two mistakes that ruin otherwise correct storage

- **Storing apples (or other fruit) next to potatoes.** Ripening fruit gives off ethylene gas, which speeds up sprouting in potatoes and hastens spoilage generally. Keep ethylene producers, apples, pears, peaches, tomatoes, away from root vegetables entirely, or wrap the fruit to cut down on the gas that escapes.
- **Skipping the potato curing step.** Potatoes need 7–10 days in a warm, dark spot right after harvest to toughen their skins before they go into cold storage; moving them straight to 32–40°F skips that step and shortens real storage life. Note also that grocery-store potatoes are usually treated with a sprout

inhibitor and won't behave the same way homegrown potatoes do, worth knowing if testing a storage method before a real harvest.

Situational option: a spring house

If a property has an actual flowing spring, a small structure built directly over or beside it, using the constant year-round temperature of spring water (commonly 40–50°F) for cooling, is a genuine traditional method with centuries of use. It isn't something to build from scratch without a real spring; it's listed here for completeness, not as an option most households can pursue.

Northern Utah note: check your actual frost-line depth before digging a permanent cellar

Required footing depth (a reasonable proxy for how deep the ground actually freezes) varies significantly even within the state: 30 inches is the common minimum across Salt Lake, Davis, and Utah counties, 18 inches in St. George, and 36–48 inches or more at higher elevations like Park City. A cellar floor that doesn't clear this depth risks freezing produce in a hard cold snap regardless of how well-insulated the structure above it is. Confirm the exact figure for your specific jurisdiction with your county building department rather than assuming the valley-floor number applies everywhere.

Sources

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